

Compositional science and religious philosophy

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Abstract: Religious thought often assumes that the principle of physical causal completeness (PCC) is false. But those who explicitly deny or doubt PCC, including William Alston, W. D. Hart, Tim Crane, Paul Moser and David Yandell, Charles Taliaferro, Keith Yandell, Dallas Willard, William Vallicella, Frank Dilley, and, recently, David Chalmers, have ignored not only the explicit but also the implicit grounds for acceptance of PCC. I review the explicit grounds, and extend the hitherto implicit grounds, which together constitute a greater challenge to contemporary religious philosophy than has been realized. Religious philosophers need to find a better way around PCC than has been found, or, if PCC is unavoidable, religious philosophers need to work toward a worldview that both accepts PCC and defends strong forms of religious experience.

Contradictory rumours about physical completeness

When we put our ears to the ground we hear contradictory rumours: ‘Physicalism has been established by science!’; ‘Physicalism has no scientific evidence for it; it’s just a temporary fashion!’ The difference in attitudes is well-known. So, too, is the idea that the different attitudes spring from a split over the principle of physical causal completeness (PCC), the thesis that every physical change is caused, probabilistically or deterministically, by exclusively physical causes. Some philosophical schools accept PCC, some reject PCC. But the rejection of PCC is, I’ll argue, illegitimate. Sometimes the rejection is only implicit, and needs to become explicit. But making it explicit would not eliminate a confusion of methodological or theoretical non-reductionism with ontological non-reductionism. This confusion, I’ll claim, infects many religious systems. As a result, PCC has been inadequately rejected. However, for the reasons I’ll exhibit, PCC should be accepted.

Within religious philosophical circles it is often thought that recent non-reductive accounts of the mental, e.g. in anomalous monism and its cousins, allow mental states to cause physical changes in a way that entitles one to deny

PCC. However, we need to be careful when we talk about reductive and non-reductive accounts of the mental. We understand the difference between ontological monism on the one hand, and, on the other hand, methodological and theoretical reduction.

In ontological physicalist monism, one takes it that entities referred to as having psychological states are, at some level of analysis, physical entities. For terminological simplicity, we will say that theories that postulate standard identity or realization or subvention/supervenience relations between the physical and the mental are theories in which there is *ontological* reduction of the mental to the physical. (The broad terminology is standard. See, for example, Teller (1995), 680). On the other hand, in *methodological* mental reductions one takes it that the explanations of the having of psychological states are best given by descriptions of the complex states of the smallest compositional entities in the physical system. And in *theoretical* mental reductions one takes it that in one way or another the psychological descriptive terms map neatly on to physical descriptive terms, and the former, at some hypothetical level at least, can be replaced by the latter. Our interest at the moment is only in the question of whether mental to physical causal claims and physical to mental causal claims can threaten PCC, and if they can, then in what circumstances this can happen.

There are two types of mental to physical and physical to mental causal claims we need to consider: (a) interactive ontological dualist causal claims, and (b) either methodological or theoretical non-reductive causal claims. Let's look at what happens if we have either of the latter without having the former. This would yield non-ontological (that is, methodological or theoretical) non-reductionism, plus either ontological physicalism, or a causally parallelist ontological dualism, or a Spinozean double-aspect theory (with no fundamental causal relations between the mental and the physical), or an ontological epiphenomenalism. Which of these ontological options we have won't make any difference to the subsequent analysis. For convenience, let's begin by assuming that we have methodological or theoretical non-reductionism and ontological physicalism.

