There is No Question of Physicalism

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1. *What is physicalism?*

Many philosophers are impressed by the progress achieved by physical sciences. This has had an especially deep effect on their ontological views: it has made many of them physicalists. Physicalists believe that everything is physical: more precisely, that all entities, properties, relations, and facts are those which are studied by physics or other physical sciences. They may not all agree with the spirit of Rutherford's quoted remark that 'there is physics; and there is stamp-collecting',[1] but they all grant physical science a unique ontological authority: the authority to tell us what there is.

Physicalism is now almost orthodox in much philosophy, notably in much recent philosophy of mind. But although often invoked, it is rarely explicitly defined. It should be. The claim that everything is physical is not as clear as it seems. In this paper, we examine a number of proposed definitions of physicalism and reasons for being a physicalist. We will argue both that physicalism lacks a clear and credible definition, and that in no non-vacuous interpretation is it true.

We are concerned here only with physicalism as a doctrine about the *empirical* world. In particular, it should not be confused with nominalism, the doctrine that there are no universals.[2] Nominalism and physicalism are quite independent doctrines. Believers in universals may as consistently assert as deny that the only properties and relations are those studied by physical science. And nominalists may with equal consistency assert or deny that physical science could provide enough predicates to describe the world. That is the question which concerns physicalists, not whether physical predicates name real universals. (We will for brevity write as if they do, but we do not need that assumption.)

As we will understand it, then, physicalism is not a doctrine about universals or other abstract objects, but about the empirical world, and specifically about minds. It says that mental entities, properties, relations and facts are all really physical. The mental is physicalism's chief target; but one we think it does not hit.

Physicalism is a kind of monism, opposing the dualist's distinction between two kinds of substance: matter and mind. As such, it is descended

[1] C. Longuet-Higgins, 'The Failure of Reductionism', in C. Longuet-Higgins *et al.*, *The Nature of Mind*, Edinburgh, Edinburgh University Press, p. 16

[2] *Pace* H. H. Field, *Science Without Numbers*, Oxford, Blackwell, 1980 and B. Stroud 'The Physical World', *Proceedings of the Aristotelian Society*, 1987, p. 264.

from *materialism*: the view that everything is matter—for instance, the view that nothing exists but collections of atoms in the void—as opposed say to Cartesian dualism, which held that as well as matter (extended substance) there is also mind (thinking substance). Many physicalists take their doctrine to be a modern version of materialism: defending the hegemony of modern matter against the mysteries of mental substance and of mind/matter interaction.

But physicalism differs significantly from its materialist ancestors. In its seventeenth-century form of mechanism, for instance, materialism was a metaphysical doctrine: it attempted to limit physics a priori by requiring matter to be solid, inert, impenetrable and conserved, and to interact deterministically and only on contact. But as it has subsequently developed, physics has shown this conception of matter to be wrong in almost every respect: the 'matter' of modern physics is not all solid, or inert, or impenetrable, or conserved; and it interacts indeterministically and arguably sometimes at a distance. Faced with these discoveries, materialism's modern descendants have—understandably—lost their metaphysical nerve. No longer trying to limit the matter of physics a priori, they now take a more subservient attitude: the empirical world, they claim, contains just what a true complete physical science would say it contains.

But this raises two questions. What is physical science: that is, what sciences does it comprise? And what gives it this ontological authority? In other words, what entitles certain sciences to tell us *in their own terms* what the world contains—thereby entitling them to the physicalist's honorific title 'physical'?

'Physical science' so construed certainly includes physics proper. Physics is the paradigm (hence 'physical'). And chemistry, molecular biology and neurophysiology are also indisputably physical sciences. But not psychology, sociology, and economics. One may debate the exact boundary of physical science: but unless some human sciences, of which psychology will be our exemplar, lie beyond its pale, physicalism, as a doctrine about the mind, will be vacuous.

What puts psychology beyond the pale of the physical? Not the a priori metaphysics of seventeenth-century materialism, since that has been refuted by physics itself. Nor the materialist's denial of mental substance. Psychology can—and mostly does—deny that too: but it still does not count as a physical science. The question of whether there is 'mental substance' as well as 'physical substance' is an irrelevant one. For that contrast of substances is really a contrast between their characteristic properties: between thinking, say, and being extended. A merely thinking substance is not a physically respectable entity because thinking is not a physically respectable property. But why not? What, if not the metaphysics of materialism, prevents the empirical psychology of thought, and of other mental phenomena, adding in its own terms, as physics does, to our inventory of what there is?

It is often said that the human sciences have produced fewer results than the admittedly physical sciences. Their laws are said to be few and ill established, and their theories to proliferate, and to predict far less than those of gravity, say, or of molecular biology. Perhaps this paucity of results provides an epistemic basis for denying that psychology and the rest are physical—that is, entitled to tell us what there is. Perhaps they are just not good enough.

But that cannot be why psychology lacks the ontological authority of physics, chemistry and the rest. There are, as we shall see, many well-established psychological laws. And anyway, this epistemic argument is the wrong way round. Those who think psychology is epistemically suspect do so *because* its subject matter is not physical, and not vice versa. In other words, they have some other basis for taking physical science to exclude psychology, a basis from which psychology's epistemic inferiority is supposed to follow. And it is really quite obvious that this basis is not epistemic. For accepting the results of psychology does not entail accepting them as *physical*: on the contrary, the more such results physicalists accept, the more they reckon they have to explain (or explain away) in non-psychological terms.

The bounds of the physical are in fact set from the outside. Something about the mental is supposed to deprive psychology of the ontological authority of physics and chemistry. But what? What prevents psychology from telling us in its own terms what kinds of mental things and events there are? There are a number of answers to that question: but none, we shall argue, justifies the prima facie exclusion of psychology from the realm of the physical which is needed to make physicalism a non-vacuous doctrine about the mind.

2. *Reduction to physics*

To assess physicalists' reasons for dismissing psychology as non-physical, and thus ontologically inconsequential, we must ask what makes them classify their favoured sciences as physical. What makes them count as physical not only the many diverse branches of physics itself (mechanics, electromagnetism, thermodynamics, gravity, and particle physics), but also sciences like chemistry and molecular biology?

One common answer is that these other sciences are physical because they *reduce* to physics, which for present purposes we may take to mean that a physics enhanced with suitable bridge principles (to link its vocabulary to theirs) would entail credible approximations of all their established laws.[3]

Some theories in other physical sciences have indeed been reduced to

[3] See e.g. C. G. Hempel, *Philosophy of Natural Science*, Englewood Cliffs, NJ, Prentice-Hall, 1966, ch. 8.

physics in this sense,[4] but by no means all. But those for whom reduction to physics is the touchstone of the physical do not propose to do it in practice. They simply insist that it can be done 'in principle'. But what is the principle? It cannot be physicalism. These sciences cannot be reducible in principle *because* they are physical if reducibility in principle (RIP) is supposed to tell us where the bounds of the physical lie. So what other principle will tell us which sciences could 'in principle' be reduced to physics?

