The Return of Reductive Physicalism

Panu Raatikainen

Abstract. The importance of the exclusion argument for contemporary physicalism is emphasized. The recent attempts to vindicate reductive physicalism by invoking certain needed revisions to the Nagelian model of reduction are then discussed. It is argued that such revised views of reduction offer in fact much less help to reductive physicalism than is sometimes supposed, and that many of these views lead to trouble when combined with the exclusion argument.

1. Motivating Physicalism

As Papineau (2001) argues, the popularity of physicalism among contemporary philosophers is not just a result of arbitrary fashion: it has rather been characteristically motivated by a certain line of reasoning, which is based on the apparently plausible assumption of "the completeness of physics" and the worry that the mental would end up being causally epiphenomenal. By "the completeness of physics" one means here the assumption that all *physical* effects are due to physical causes. The exclusion argument is then, roughly, that anything that has a physical effect must itself be physical. Thus, if the mental is capable of causing physical effects, it must be itself physical.

Smart (1959) therefore proposed that we should identify mental states with brain states, for otherwise those mental states would be "nomological danglers" which play no role in the explanation of behaviour. Armstrong (1968) and Lewis (1966, 1972) argued that, since mental states are picked out by their causal roles, and since we know that physical states play these roles, mental states must be identical with those physical states. Lewis (1966) made the completeness assumption explicit. More recently, Kim (1989, 1992) and Papineau (1993, 2001) in particular have pressed the exclusion argument in defence of physicalism. In sum, it is fair to say the exclusion argument, or something like it, is essential for contemporary physicalism.

2. The Causal Exclusion Argument

Let us look a bit closer at the argument. Assume first that reductive physicalism is false:

Assumption: (distinctness)
Mental properties are distinct from physical properties.

However, the following three premises are – so the argument goes – apparently indisputable:

Premise 1 (the completeness of physics):
Every physical occurrence has a sufficient physical cause.

Premise 2 (causal efficacy):
Mental events sometimes cause physical events, and sometimes do so by virtue of their mental properties.

Premise 3 (no universal overdetermination):
The physical effects of mental causes are not all overdetermined.

However, these four claims together are arguably inconsistent. Therefore, physicalists conclude, the assumption must be rejected.

Conclusion:
Mental properties must be identical to physical properties.

On can surely dispute this argument (as I, for one, would), but the point here is to emphasize just how vital this argumentation strategy is for contemporary physicalism.

3. Multiple Realizability

The (type) identity theory is, of course, today disbelieved by many because of the so-called multiple realizability argument: it is suggested that a particular mental kind can be realized by many distinct physical kinds (see e.g. Putnam 1967, Fodor 1968, 1974, Block and Fodor 1972). Consider, for example, pain. It seems plausible that various different animals – humans, primates, other mammals, perhaps even birds and reptiles – are all capable of having (the same kind of) pain. However, it is also clear that these different animals must have radically different physical-chemical build-up. Therefore, it would be a mistake to identify the property of having (a certain kind of) pain with any particular underlying physical-chemical property, for the latter must vary greatly between different species. Further, it has been argued that the underlying physical state which realizes a certain mental state may be different even in the same individual at different times (see below).

4. Reductionism Strikes Back: Attacking the Nagelian Model

It would be, however, premature to proclaim the death of reductionism. Several philosophers have accepted the claim that psychological kinds are multiply realized while nevertheless denying such non-reductionist conclusions.

In particular, it has been often suggested that the anti-reductionists' master argument (based on multiple realizability) presupposes the classical Nagelian picture of reduction (cf. Nagel 1961), but that this theory is arguably outdated and problematic; and that if one leans instead on a more accurate picture of reduction, one might be able to vindicate reductionism. Such arguments are certainly worthy of serious consideration.

(*1*) *Mere biconditionals are too weak.* It has been argued that biconditional bridge laws of the Nagelian model are too weak, and must be strengthened into *identities* if they are to yield genuine reductions (Sklar 1967; Causey 1977; Wimsatt 1976, 1979; cf. Kim 1998). What is really needed is, for example, the identity "temperature = mean molecular kinetic energy", not just a law that merely affirms the covariance of the two magnitudes. In Kim's words, "as long as the reduction falls short of identifying them, there would be temperatures as properties of physical systems 'over and above' their microstructural properties." Furthermore, such correlations are badly in need of an explanation: why does temperature covary in just this way with mean molecular kinetic energy? Identifying the two magnitudes answers this nicely: because they are in fact one and the same (see Kim 1998).

Such a view certainly has much to be said for it, but the relevant point here is that this stronger requirement hardly makes life any easier for reductionists: if multiple realizability ever was an obstacle to Nagelian reducibility via biconditionals, how much more so would it be if genuine identities are required? Therefore, apparently pressing this point is in itself little help to reductionism.