Any ontological position that is theoretically or methodologically mentally non-reductive allows one to say that a mental state causes a physical change, and that there is no way methodologically or theoretically to reduce the mental aspect of the causal relationship. In our case, an ontological physicalist who is otherwise a non-reductive theorist of the mind might say, 'I decided to speak up, and as a result of that decision, I broke my silence'. The ontological physicalist can then add that the mental aspect of the causal claim can't be methodologically or theoretically reduced. But ontologically it is all supposed to be physical. The mental units are identical to physical units, or the physical units realize the mental units, or the physical units subvene the mental units. The decision was described using mental terms, and the breaking of the silence is understood to be a physical event,

and there was, according to the claim, a causal relationship between the theoretically or methodologically non-reducible mental state and the subsequent physical change. However, such a non-reductive theorist is still ontologically physicalist. The non-ontologically non-reductive aspect of the theory does not, on its own, succeed in undercutting PCC. If empirical considerations lead to the conclusion that the atoms of the brain move strictly in accord with the laws of physics, then acceptance of PCC would be reinforced. This may diminish the success of a blend of ontological reductionism with theoretical or methodological non-reductionism. Then again, it may not. In any case, we are not focusing on that issue. What we want to look at is the way in which an ontologically dualist system can threaten PCC.

Let's move along, then, to the other ontological positions exclusive of interactive ontological dualism. It's important to note that a proponent of a dualist ontology, an ontological epiphenomenalist, say, who also takes it that the physical laws do fully govern the motions of sub-atomic particles, does not deny PCC. PCC, then, is consistent with the dualist ontologies other than interactive ontological dualism. It's true that over-determinative parallelism could be considered as a second exception, depending on the meaning we give to 'exclusive' in the definition of PCC. However, even if it is taken to be an exception, the over-determination would preserve the sufficiency of the physical causes for the physical effects. For this reason, over-determinative parallelism would be as inconsistent with typical religious systems as is ontological monism. Also, PCC is required by all physicalist ontologies. The question, then, arises, as to how PCC is established for the dualist positions other than ontological interactive dualism. In fact, the argument for PCC has been based on the empirical evidence with regard to physical micro-particles. Given the vast amount of such empirical evidence, a theoretical system can only threaten PCC by providing a plausible energy flow or information selection way in which PCC can be broken.¹

The two claims offered here are, first, that the empirical basis for the conclusion of PCC is very strong, and, second, that the specific energy or informational ways that have been proposed for denying PCC are highly implausible. It follows that typical religious theories at the beginning of the twenty-first century are groundlessly going against the results of twentieth-century science. It is easy to show how typical religious doctrines are causally interactively dualist and deny PCC. For example, many religious philosophers posit a non-physical God who routinely interacts with nature, and, in particular, with human beings. Many take it that humans have a strong sort of contra-causal freedom (a freedom in which the physical rules are overturned) and that such a freedom enables them to be strongly responsible for their actions. Many posit the existence of some human minds which directly experience an aspect of the mind of God – for example, an aspect of God's love – through an interactive process of religious cultivation. Many posit human minds whose irreducible and causally active ontological

nature is the basis for other strong forms of religious realization, like simple survival after bodily death, or a world-interactive afterlife, or special forms of (what might be called paranormal) cognition. And the standard interpretations of mystical experience require that human minds can experience a non-physical ultimate reality.

Evidently, all of these theories require the falsity of PCC, since they require a causal interaction between some non-physical mental being(s) and some non-mental physical beings such as the atoms of various brains. To some, it seems to be the case that acceptance of PCC excludes *all* major religious views. Elsewhere (2002; 2004), I have argued that it does not, but rather that some religious experiences of the strongest sort can be straightforwardly described in a way that is consistent with and supported by PCC. However, our task here is to see whether there is plausibility in any of the various ways PCC has been denied.

In this paper, I will add to the evidence usually given in favour of PCC. More specifically, I will exhibit a basic problem – the demarcation problem – that any energy- or information-specific denial of PCC will have to face. The demarcation problem, I contend, is a problem that was implicitly understood in defences of PCC, but it needs to be more clearly articulated than it has been, and for two reasons. First, because deniers of PCC need to be specific about the energy or informational means whereby they deny PCC, and then they need to respond to the demarcation problem, or they will be accused of ignoring the plain consequences of scientific discovery. Second, because those of religious sensibility who cannot find a way to get around the demarcation problem should find defences of theistic or other religious notions that are fully consistent with, and, perhaps, supported by, PCC.