To answer this, we must first ask to *what* physics the RIP principle is supposed to be applied: to present physics, or to some hypothetical future physics? This question poses a dilemma. For applying the principle to present physics entails that any future extensions of it would not be physical: that physics, the paradigm physical science, is already complete. But no one believes this. And if we apply the principle to an otherwise unspecified future physics, we shall not be able to say which sciences are physical until we know which of them *that* physics must cover—which is just what the principle was supposed to tell us. To use RIP to future physics to say what that physics must cover if it is to cover everything physical is obviously viciously circular. So the physical cannot be defined as what is reducible in principle to physics, either present or future.

We think the RIP principle's specious appeal actually rests on two other prejudices. One is the old dream of the 'unity of science', of being able to derive all scientific laws from one 'ever more adequate grand scheme'.[5] But we see no reason either to believe in or to aim for such a scheme. The world even of the admittedly physical sciences contains a vast number of very different kinds of entities, properties and facts. That is why so many different sciences, using widely different methods, are needed to study them. No one could think astrophysics and genetics unified even in their methods, except under the most abstract descriptions of scientific methodology. And in their contents, they display no more unity than that of a conjunction. Nothing wrong with that: but then why cannot psychology supply another conjunct?

But even if some 'unity of science' thesis were credible, it would not enable the RIP principle to define the physical. For even physics proper is not unified. Maybe it will be some day; but even if it is not, physicalists will still accept gravity, quantum and electromagnetic phenomena as physical, to be identified and described in their own terms by independent physical sciences. Similarly for the sciences of chemical, biological, and neurophysiological phenomena. So why not for psychology, the science of mental phenomena?

[4] See M. Friedman, 'Theoretical Explanation', in R. Healey (ed.), *Reduction, Time and Reality*, Cambridge, Cambridge University Press, 1981.

[5] H. Feigl, 'Physicalism, Unity of Science and the Foundations of Psychology' (1963), in his *Inquiries & Provocations*, ed. R. Cohen, Dordrecht, Reidel, 1981, p. 315.

The other source of the RIP principle's appeal is the idea that there is really no more to things than the smallest particles they are made up of. Let us call this thesis 'microreduction', or 'MR' for short.[6] The idea is very persistent. Take Eddington's two tables: his commonplace one, with extension, colour, and permanence, versus his 'scientific' one, nothing but myriad minute particles in empty space: the table which 'modern physics has by delicate test and remorseless logic assured me . . . is the only one which is really there'.[7] Or more recently, McGinn's claim that science tells us that the way things are is very different from the way they look. The table that looks and feels so solid is, he thinks physics tells us, really full of holes.[8]

Now the study of the smallest entities is indeed traditionally called 'physics': departments of physics have by long established custom cornered that particular market. And this makes MR say that the empirical world is physical, since it consists only of its smallest particles. We are back with the doctrine of atoms in the void—or at least, in the field—which count as physical simply because they are microscopic.

The fact that physics by mere convention includes the study of the very small does indeed trivially entail that everything extended in space either is physical or has some physical parts; and for some, this trivial truth is all that physicalism means.[9] But for physicalism so defined to be non-vacuous, one must also take these smallest things to be all there is. But what reason is there to think this? Why should we suppose the existence of sub-atomic particles to require the non-existence of atoms, molecules, tables, trees, or tennis rackets, figs or fast food restaurants—or animals or people with minds?

Proponents of MR can of course distinguish our non-existence from that of, say, unicorns. There are undoubted facts which at least appear to be about us, whereas there are no such facts apparently about unicorns. And of course, since physics itself also studies very large things—galaxies, quasars, etc.—MR is also obliged to say why facts about even these admittedly physical things are different from facts about unicorns on the one hand and facts about sub-atomic particles on the other. What MR actually does say is that all these facts—about galaxies, minds, and the rest—*reduce* to facts about their sub-atomic parts. So those parts are all there is, perhaps because we need not quantify over anything else in order to state all the facts—and we think with Quine that we should not multiply entities beyond quantificational necessity.[10]

[6] G. Schlesinger, *Method in the Physical Sciences*, London, Routledge & Kegan Paul, 1963, ch. 2.

[7] A. S. Eddington, *The Nature of the Physical World*, Cambridge, Cambridge University Press, 1929, pp. xi–xiv.

[8] C. McGinn, *The Subjective View*, Oxford, Clarendon Press, 1983, ch. 7.

[9] G. P. Hellman and F. W. Thompson, 'Physicalism: Ontology, Determination and Reduction', *Journal of Philosophy*, 1905.

[10] W. V. O. Quine, 'On What There Is', in his *From a Logical Point of View*, Harvard University Press, 1953.

But this appeal to reduction shows that MR itself needs a strong form of the very RIP principle it is supposed to support. And it cannot have it. For unless the sciences of the relatively large, including psychology, reduce to microphysics, we shall still need to quantify over entities described in those sciences' terms. But in fact, as we shall now show, even the *physics* of the relatively large does not reduce to microphysics. So even if all sciences were reducible in principle to physics, this would not entail that the smallest particles are all there is: MR would be false, even if the RIP principle were true. So the RIP principle cannot be used to support MR.

What *is* true is that facts about parts often explain facts about wholes. As a thesis about explanation, MR is often a good working hypothesis. But it is not always verified, even in microphysics. If for example we take the quantum mechanical description of a quantum ensemble to be complete (as orthodox interpretations do), the superposition principle entails that its properties will not be a function only of those of its isolated constituents plus relations between them. Orthodox quantum physics is not microreductive. And some physics is positively *macro*reductive: Mach's principle, for example, which makes the inertial mass even of microparticles depend on how matter is distributed throughout the universe. We realize of course that Mach's principle and orthodox quantum theory are controversial, and that a future physics might well abandon them. But they cannot be abandoned because they conflict with an MR entailed by modern microphysics: since, as they show, it entails no such thing.