(*2*) *One-way Nagelian bridge principles.* It has also been suggested that the common anti-reductionist argument involves a misunderstanding of the Nagelian model: although Nagel's examples involve biconditional bridge laws, one-way conditional connections expressing sufficient conditions at the reducing level are all that his "principle of derivability" requires. Multiple realizability, on the other hand, only challenges necessity reducing conditions, and so is not a challenge to even a projected Nagelian reduction of psychology to the physical sciences (Richardson 1979; cf. Bickle 2000). However, this approach is in considerable tension with the first objection to the Nagelian model, which requires that the connections between the reduced theory T_1 and reducing theory T_2 must be strengthened, not weakened. Also, this strategy is in conflict with the exclusion argument: mere one-way conditionals simply won't do; only genuine identities suffice. Otherwise the mental (even if it may be "reducible") may end up being causally epiphenomenal.

(*3*) *Reduced theories are often false.* Still another problem for the Nagelian model is presented by the undeniable historical fact that often the reduced theory T_1 is, strictly speaking, false, and hence its laws can be derived from the reducing theory T_2 (which is assumed, for the time being, to be true) only with some false auxiliary assumptions, for example. This holds even for many classical examples of reduction in science. Consequently, it has been proposed that what one really reduces (e.g., derives from T_2) is a revised version of T_1 (or its "image" in T_2) rather than T_1 itself (Schaffner 1967; Churchland 1986).

Yet, this observation poses no serious problems for the anti-reductionist; she need not commit herself to any specific theory involving mental states (indeed, it is not even clear that there exists a definite theory of the mental that would be at stake here). She can well allow extensive correcting of theories. The real question here is about ontological reduction of properties, not about epistemological reduction of any particular theory. (For this distinction, see Silberstein 2002.)

(*4*) *Local reductions.* Finally, it has been argued that the Nagelian condition of connectibility is "unrealistic and can seldom be satisfied" (Kim 1998), and that even in many paradigmatic examples of reduction in the history of science the reduced concept is multiply realizable; e.g., that temperature cannot be uniformly identified with a single micro-based property; it may be mean kinetic energy of molecules for gases, but something else for solids or in vacuums; but one may still have "local reductions" which are specific to domain, structure or species – for example of temperature in gas, or, pain in humans (Hooker 1981, Enc 1983, Churchland 1986, Ch. 7, Kim 1998, Bickle 2000).

However, this strategy too faces problems in the presence of the exclusion argument: together they threaten to make the general property of pain but also of temperature causally epiphenomenal (see below). And in any case, this kind of reply may well be insufficient: one may argue for a much more radical type of multiple realizability, that the underlying physical realizations of a certain psychological property may differ even in the one and the same token individual over time (Block 1978, Horgan 1993). Arguably there is some empirical evidence about such plasticity (Endicott 1993). Yet, in the case of such a massive kind of multiple realizability, the idea of local reduction leads to absurdity. At least one key advocate of new wave reductionism, John Bickle, grants this much: "The more radical type of multiple realizability seems to force increasingly narrower domains for reductions to be relativized – at the extreme, to individuals at times. This much 'local reduction' seems inconsistent with the assumed generality of science" (Bickle 2006).

5. A Reductionist Reply to Radical Multiple Realizability

Bickle – following Hooker (1981) and Enc (1983) – argues that the radical type of multiple realizability is a feature of some "textbook" cases of reduction, such as the one of classical thermodynamics to statistical mechanics: "For any token aggregate of gas molecules, there is an indefinite number of realizations of a given temperature – a given mean molecular kinetic energy. Microphysically, the most fine-grained theoretical specification of a gas is its microcanonical ensemble, in which the momentum and location (and thus the kinetic energy) of each molecule are specified. Indefinitely many distinct microcanonical ensembles of a token volume of gas molecules can yield the same mean molecular kinetic energy. Thus at the lowest level of microphysical description, a given temperature is vastly multiply realizable in the same token system over times … So this type of multiple realizability is not by itself a barrier to reducibility" (Bickle 2006).

To begin with, a "textbook case" or not, one should note that some distinguished philosophers of physics have expressed serious doubts about this alleged reduction of classical thermodynamics. The locality of it mentioned above is actually one of the reasons, but there are many more: for example,

statistical mechanics is time symmetric whereas thermodynamics possesses time asymmetry (Primas 1991, 1998, Sklar 1993, 1999; cf. Silberstein 2002). So perhaps one should not make too much out of the contingent fact that Nagel and some others took this as a good example of reduction.

Moreover, this strategy has its price; now the exclusion argument enters, and one must conclude again that temperature is a causally epiphenomenal property. For, temperature clearly is not *identical* to any particular token microlevel arrangement or such.[1] But without genuine identities, one cannot circumvent the exclusion problem. And surely, the conclusion is implausible. For example, consider water boiling in a test tube. Now the difference-making cause of the boiling is seemingly the temperature (> 100°C) of its surroundings, no matter whether it was solid or gas, and whatever its specific arrangement of microparticles is. Therefore, something must have gone wrong.

6. Conclusions

Advances in understanding reduction in the philosophy of science must certainly be taken into account. However, arguably they are not as much help to reductive physicalism as is sometimes suggested. In particular, contemporary physicalism which essentially depends on the exclusion problem does not harmonize well with certain new views of reductionism.

Notes

1. As Tim Crane pointed out in a discussion, essentially the same worry is already presented (in a slightly different context) in Crane (1992).

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