In the second section, I'll show how the demarcation problem seriously undermines any PCC-denying theory that attempts to be energy-flow or informationally specific. And in the third section, I discuss the converse of the demarcation problem, a problem that poses the following question: how do those who accept PCC explain the boundary between what does and what doesn't generate consciousness? In answer, we'll note the standard PCC-accepting responses that are indifferent to the religious positions, and, more pertinent to this context, we'll note a PCC-accepting answer that supports the cultivation of transformative religious experience. In the remainder of this introductory section, I'll review the shocking aspects of the lack of communication between the pro-PCC and anti-PCC groups. We'll begin with the recent remarks of the pro-PCC group.

David Papineau (2002, 232–256), presents a short but historically comprehensive review of the philosophical and empirical evidence for PCC. His evidential story takes us from Leibniz to the middle of the twentieth century. The key element in the buildup toward a broad acceptance of PCC is the development of the compositional hierarchy of the natural sciences. I would put the claim in the

following six-statement version: chemical states are composed of physical states; and observable chemical changes are large-scale changes of many physical states; biological states are composed of chemical states; and observable biological changes are large-scale changes of many chemical states; and psychological states are composed of biological states; and observable psychological changes are large-scale changes of many biological or biochemical states.

By 1960 or so, the only possible evidential gap was in regard to whether psychology relates to biology and biochemistry in this way. But since then (though Papineau does not refer to this, nor is there any need for him to do so) some strong psychological reductions have been explicitly put forward, as we find reviewed, for example, in John Bickle (2003). In any case, as Theo Meyering puts it, we have compositional physicalism (2000, 196), taking us at least from physical states, through chemical states, and into biological states. When we find ways of justifying top-down causation, they will only be compatible with 'the reign of physics'. Moreover, as Brian McGlaughlin (1992, 55), Hilary Putnam (1999, 79), and many others maintain, there has never been a credible hint of any evidence against PCC. Thus it is that PCC has been 'fully established' (Papineau, 2002, 256).

Papineau acknowledges that there are some bitter-end holdovers against PCC, yet he also takes it that the main elements in the evidential establishment of PCC were discovered by the end of the 1950s. By now, he claims, it's *a done deal*, and the holdovers don't merit more comment than he has given. He is entirely precise about this: 'there is no more I can do to persuade them of the completeness of physics', (2002, 256). This is a little odd. For the last few decades philosophers and scientists have proposed three noteworthy energy- or information-specific ways to have a physically incomplete causality. First, it has been suggested that non-physical minds select from the information of the quantum states. For example, Eugene Wigner (1967) presents the basic idea, and Sir John Eccles (1994), H. P. Stapp (1999), and, most recently, David Chalmers (2003, 126) propose specific implementations of the idea. Second, in 1988 W. D. Hart proposed an expanded mass-energy conservation system in which the current strictly physical conservation laws would, in some regions of the universe, be violated, to allow for quantified physical to psychic transfers of energy, and vice versa. And, third, Tim Crane (1995) and (2001, 64), has developed a position in which PCC can be denied. Crane (2001, 64), for example, holds that Nancy Cartwright's view of the absence of uniform laws leaves the door wide open for a multi-causal denial of PCC.

Yet, there is nary a mention of these proposals in Papineau's account. The closest he comes to them is to mention in a footnote the idea of consciousness producing quantum-wave collapses (255). He then dismisses that proposal with two 'brief remarks' that are by no means clear. In fact, his conclusion is merely that 'it would seem an odd victory for anti-materialists'. Moreover, quantum-wave collapses are the setting for just one of three main methods of denying PCC,

and Papineau says nothing about the other two. Papineau is not unique in having more or less ignored the energy- or information-specific anti-PCC proposals. In a personal communication to me, W. D. Hart said that he knows of no pro-PCC response to the central-energy-flow aspect of the proposal he has made. Similarly, critics of PCC may well want to know what proponents of PCC might say in response to Crane's multi-causal physical-incompleteness proposal.