And even in the most ordinary physics, MR does not always hold. It is indeed usually true that where the parts of something go, the whole thing must go too: that a gas sample must go where its molecules go. But equally, its molecules must go where it goes: since any that do not will thereby cease to be *its* molecules. And that is not the only way in which a gas's molecules are as much governed by it as it is by them. Suppose for instance that our sample's volume is suddenly halved at a constant temperature. If the gas is ideal, Boyle's law entails that when its pressure settles down again it will be twice what it was. That law does not dictate all the interim behaviour of the sample's molecules—except that it must be such as will eventually double the sample's pressure. That much of their behaviour is determined—and thereby explained—*macro*reductively by a law governing the sample as a whole.

So even as a principle of explanation, MR does not always hold, even in physics. Its explanatory value cannot therefore support it as an ontological thesis. A fortiori, it cannot support physicalism. But it could not even do that if it were true. For no true reading of MR could entail that macroscopic entities, and their properties and relations, are *impugned* by being linked by laws to properties and relations of their smaller parts. They cannot be. For if they were, there would have to be some smallest entities, without parts: that is, a limit to the small-scale structure of matter.

But there clearly need be no such limit. So the existence of the currently smallest known particles could not be refuted by the discovery of even smaller ones inside them. But then atoms too must be able to co-exist with their sub-atomic parts, molecules with their atoms, and so on, up to tables, trees—and us. The existence of animals and people, with their psychological and social properties and relations, cannot be denied just by crediting them with parts small enough to matter to microphysics.

The fact that physics takes in the very small has fostered the myth that it is a universal science in a sense in which others—like psychology—are not universal but merely 'special sciences'.[11] It has fostered this myth because it makes everything bigger than a point have (or have parts small enough to have) properties that are physical by mere definition. In a similar way, everything that moves has physical properties, such as inertial mass, just because physics by definition includes the science of mechanics. But that does not make these sciences *universal*, in the sense of encompassing all the properties and relations of things; nor *basic*, in the sense that other sciences must reduce to them. In any sense that would support a non-vacuous definition of the physical, which is what physicalism needs, mechanics and microphysics are no more universal or basic than psychology is. They are merely the special sciences of motion and of the very small.

In short, if the phenomena of psychology are less ontologically acceptable than those of physics and chemistry, it cannot be because psychology is irreducible to present or future physics. Reducibility to physics, or to microphysics, is a hopeless test of the ontological authority of a science: a test which not even a physicalist can apply consistently. For as we have seen, reducibility in practice is neither feasible nor to the point; while those who claim reducibility 'in principle' either beg the question or appeal to principles, of the unity of science or of microreduction, which modern physics itself denies.

3. *Mental causation and intentionality*

How else might physical (that is, ontologically authoritative) science be defined so as to exclude psychology? Perhaps by causation, which many think is essentially physical. Perhaps the physical just is the causal, and what physicalism really means is that the empirical world comprises all and only those entities, properties, relations, and facts which have causes or effects. This definition clearly underlies one familiar formulation of the mind–body problem: how can mental states have effects in a physical world? This question would not pose such a problem if it were not assumed that causation is essentially non-mental.

[11] See J. A. Fodor,'Special Sciences', *Synthèse*, 1974.

But why should we assume this? It is surely obvious that there is plenty of mental causation. Suppose you see a friend, and this causes you to wave to him: how? Something like this: light is reflected from him onto your retina; impulses travel up your optic nerve; your striate cortex processes the information carried by them; you form (somehow) the belief that your friend is there; this makes you form the intention to greet your friend; that makes certain things happen in your motor systems; they cause your arm to rise . . .. Both physical and mental facts seem equally involved in this chain of causation. How then can a physicalism defined by causation exclude these apparently mental causes and effects?

It is indeed an old thought that mental causation is hard to make sense of, and especially causation linking the mental to the non-mental, because they seem to be so different. But why should that impress anyone who has learned from Hume that causation never 'makes sense': that it is always a matter of fact, not of reason? Nothing in either Humean or other modern analyses of causation forces causes to be like their effects; nor does anything in them stop causes and effects being mental.

Take the requirement that token causes and effects be localized in space and time, so that they can be contiguous (or, if need be, dense or continuous) and so that one can precede the other. Token sensations and even token thoughts can certainly be localized enough for that (since localizing a token thought no more localizes its unlocalizable abstract content than localizing a red object localizes the abstract colour red). Nothing about the mental prevents people's token thoughts, feelings, and sensations being wherever and whenever those people are, in order to be where they can have the immediate and therefore contiguous mental and non-mental causes and effects which they clearly appear to have.

Other common demands on causation are also just as easily met by mental as by non-mental causes and effects: for instance, the demand that causes be in the circumstances sufficient for their effects, or necessary (or both); or that they make their effects more probable than they would have been without them; or that causal relations instantiate laws. It is hard to see why any such condition should present any obstacle to the existence of mental causes and effects.

If there is a problem with mental causation, it lies in intentionality, the mind's capacity to represent aspects of the world. And intentionality is indeed often supposed to prevent mental phenomena from being, as such, physical. Thus Fodor:

> I suppose that sooner or later the physicists will complete the catalogue they've been compiling of the ultimate and irreducible properties of things. When they do, the likes of *spin*, *charm*, and *charge* will perhaps appear on their list. But *aboutness* surely won't; intentionality simply doesn't go that deep.[12]

[12] J. A. Fodor, *Psychosemantics: the Problem of Meaning in the Philosophy of Mind*, Cambridge, Mass., MIT Press, 1987, p. 97.

But in the previous section, we have already disputed the pretensions of physics to provide all 'the ultimate and irreducible properties of things'. And no one impressed by our arguments will think it matters that intentionality goes less 'deep' in this sense than spin and charge. For many non-mental (e.g. chemical and biological) properties will also not figure on the physicists' list; and if that does not impugn them or the entities they characterize, why should it impugn intentionality or the entities it characterizes?

But many philosophers would still agree with Fodor's subsequent comment that 'the deepest motivation for intentional irrealism derives from a certain ontological intuition: that there is no place for intentional categories in a physicalist view of the world'. Thus Field writes: 'Any materialist who takes beliefs and desires at face value . . . must show that the relations in question are not irreducibly mental.'[13] If this intuition were correct, and there were independent reasons for accepting his 'physicalist view of the world', then we would indeed have reason to deny the reality of intentionality, and thus much, if not all, of the mental. But as we shall see, the intuition is wrong.

What is the problem of intentionality supposed to be? Intentional states typically have three distinctive features: (i) they seem to be affected by, and to cause actions involving, distant objects or events; (ii) their ascription creates non-extensional contexts—sentences whose truth-value may alter when names or descriptions in them are replaced by others that apply to the same things; and (iii) they can be about objects or events which do not exist. Suppose for example that (i) you read something about Santa Fe that makes you want to go there, which causes you to get on a plane and do so. But (ii) you do not want to go to the most beautiful city in New Mexico, which Santa Fe is, because you do not know that it is. And (iii) you could have wanted to go to Santa Fe even if, like Eldorado, it did not exist.