From the point of view of PCC-deniers, many of whom are moved by religious considerations, how does it look? About thirty years after the end of the story of scientific evidence that Papineau gives, William Alston said, 'None of the data at our disposal have any tendency to show that mystical experience does not satisfy the requirement that God figure somewhere among the causal conditions of mystical experience' (1991, 232). Such a complete dismissal of what Papineau takes to be a solid evidential base is striking. It's one thing to hold that the evidence is insufficient, and quite different to say that *none* of the data have *any tendency* to eliminate God from the causal story. Was Papineau's material concerning the development of the sciences culminating, by the mid-twentieth century, in the nomologically smooth compositional hierarchy of the natural sciences completely unavailable to Alston?

Nine years after Alston's remark, Paul Moser and David Yandell are equally bold, only their scope is broader. They say: 'Each such [empirical] science logically permits the existence of God, the reliability of certain kinds of religious experience, the objectivity of moral value, and the reality of thinking substances' (2000, 11). Immediately afterwards, they broaden the claim still further so as to show, not only the logical possibility of causal interactive dualism, but also that there is no warrant for the exclusion of such doctrines as thinking substances. Forgive me for flip-flopping, but it's worth observing that two years before Moser and Yandell assured us that there's no warrant for the exclusion of doctrines with thinking substances, Jaegwon Kim told us that due to the challenge of causality, 'mental substance is no longer with us' (1998, 60). And Daniel Dennett had been less polite in his mode of expression. According to Dennett, causal interactive dualism has been placed 'in the trash heap of history along with alchemy and astrology' (1996, 24).

Some anti-PCC-ers offer gestures of confusion in the form of requests. Dallas Willard (2000, 29), implores scientists to speak more clearly about the fundamentals. He directs his question to John Searle, who (1992, 85–90) explains the results of the scientific point of view. Searle says that we have to accept atomic composition and evolutionary biology, and, consequently, we have to accept the notion that consciousness is produced biologically. As a result, says Searle, one can't take opinions affirming that there is an afterlife seriously. Willard asks, 'could he [John Searle] possibly just point out when, where, how and by whom this "discovery of science" was made. Was it made?' Similarly, William Vallicella

(1998, 176), wonders, ironically, saying ‘[i]t would be interesting to know what marvellous scientific knowledge renders substance dualism untenable’. Charles Taliaferro, less deferentially, claims that ‘none of the solid scientific findings he [Paul Churchland] cites shows that one cannot square dualism with the neurosciences’ (2000, 153). And Taliaferro’s dualism is an ontological interactive dualism, not a non-causal-property dualism. Again, Frank Dilley (2004) wants to take Cartesian interactive dualism seriously, yet he by no means takes seriously the evidence for nomologically smooth compositional science. For example, he holds that the mind might merely redistribute conserved energy (2004, 143); however, the peculiarity of the non-locality this would presumably entail is completely ignored.

The lack of communication has been profound. The deniers of PCC, presumably, are not denying basic elements of atomic composition and evolutionary biology. What one guesses they assume, rather, is that, given several energy or information specific proposals for denial of PCC (e.g. given Hart’s proposal, quantum-physics-based proposals, and Crane’s proposal) there is currently no problem for ontological interactive dualism. This indicates that at this stage we might recognize a common ground between advocates of PCC and deniers of PCC. There is enormous empirical evidence for some form of the compositional science structure and the evolutionary biological picture. So, if a religious system requires the denial of PCC, then that system had better be able to exhibit a plausible energy-flow or information-selection means whereby PCC can be denied.

The demarcation problem

Fine and well. Religious philosophers need a plausible energy-flow or information-selection means whereby PCC can be denied. However, there is a simple, yet clear and strong objection to any such proposal that goes against PCC. The objection is that one can’t plausibly find the right sort of demarcations. The nature of these demarcations will be spelled out in a moment, but to be clear about the objection from the start, it does not work against a theory that accepts PCC for human-agency-generated states. Therefore, for example, if the *only* failure of PCC comes from divine activity through the quantum probability or superposition resolutions, the demarcation problem doesn’t apply. But the demarcation problem does work against any anti-PCC view that holds that many human minds are ontologically independent of the physical system and are causally interactive in relation to it. Hart’s proposal, those based on quantum theory as mentioned above, and Crane’s proposal, are of the latter sort. As far as religion is concerned, it is claims about the powers, freedoms, responsibilities, cultivated experiences, and afterlives of many humans that we are interested in. Holding that PCC fails so that there can be strongly free human agency and

religious responsibility, or an afterlife, or religious-experience cultivation is, typically, central in the religious systems we are looking at.