The challenge which (i) and (iii) present is to explain how Santa Fe can cause you to act as you do when it is so far away, and need not even exist. No one believes that a city can have such effects directly at such distances—especially when it need not exist. Your action must be directly caused by some intrinsic property you actually have, not by your relations to distant and possibly non-existent objects, like Santa Fe, or to abstract ones like the possibly false proposition that it is in New Mexico.

But this does not mean that the causal powers of token thoughts and other mental states cannot depend on their contents: they can. All it means is that they must do so indirectly, via a mental representation, i.e. via some intrinsic non-relational property of the mental state (or of its owner). A token thought must have some such intrinsic property, correlated some-

[13] H. H. Field, 'Mental Representation', *Erkenntnis*, 1978, p. 78.

how with its content, to give it its right causes and effects. An instance of this property is, we may say, the local *causal surrogate* for that content.

But these intrinsic properties could still be mental. They could be sensations, or visual or other mental images or models—which need not, incidentally, be conscious.[14] And even if the compositional structure of thought requires these tokens to form a correspondingly complex ('syntactic') structure, they could still be images—like Shepard's shapes composed of images of cubes.[15] So the problem which thoughts pose for causation is *not* that they are mental and causation is not. It is that causation depends directly only on intrinsic properties, whereas the causal powers of token thoughts depend on their contents, which are not intrinsic.[16] This indeed shows that these contents need causal surrogates: but not because they are mental, since the surrogates could be mental too.

Moreover, the need for causal surrogates is by no means confined to psychology. They are needed throughout physical science. It is, for example, a standard function of physical fields to provide local causal surrogates for what would otherwise be unmediated action at a distance. But no one thinks that accepting Newtonian gravitational fields means denying the physical status, or the existence, of the Newtonian gravity they mediate.

In other parts of physics and chemistry, causal surrogates are needed also to bring about what would otherwise have to be backward causation. We noted earlier that Boyle's law makes the eventual pressure of an ideal gas sample double after its volume is suddenly halved at constant temperature. But that token equilibrium pressure, P, cannot directly affect the non-equilibrium processes which lead to it, since that would need backward causation. Moreover, P, like Santa Fe, need not even exist. The sample's volume may be altered again before it reaches equilibrium: but this cannot affect its behaviour before that. So the future P needs a causal surrogate *in the present* to make the sample head for P, just as Santa Fe needs one *in you* to make you head for it.

And as for this case, so for all systems that tend to stable equilibria: from simple pendulums to chemical and biological reactions of all kinds. The Gibbs' potentials of chemical thermodynamics, for example, are causal surrogates for the equilibria to which chemical systems tend:[17] equilibria whose existence and physical status they certainly do not impugn, any more than the field mechanisms of Newtonian gravity

[14] See P. N. Johnson-Laird, *Mental Models*, Cambridge, Cambridge University Press, 1983; R. N. Shepard and L. A. Cooper, *Mental Images and Their Transformations*, Cambridge, Mass., MIT Press, 1982.

[15] Shepard and Cooper, op. cit., ch. 3.

[16] As one of us has shown in detail elsewhere: T. M. Crane, *The Content and Causation of Thought*, Cambridge University Ph.D. Dissertation, 1989.

[17] K. G. Denbigh, *The Principles of Chemical Equilibrium*, Cambridge, Cambridge University Press, 1955, p. 76.

impugn it, or than the kinetics of gases refutes Boyle's law or shows that halving a gas sample's volume does not really cause the doubling of its pressure. Why therefore should physiological or psychological accounts of how the contents of token thoughts produce their effects contradict them, or the causal explanations they give of our actions?

So much for the alleged problems posed by (i) and (iii) for the ontological authority of intentional psychology. What about (ii), the non-extensionality of ascriptions of intentional mental states? This does not exclude the mental from the physical either, since non-extensionality occurs in physics too.[18] This is because laws entail non-extensional conditionals. Suppose for example that *H* and *K* are the genes that give us hearts and kidneys. The fact that we all have both does not make 'anyone who had gene *H* would have a heart' entail either 'anyone who had gene *K* would have a heart' or 'anyone who had gene *H* would have a kidney'.

The probabilistic laws of modern microphysics cannot be extensional for another reason too, because '$p(\ldots) = n$' is not extensional: for if it were, '*a* is the *F*' and the necessary truth '$p(a \text{ is } a) = 1$' would entail '$p(a \text{ is the } F) = 1$', which it clearly does not, on any view of probability (take for example '*F*' = 'next Prime Minister').

The non-extensionality of probability incidentally explains that of many singular causal instances of the contexts '. . . because . . .', even in physics. This is because causation gives effects probabilities, if only subjective ones. Probabilistic accounts of causation make that explicit, and it is implicit even in deterministic accounts.[19] Effects of sufficient causes, for example, have probability 1; and effects of necessary ones would in their absence have probability 0. So 'E because . . .' must be non-extensional, since though *a*'s being the *F* might give 'E' a contingent probability, *a*'s being *a* cannot. And '. . . because C' cannot be extensional either, because of its counterfactual implications: the probability of a necessary truth like '*a* is *a*' cannot depend on C, even if that of a true '*a* is the *F*' does.

These and other reasons convince us, *pace* Davidson and others, that even in physics singular causation never depends on, and mostly is not, an extensional causal relation between particulars.[20] But if causal contexts can be non-extensional anyway, they can perfectly well contain non-extensional contexts like 'believes . . .', 'wants . . .', 'fears . . .', etc.: as in '*b* fears that *a* is the *F* because *a* told her so' or '*b* does *D* because she wants *a* to be the *F* and believes he will be only if she does *D*'. So we see no reason either to deny the causation which such sentences obviously report, or to

[18] B. Enc, 'Intentional States of Mechanical Systems', *Mind*, 1982.

[19] E.g. D. H. Mellor, 'On Raising the Chances of Effects', in J. H. Fetzer (ed.), *Probability and Causality*, Dordrecht, Reidel, 1988; J. L. Mackie, 'Causes and Conditions' (1965), in E. Sosa (ed.), *Causation and Conditionals*, Oxford, Oxford University Press, 1975.

[20] D. Davidson, 'Causal Relations' (1967), in his *Essays on Actions and Events*, Oxford, Clarendon Press, 1980; D. H. Mellor, 'The Singularly Affecting Facts of Causation', in D. Pettit *et al.*, (eds), *Metaphysics and Morality*, Oxford, Blackwell, 1987.

suppose that it must be based on, or reduced to, any extensional causal relation—let alone a non-mental one that relates non-mental particulars.

In short, all the supposedly problematic features of intentional states are as endemic to physics, and in particular to non-mental causation, as they are to psychology. The notion of causation will thus not serve to define the physical (and hence ontologically authoritative) sciences in such a way as to exclude psychology. Defining the physical as the causal will not make physicalism a non-vacuous doctrine about the mind.

4. *Psychological and psychophysical laws*

In order for the issue of physicalism to be a serious one, there has to be a principled distinction between the mental and the physical which explains why non-mental sciences have an ontological authority which psychology lacks. We have seen that neither causation nor reducibility to physics can provide such a distinction. But perhaps laws can. The ontological authority of science arguably rests on the laws it discovers, which tell us what kinds of things there are, and what properties and relations distinguish them. But many agree with Davidson that the mental is 'anomalous': that strictly speaking there are no psychological or psychophysical laws.[21] If that were so, psychology would add nothing to our ontology of non-mental kinds, with their distinctive non-mental properties and relations.

But why should we deny that, for example, 'All men are mortal' (a true psychophysical generalization limiting the sentience of members of our species) is a law? There are some bad reasons for denying it, which we shall not consider in detail. One is the idea that laws are necessarily true, which no generalizations about the mental ever are. Thus for McGinn, for mental terms to feature in laws is for 'universal generalizations containing mental terms [to be] metaphysically necessary'.[22] But, he argues (influenced by Kripke's well-known argument against the identity theory),[23] no non-analytic necessarily true generalizations link mental terms either to non-mental or to other mental terms.

Nor they do: but then none links the terms of physics to each other either. The laws of physics are not metaphysically necessary. We agree with Davidson that laws must be 'supported by their instances' and 'support counterfactual and subjunctive claims' ('if x were F it would be G').[24] But 'All men are mortal' can clearly meet these conditions without being a necessary truth: the fact that something *would not* live for ever if it

[21] D. Davidson, 'Mental Events' (1970), in his *Essays on Actions and Events*, Oxford, Clarendon Press, 1980.

[22] C. McGinn, 'Philosophical Materialism', *Synthèse*, 1980, p. 187.

[23] S. Kripke, 'Naming and Necessity', in D. Davidson and G. Harman (eds), *Semantics of Natural Languages*, Dordrecht, Reidel, 1972.

[24] D. Davidson, 'Mental Events', loc. cit., p. 217.

were human does not mean it *could not*, any more than 'if we went we would go by bus' means we could not go by train. Nor therefore does the fact that the laws of physics meet these conditions show them to be necessary truths; and one of us has argued elsewhere that they are not.[25] So if terms had to feature in non-analytic necessary laws in order to count as physical, the terms of *physics* would not count, never mind those of psychology.

The law that all *F*s are *G* entails only that anything *would* be *G* if it were *F*, not that it *must* be. (And the probabilistic law that all *F*s have a chance *p* of being *G*, where $0 < p < 1$, does not even entail that—not even if it is a necessary truth.) The mere possibility of exceptions to psychological and psychophysical generalizations cannot therefore stop them being laws. And even if it could, even if laws did have to be both necessary and deterministic, how would one show without begging the question that a true generalization really could have exceptions? Not just by imagining them. We can all imagine light going faster in a vacuum than its actual speed *c*. This does not show that it really could go faster, still less that the constancy of *c* is not a law. And similarly in psychology. Anyone can imagine brine tasting like port: it can still be a law that to no one with our taste-buds would it ever taste anything like that.

Another bad reason for denying the existence of psychophysical laws is the so-called 'variable realisation' of mental states: the fact that 'the range of physical states fit to realise a given mental state can be indefinitely various'.[26] That cannot stop psychophysical generalizations being laws. For if it did, there would be hardly any laws in physics either. States like masses, volumes, and temperatures are even more variously realized than mental states: one can have a gram or a litre of almost anything, at any one of an indenumerable infinity of temperatures.[27] So if variable realization does not rule out laws in mechanics and thermodynamics, it can hardly rule them out in psychology.

Nor should we be impressed by the inability of armchair reflection to excogitate psychological or psychophysical generalizations. Physics and chemistry are not excogitatable a priori, and we see no reason why psychology should be. It can take as much unobvious theory and experiment to discover the psychophysics of taste, or of vision,[28] or the unconscious psychology of inference,[29] as to uncover (say) the biochemistry of reproduction.

[25] See D. H. Mellor, 'Necessities and Universals in Natural Laws', in D. H. Mellor (ed.), *Science, Belief & Behaviour*, Cambridge, Cambridge University Press, 1980; D. M. Armstrong, *What is a Law of Nature?*, Cambridge, Cambridge University Press, 1983.

[26] C. McGinn, 'Mental States, Natural Kinds, and Psychophysical Laws I', *Proceedings of the Aristotelian Society Supplementary Volume*, 1978, p. 197.

[27] See M. Wilson, 'What is this Thing Called "Pain"?—the Philosophy of Science Behind the Contemporary Debate', *Pacific Philosophical Quarterly*, 1985, p. 235

[28] D. Marr, *Vision*, San Francisco, Freeman, 1982.

[29] P. N. Johnson-Laird, op. cit.

So in particular, Stich's failure to excogitate laws featuring intentional mental states does not mean there are not any.[30] The obvious explanation of our inability to state such laws in simple and exceptionless forms is that our intentional psychology is too complex and (probably) probabilistic. But so is the meteorology of hurricanes, and the quantum mechanics of large molecules. Their laws, for those very reasons, are not statable by us in simple and exceptionless forms. No one infers from this that there are no such laws; and the inference is no better in psychology.

Davidson himself does not use these arguments against the existence of psychological laws. His own argument goes as follows:

(1) There are no strict psycho*physical* laws.
(2) Singular causes and effects must instantiate strict laws.
(3) The mental is not a 'comprehensive closed' system, being affected by the non-mental, which does form such a system.

But by (1) these mental effects cannot instantiate strict psychophysical laws. So

(4) 'there are no strict laws at all on the basis of which we can predict and explain mental phenomena'.[31]

The argument fails at every step. (1) is false, and not only because 'All men are mortal' is a law. There are many more such laws, linking sensations—like pains, smells, tastes, and visual, aural and tactile sensations—to non-mental features of those who have them. There must be, because whole industries depend on them. Think of the laws which must underlie the reliable production and use of anaesthetics, scents, narcotics, sweeteners, coloured paints and lights, loudspeakers, and soft cushions. And if Newton's laws of motion suffice to add masses and forces to our physical ontology, these laws must suffice to add to it the kinds of sensations that feature in them.