The demarcation problem is built on two points. First, all of the anti-PCC arguments for human causal dualist interactions rely on the notion that there are objective, or ontological, or non-conventional demarcations between two sorts of space–time regions. For each mind, the objective demarcation is between (a) the region(s) of the space–time world in which there are or can be direct interactions with that mind; and (b) the region(s) of the space–time world in which there cannot be any such direct interactions with that mind. Clearly, any direct interaction would have to take place in some space–time region. For example, suppose we say of someone that her arm moved to the window because she wanted to open the window to let some air in. A mental state – wanting to open the window to let some air in – is put forward as a causal factor leading to a physical effect – the moving of the arm toward the window. The space–time region in which such a direct interaction could occur would have to be in or near the moving arm. Now, if there is an ontological causal dualism in which more than one mind causally interacts with the world, then there must be a space–time division between a region that can be directly causally affected by a specified mind, but cannot be directly causally affected by another mind. For assume that there is no such demarcation. Then there would be routine conflict between many minds over producing causal results in a single space–time region.

For example, suppose that the window is an inch open, and I want the window to be wide open, and you want the window to be shut. If there is no boundary between a region your non-physical mind can directly work on and a region that it cannot directly work on, and if there is no such boundary for my mind, then odd results would follow. We'd both be mentally causing changes in the position of the window, and, presumably, we'd see the untouched window jiggling in evidence of the struggle. And even if there were no struggle, because, say, only one person wanted a change in the window's position, there would still be a paranormal-looking event. The events required by this hypothesis are too far removed from our experience to be seriously considered. It follows that there must be an objective or ontological or non-conventional distinction between the (a) regions, that is the direct interaction regions, and the other regions, the (b) regions; and, for any one mind, the (a) region(s) will not overlap any other mind's (a) region(s).

Second, given all that we know about the inanimate world that evolved to produce living forms, it is strongly abductively implausible to maintain a theory that requires such a demarcation for any one mind and that requires non-overlapping (a) regions for many minds. It is this second thesis that needs some detailed defence.

In the usual presentation of the reasons to accept PCC we find the following factors. To begin with, there was the confirmation of the compositional science

picture. Chemical events are complex physical events; and biological events are complex chemical events. Human beings are biological creatures, and so human beings, with all their psychological states, are complex physical creatures. We'll now add a little to this picture so that we can more easily defend the second thesis. A century ago, there were many uncertainties about the way compositional science would develop. In the late nineteenth century and the first half of the twentieth century, for example, there were the British emergentists, many of whom held that fundamental forces would be discovered in particle configurations of chemical, biological, or psychological complexity (McLaughlin, 1992, 50–51). If any such fundamental forces had been discovered in the brain, then the situation would have permitted an ontological interactive dualist interpretation (like that of Hart, 1988) as well as a physically monist but nomologically emergentist interpretation of mind–body relations. However, no such chemical, or biological, or psychological fundamental forces were discovered in the brain or anywhere else.

McLaughlin (1992, 54, n. 6) suggests that it was the 1920s, '30s, and '40s quantum mechanics (in which sub-atomic structures explain chemical valences) that set the stage for the broad acceptance of the compositional science picture in which the fundamental laws are all in physics. Papineau (2002, 253–254) suggests that the stronger turning point was the biological confirmation of the compositional science picture. This had happened by the mid-1950s, by which time there was a great deal known about the cell, including the nature of the DNA, for example, so that there was the nomologically smooth physics, chemistry, and biology compositional structure. Under either interpretation of the historical turning point, it is the *nomologically smooth* compositional natural-science structure that provided the base for physicalist ontological monism.