But even if there were no such psychophysical laws, this would not undermine the ontological authority of psychology. Even if no laws linked the mental to the non-mental, psychology could still have its own laws, defining its own mental ontology, on a par with that of chemistry (say). For as we saw in section 2, chemistry's ontological authority does not depend on its being reducible to physics via physicochemical laws. Nor therefore can psychology's ontological authority depend on there being psychophysical laws.[32]

But as we have seen, our sensations are in fact subject to psychophysical laws, which themselves suffice to refute Davidson's denial that 'there can

[30] S. Stich, *From Folk Psychology to Cognitive Science*, Cambridge, Mass., 1983, ch. 7.
[31] D. Davidson, 'Mental Events', loc. cit., pp. 224–5.
[32] See W. Lycan, 'Psychological Laws', *Philosophical Topics*, 1981.

be strict laws linking the mental and the [non-mental]';[33] since these laws may very well be 'strict' (i.e. deterministic). Davidson is admittedly more interested in intentional states than in sensations; but the refutation still holds, since sensations are indisputably mental—as Davidson himself admits.[34]

So (1) is false. And so is (2): causes and effects need only instantiate probabilistic laws.[35] But can we not therefore make (2) true—and strengthen (4)—by deleting 'strict' throughout? Indeed we can, and we should: but that will not help Davidson, since it only makes (1) even more incredible.

Nor does admitting probabilistic laws do anything to rescue (3). For whether causation needs strict or merely probabilistic laws, the non-mental no more forms a 'comprehensive closed system' than the mental does.

For what does 'a comprehensive closed system' mean? For Davidson, it means a system of 'homonomic' laws, which 'can hope to be precise, explicit and as exceptionless as possible' only because they draw their concepts 'from a comprehensive closed theory'. The non-mental sciences can provide such a theory, Davidson claims; but psychology cannot. Its generalizations are hopelessly 'heteronomic': that is, they 'may give us reason to believe there is a precise law at work, but one that can be stated only by shifting to a different vocabulary'.[36]

But this distinction will not do, since physics itself is full of heteronomic laws. Take Newtonian mechanics, which defines Newtonian concepts of force and mass by saying how they combine to cause acceleration. But the laws of motion that do this do not form a closed theory. Indeed, without some further law relating force to other concepts, they form no testable theory at all. In the theory of Newton's *Principia*, the further law is the inverse square law of gravity. But that theory is not closed either. There are many other kinds of force: electrical, magnetic, viscous, etc. So as a law of net force, Newton's law of gravity is as hopelessly heteronomic as the laws of psychology: it can be made exceptionless only by provisos invoking alien concepts of electricity, etc.[37] And similarly for all the other laws of force. All are true only as laws of *kinds* of forces: gravitational, electrical, etc., which combine into net forces by vectorial addition. The theory of Newtonian mechanics is just the conjunction of all such laws, however diverse their other concepts, with Newton's laws of motion.

Newtonian mechanics has of course been superseded, but not because it

[33] D. Davidson, 'Mental Events', loc. cit., p. 212.

[34] ibid., p. 211; see also his 'Replies to Essays', in B. Vermazen and M. Hintikka (eds), *Essays on Davidson: Actions and Events*, Oxford, Clarendon Press, 1985, p. 246.

[35] See e.g. P. Suppes, 'Davidson's Views on Psychology as a Science', in B. Vermazen & M. Hintikka, (eds), op. cit.; D. H. Mellor, 'On Raising the Chances of Effects', loc. cit.

[36] D. Davidson, 'Mental Events', loc. cit., p. 219.

[37] See N. Cartwright, *How the Laws of Physics Lie*, Oxford, Clarendon Press, 1983, ch. 3.

was only a conjunction: for a conjunction, as we saw in section 2, has all the unity a science needs. So our 'comprehensive closed theory' can also be a simple conjunction: the conjunction of all true scientific theories and laws. But then to say, as Davidson does, that the non-mental sciences can supply this conjunction on their own is simply to deny the existence of psychological laws: which both begs the question and is refuted by the laws that we know link sensations to their non-mental causes.

So Davidson's argument (1)–(4) quite fails to show that there are no psychophysical or psychological laws. But this does not refute his claim that there are no laws linking *intentional* mental states. And for that claim Davidson gives a special argument, which rests mainly on two connected ideas: the 'holism' of the intentional, and the 'constitutive ideal of rationality'.

The holism of intentional mental states amounts to their being conceptually interdependent, which sensations are not. The belief that *P*, for example, must inhibit the belief that not-*P*, and also the desire that *P* (people do not want what they think they already have). Again, neither belief nor desire can cause action on its own. To do that they must combine, and different combinations can cause the same action: I can say '*P*', for example, either because I believe it and want to speak truly or because I disbelieve it and want to lie. And there is no doubt that such familiar relations between beliefs, desires and actions do partly define them, and thus stop any laws involving them being wholly independent.

But these facts cannot stop there being such laws, because they too have Newtonian parallels. Newtonian force (*f*) and mass (*m*) are also conceptually interdependent, being partly defined by the relation $f = ma$, which stops laws involving them being independent of each other. And this relation too requires forces and masses to combine to produce their effects (accelerations) —and lets many combinations cause the same effect. So we can no more infer a force f or a mass m from the acceleration a they cause than we can infer a belief or a desire from the action they cause. In short, holism alone will not suffice to distinguish the intentional from the non-mental in a way that will show it to be anomalous—as Davidson again admits.[38]

What about Davidson's 'constitutive ideal of rationality'? This is the idea that the relations between beliefs, desires and actions mentioned above partly define or constitute (hence 'constitutive') what it is to be rational. For instance, the fact that the belief that *P* will generally inhibit the belief that not-*P* is one of the holistic truisms that help to define rationality: it is rational not to have obviously contradictory pairs of beliefs. Rationality is an ideal because thinkers can be more or less rational: they can fail to have the totality of their intentional states standing in all these 'rational' relations.

[38] 'Mental Events', loc. cit., p. 221; 'Replies to Essays', loc. cit., p. 248.

This may all be true: but again it cannot rule out psychological laws since it too has a Newtonian parallel. Indeed everything that Davidson says is peculiar to 'our use of the concepts of belief, desire and the rest' has a Newtonian parallel. Here it is:

> We must stand prepared, as the evidence [of accelerations induced by gravity, electricity, etc.] accumulates, to adjust our theory [of the forces and masses involved] in the light of considerations of cogency [satisfying Newton's laws]: the constitutive ideal of *rationality* [Newton's laws] partly controls each phase in the evolution of what must be an evolving theory. An arbitrary choice of translation scheme [from accelerations to forces] would preclude such opportunistic tempering of theory: put differently, *a right arbitrary choice of a translation manual* would be of a manual acceptable in the light of all possible evidence, and this *is a choice we cannot make*.[39]

We have italicized the two debatable analogies. First, *rationality*, which many think is a normative notion, constraining for example, what one *ought* to believe. Well, maybe it is, but a belief's rationality may still be a fact about it, for example, something that makes it probably true; with the constitutive ideal simply requiring beliefs to be so related to each other, and to their perceptual causes, that under normal conditions most of them *are* true. And that, far from preventing laws linking the contents of our beliefs to our surroundings and to the non-mental operation of our senses, positively requires there to be some such laws (if only probabilistic ones).

Secondly, the claim that no evidence can enable us to choose a right translation scheme: that is, one which correctly infers beliefs, desires, etc. from their perceptual causes and behavioural effects. But if this is to provide a disanalogy with mechanics, it cannot just mean that no evidence could entail the right theory. That is true in spades in Newtonian mechanics, even if forces are observable, since every ascription of a mass at any time t entails an indenumerable infinity of net accelerations under different net forces at t, none of which entails any other, and only one of which can be actual. How could intentional mental states be more underdetermined by the evidence for them than that?

Davidson, however, thinks that Quine's 'indeterminacy of translation' shows that they must be.[40] He says that the anomalism of the mental 'traces back' to the 'central role of translation' and its indeterminacy. For if there is no determinate translation of sentences, there is no right statement of what they mean. So, since their meanings are the contents of the beliefs they would express, there is no right statement of those either: that is, beliefs (and a fortiori other intentional mental states) have no determinate contents. Contents, like sentence meanings, are not just underdetermined

[39] 'Mental Events', loc. cit., p. 223.

[40] W. V. O. Quine, *Word and Object*, Cambridge, Mass., MIT Press, 1960, ch. 2.; D. Davidson, 'Mental Events', loc. cit., p. 222.

by evidence: they simply do not exist. And if they do not exist, they certainly cannot have instances which feature in laws.

But we deny the indeterminacy of translation, for familiar reasons.[41] As we have already seen, and many others have pointed out,[42] it cannot be entailed by the underdetermination of theories by evidence, or even Newtonian mechanics would have no laws. Nor, without begging the present question, can it be entailed by 'Quine's claim that theories of translation are ... underdetermined even by the totality of truths expressible in terms of physics',[43] since psychological and psychophysical laws are *ex hypothesi* not so expressible. To base the indeterminacy of translation on that claim is to base it on what we saw in section 2 is an untenable version—the reducibility-to-physics version—of the very physicalism it is being used to support.

We know of no other reason to deny a priori the existence of laws involving intentional mental states. But might not the totality of all true non-mental theories be *in fact* so comprehensive and closed as to preclude psychological and psychophysical laws? We do not see how. No amount of physics, for example, can stop mental states instantiating other laws as well. The other laws must of course be consistent with physics—but only because all truths must be consistent with each other. That truism gives no priority to physics, whose laws must equally be consistent with those of psychology.

But perhaps this reading of (3) may look more plausible as a thesis about *causation*, rather than about laws: and Davidson himself suggests that this is how he understands (3) when he says that 'too much happens to affect the mental that is not itself a systematic part of the mental'.[44]

For suppose physics did form a comprehensive causal system: so that laws of physics made each brain state or bodily movement b_2 of yours at any time t_2 be determined by your brain states at an earlier time t_1 (plus non-mental input between t_1 and t_2). How could your mental states between t_1 and t_2 also affect b_2 without violating these deterministic laws?

But now consider a parallel case. Suppose Kepler's laws made the Earth's orbital position p_2 at t_2 be determined by its position p_1 at t_1 (plus its velocity then, and input from space between t_1 and t_2). How, we might equally ask, could the Earth's positions between t_1 and t_2 also affect p_2 without violating Kepler's laws? Yet they must affect p_2 if p_1 does, for p_1 itself comes between t_2 and still earlier positions p_0 which, given Kepler's laws, also determine p_2. There's nothing special about t_1.

The solution to this puzzle lies in the counterfactual conditional (C)

[41] See e.g. R. Kirk, *Translation Determined*, Oxford, Clarendon Press, 1986, pt.III.

[42] E.g. N. Chomsky, 'Quine's Empirical Assumptions', in D. Davidson and J. Hintikka (eds), *Words and Objections*, Dordrecht, Reidel, 1969.

[43] R. Kirk, op. cit. p. 136.

[44] 'Mental Events', loc. cit., p. 224.

which this causal claim entails: if p_1 had been different, so would p_2—but p_0 would not. In other words, what violates Kepler's laws is only (C)'s counterfactual antecedent. (C) itself does not violate them, and nor therefore does the causal claim which entails it: indeed Kepler's laws are what make (C), and hence the causal claim, true.

Similarly in our original case. Our mental states, intentional and otherwise, could—and would—affect our brain states and bodily movements even if the laws of physics made them all determined also by earlier brain states. The claim that a system thus constrained by non-mental laws must be closed, in the sense of being unaffectable by its mental states, simply does not follow—and it is not true.

5. *Supervenience*

We have seen that neither laws nor causation deprive psychology of the ontological authority of non-mental sciences. But that still leaves one non-vacuous interpretation of physicalism. The last refuge of the modern physicalist is *supervenience*: the thesis that there is no change or difference without a non-mental change or difference. Two things will never change or differ in any way without also changing or differing in some non-mental way. The physical excludes the mental by being that on which everything else, including the mental, supervenes.

Supervenience is stronger than the trivial claim that everything extended in space has physical parts, but weaker than reductionism, since it says nothing about *which* non-mental difference will accompany any mental one: it does not entail the existence of any psychophysical laws. But it must be stronger than we have so far indicated. For given the multitude of changeable non-mental properties which any thing has (including its spatiotemporal location), all things that change or differ mentally are bound to change or differ in fact in some non-mental respect. So supervenience, to be serious, must mean more than that. The relevant range of non-mental respects must be restricted (at least by excluding spatiotemporal location), and the claim must be at least subjunctive—'Two things *would* never differ . . .'—and arguably even stronger—'Two things *could* never differ . . .'.