In addition, there is the evolutionary continuity. Viruses and bacteria are physical systems, and from such early living systems, gradually, plants, animals, and other living things developed. It would be odd, indeed, if, through this gradual process, suddenly non-physical mental entities came into being. Moreover, it would now be hard to find any natural basis on which we could determine which animals were strictly physical systems and which animals were physical systems in causal interaction with non-physical minds. The evolution of hominids, too, was gradual, and it would seem ad hoc or arbitrary to think that some animals have only a physical system of causes and effects, while others have non-physical minds to initiate actions and to receive information from the physical system. And bridging the dualism with partially distinct ontological states seems inherently confused. The causal interactionist ontological dualism thus seems to be embedded in the pre-evolutionary picture. The sense developed that the proponents of religious hypotheses should take more seriously than they have the nature of the evolutionary continuities (Churchland, 1986, 320).²

And finally, it's the practice of the sciences to avoid inflationary metaphysics. It is, of course, *logically possible* that the use of the simplicity principle (Ockham's Razor) in this case would incorrectly eliminate non-physical minds. However, we only want to rely on the logically possible when it coheres with an ongoing empirical investigation. Use of Ockham's Razor will eliminate the postulate of hypothetically measurable impacts of a non-physical mind on a physical body when no such impacts have been found after more than a century of looking for them. And it will eliminate energy-unmeasurable but inflationary postulates, including parallelisms in which non-physical minds causally affect physical bodies in an over-determined manner. Over-determined parallelisms are not postulated in most religious philosophical systems, but the quantum-based hypotheses denying PCC are also energy unmeasurable but metaphysically inflationary postulates. Similarly, an epiphenomenalist system postulates a causally inefficacious mental realm, and is undercut by the use of Ockham's Razor. So the use of Ockham's Razor here, although to some extent controversial, is worth mentioning.

The standard evidence for PCC, then, has some merit. Yet there is another crucial evidential factor that should be put forward, namely, the gross implausibility of the required demarcations between the direct interaction (a) regions, and the other (b) regions, together with the implausibility of a postulate that results in there being no overlapping (a) regions. This factor may have been primarily implicit to date, but, given the three current specific proposals for denial of PCC (Hart's, the quantum-based approaches, and Tim Crane's), and the absence of adequate responses to them, it needs to become explicit.

It's also worth noting that this factor was not *merely* implicit. For example, there is more than a hint of the demarcation problem in J. J. C. Smart's remark, in 1959, that he wouldn't opt for a fundamental dynamic law defined by the positions of billions of physical units like atoms in someone's brain. Indeed, he said that to posit such a law had a 'queer smell' to it. His rejection of such a posit was, he said, merely a confession of faith (1959, 143). But perhaps he was being overly modest. It was not merely philosophically olfactory talent, nor was it just faith, that led him away from the posit of a fundamental large-scale configuration law. He anticipated that the configurations required would be too large to be anything but arbitrary. Coincidentally, the enormity of the configurations that would be required has been demonstrated for the olfactory skills of small mammals. In small mammals it is the functioning of scores of millions of neurons that differentiate individual fragrances (Freeman & Skarda, 1991). And it is the arbitrariness of the proportionately enormous size of the configurations that effectively eliminates John Foster's hypothesis (1991, 200–201) that the current physical laws do apply but only outside of the candidate areas for mind–body ontologically irreducible causal exchange. Partly because the issue was based, to some degree, on guesswork in 1959, the details of the demarcation problem have remained *mostly*

implicit. Also, it's worth noting that Wilson (1999, 191) narrowly mentions the demarcation problem in the context of finding energy conservation criticisms of Eccles's proposals. This doesn't generally spell out the demarcation problem, though, nor show how it would apply to any specific energy or informational physical causal incompleteness proposal.

To continue setting out the demarcation problem, let us ask the question about how the boundary between the (a) direct interaction regions and the other (b) regions might be set. Conceivably, it might be up to the mind to choose the boundary within which to work. Alternatively, it might be a boundary that is grounded in various physical features. Of course this disjunction is inclusive. The different non-physical minds might freely choose the regions based on similar physical features from case to case. On this question, though, we would note that the mind implements its decisions through the events in the human body or, more narrowly, the brain. So the distinction between the (a) and the (b) regions should be at least physically specifiable rather than *merely* subject to the mind's decisions based on factors that need not be grounded on physical specifics.