However, to give supervenience a run for its money, we will take it as weakly as we can: in its subjunctive form, and with the relevant non-mental respects restricted as little as possible. Even so, we see no reason to believe it. The evidence for it cannot be empirical, since the prospect of ever finding two things, complex enough to have psychological properties, type-identical in every reasonable non-mental respect, is extremely slight, to say the least. The only remotely plausible argument for supervenience is one which appeals to the causal principle mentioned in section 3, that there is no unmediated action at a distance. This means, as we saw there, that

tokens of beliefs and other intentional mental states need intrinsic properties to act as causal surrogates for their contents. And if these properties are all non-mental, and sensations are likewise determined by their non-mental causes, then supervenience may well seem to follow.

But it does not. First, as we have already observed, the intrinsic properties which act as causal surrogates for the contents of token beliefs and other intentional states may very well be mental. And secondly, whether they are mental or not, beliefs will still not supervene on them. For two thinkers could easily have all the same intrinsic properties and still have different beliefs. This is an obvious moral of Putnam's 'Twin Earth' stories:[45] the content of your Twin Earth duplicate's belief that water is wet differs from yours, because his (or her) water is XYZ and yours is H_2O. And similarly for indexical beliefs. If the content of 'That's an elm' includes the tree you look at as you think it, it will differ for two people looking at different trees, even if they have all the same intrinsic properties.

The defender of supervenience might respond that this only shows that thoughts do not supervene on their thinkers' intrinsic properties. They might still supervene on those plus thinkers' non-mental (e.g. spatiotemporal) relations to other things, and those things' non-mental properties (being an elm, or H_2O). But that is not true either, as we can see by considering how thinkers make mistakes. Suppose for example that you and your intrinsically identical twin now look at the same elm, but that although this makes you think it is an elm, it makes him or her think it is an oak. Same intrinsic properties, same relations, same properties of the thing thought about: but different thoughts.

Again, the defender of supervenience might respond that in such a case there would always be some relevant non-mental difference: if not in your eyes, then in how the tree looks from your different viewpoints. But we doubt this. You and your twin might well differ in only mental respects: for example, in your beliefs about what elms look like—beliefs which need supervene on nothing present or non-mental, merely on the different mental effects trees have had on you in the past. And we see no non-question-begging reason to think that those effects must supervene on past non-mental differences.

On the other hand, your and your twin's past experiences do have present effects: they make you think 'That's an elm', and your twin think 'That's an oak'. And being at a temporal distance, they cannot have those effects immediately: their effects must be mediated by some present intrinsic properties of you and of your twin. So perhaps your thoughts must supervene on your intrinsic properties after all?

[45] H. Putnam, 'The Meaning of "Meaning"', in his *Mind, Language and Reality*, Cambridge, Cambridge University Press, 1975. The moral is drawn explicitly by T. Burge, 'Individualism and Psychology', *Philosophical Review*, 1986.

Not so. For not only, as we have seen, may these mediating properties themselves be mental, but even if they are not, they need not differ just because their mental effects do. Causation need not, after all, be deterministic, and modern physics tells us that it often is not. So we have every reason to expect some indeterminism in the causal processes of our perception, our reasoning, and our action: this being one way in which these processes can go wrong and make us make mistakes. But when causation is indeterministic, causes and effects will not supervene on each other. In short, modern physics gives us reason to deny the supervenience of the contents of our token thoughts on even the most extensive list of our other intrinsic and extrinsic properties and relations.

And as for thoughts, so for sensations. Their having non-mental causes or effects will not make them supervenient. On the contrary, if the relevant causation is somewhat indeterministic, sensations *cannot* supervene on their non-mental causes.

Yet again, however, the defenders of supervenience may reply that causation, unlike supervenience, takes time—and we agree.[46] Causes always precede their effects, whereas token thoughts and sensations are only supposed to supervene on *simultaneous* tokens of non-mental properties. So showing that they do not supervene on their earlier non-mental causes does not directly refute that claim.

But it does refute it indirectly. For suppose an intrinsic non-mental property P causes a mental property M indeterministically. (Say for example that one's chance of being M at t_2 is 0.9 if one has just been P (at t_1), and 0.1 if one has not.) Now suppose that at t_1 many people share *all* their intrinsic non-mental properties, including P. At t_2, therefore, most but not all of them will be M: that is, some pairs of people, atom-for-atom alike at t_1, will differ at t_2 in this mental respect.

Now let a and b be any such pair: at t_2, a is M and b is not. What about a's and b's intrinsic non-mental properties at t_2? Well, these may all be determined by a's and b's shared non-mental state at t_1. But if so, then they too will all be shared, and M will not supervene on them either. But M will not supervene on them anyway. For even if some relevant laws of physics are indeterministic, so that a's and b's state at t_1 does not *make* them share all their intrinsic non-mental properties at t_2, it still will not *stop* them doing so. On the contrary: given enough such as and bs, some will certainly differ mentally at t_2 without differing in any other way.

In other words, modern indeterministic physics must predict that some pairs of people, atom-for-atom alike in all non-mental respects, will differ in some simultaneous mental respects: and will do so precisely because the the properties involved are causally related. In short, modern physics suggests that even the weakest serious form of supervenience, which is

[46] D. H. Mellor, *Real Time*, Cambridge University Press, 1981, chs 9–10.

itself the weakest non-vacuous form of physicalism, is false. And physicalists can surely not expect a physicalism that is falsified by physics to be verified by anything else.

6. *The end*

We have argued that no defensible definition of physicalism will deprive psychology of the ontological status of the non-mental sciences. In no non-vacuous sense is physicalism true. But this does not mean that we want to encourage a revival of Cartesian dualism. On the contrary, our arguments entail that there is no divide between the mental and the non-mental sufficient even to set physicalism up as a serious question, let alone as a serious answer to it. Physicalism is the wrong answer to an essentially trivial question. So it cannot begin to help philosophers of mind answer the serious questions about the mind and, above all, about intentionality: what enables some parts of the world (us) to think about other parts, including other people (and of course ourselves). And to those questions it is quite obvious that neither dualism nor physicalism has anything to contribute. The dualist does not even try to explain intentionality: he just takes it for granted, stipulating it into existence. And saying that minds are all physical no more helps to explain how some physical things can think than saying that all flesh is grass helps to explain the difference between carnivores and vegetarians. This, therefore, should really be the last paper on the subject of physicalism. But we fear it will not be.[47]

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[47] The material in this paper is derived partly from one author's Ph.D. dissertation (T. M. Crane, op. cit.) and partly from material presented by the other author to meetings of the British Society for the Philosophy of Science, the Oxford University Philosophical Society, the Cambridge University PPE Workshop and of seminars at University College London, the University of Sussex, the University of California at Irvine, the University of Wisconsin at Madison, NorthWestern University and the History and Philosophy of Science Department in Cambridge. We are grateful for helpful comments and criticism made by many people on those occasions and in many private conversations and correspondence.