How, then, would the (a) region(s) be physically specifiable? The subtlety of the ecological system makes it difficult to say how a non-physical mind could specify the appropriate (a) region(s). It has become ever more difficult to specify deep ontological differences – the differences between one *genuine* object and another – between one sum of atoms and that sum of atoms plus another nearby atom. This is especially clear in the case of the animate objects and their large parts, because in them there is systematic atomic replacement. In human beings, the atoms, or most of them at any rate, are replaced during any seven-year period. Obviously, this requires atomic replacements in large parts of the human body, including, for example, the brain. It will not be plausible to maintain that there is a boundary the crossing of which will mean that an atom has, naturally, become part of the human brain, whereas, previous to its crossing, the atom was, naturally, outside of the human brain.

So, too, for the human body. Although we seem to think there are sharp boundaries for the human body, yet, considering the cavities, ingestions, evaporations, the variety of small-scale interactions, excretions, and so forth, we realize that the human body, too, has no such boundary. The postulate of sharp distinctions seems to make no sense. Consequently, it will seem to be altogether arbitrary to think that there are natural physical specifications that can enable the mind to distinguish the (a) from the (b) regions, let alone to do so in such a way as to have no overlapping (a) regions. People touch each other and exchange atomic particles in various ways (through breathing and more intimate encounters); also, identical twins develop from a single egg; and some Siamese twins are born with their heads fused and parts of their brains touching. Thus, the postulate of many non-physical minds coincidentally finding non-overlapping (a) regions is rendered somewhat dubious.

The subtlety of the natural ecological system has been of great interest to philosophers for a good time now. Eubulides (4th century BCE) was interested in heaps, and he may well have had the intuition that it wasn't only a few types of macro-discriminable objects like piles of sand or rice to which the *sorites* paradox could apply. In any case, through scientific research in the last several thousand years, we came to discover that organisms including human beings are, in some sense, heaps. Very complicated heaps, no doubt, but heaps nonetheless. Whether this gives rise to *sorites* paradoxes about human beings is not our interest here. Rather, what is of interest to us is the related problem, the problem of the many, that Peter Unger (1980) developed in detail. And it is, more specifically, one aspect of that problem that concerns us – the added strength the problem of the many has when we consider the absence of fundamental chemical, biological, or psychological particle configuration forces.

The problem of the many, in simple form, is that any precisely delineated sum of atoms supposedly making up a physical object of a size discriminable by our senses, will parallel hundreds, thousands, or millions of other extant and precisely delineated sums of atoms, each with only minute differences from the first sum, that could equally well be taken to make up that object. Consequently, when we think we see one human being, say, we won't be able to specify what it consists in. Or, we might be forced to say that it is really many overlapping human beings, even though it seems to be only one being. Given the absence of the fundamental higher-level configuration forces, the problem is as acute as it can be.

There are too many borderline particles for us to be able to neatly define a human organism. There are pieces of food being chewed or digested; invisible bits of skin falling off the surface of the body; molecules of air at various stages of incorporation into the organism; various bacteria and viruses living in and around the body; droplets of sweat in the process of evaporation; bits of clotted blood as much joined to a bandage as to the healing cut; molecules in the air whose motions were caused by nearby muscle contractions, and so forth. We want to draw from this more than that there are millions of overlapping sums of atoms each of which could be the object. In addition we want to draw the notion that there is no way to establish a boundary *non-arbitrarily* between one such sum of atoms and another, so that the former would be the object, but the latter would not.

It is also worthwhile to note the following double fact. First, judging from the conceptual system we acquire by the age of five, say, we are easily misled into thinking that objects like human beings are neatly defined. Second, we are not so easily misled to think that their large parts must be neatly defined. For example, we think we know what we're talking about when we pick out a human being. In the precincts of philosophical study, though, we learn that it is unclear as to what sum of atoms we are picking out. There are too many candidates for the sum

because there are too many borderline particles, and there are no chemical, biological or psychological fundamental forces to help us do the picking out. This troubles us. And the way it troubles us shows us how easily misled are the non-philosophers, and the philosophers, too. But for large parts of the human being, we can notice how slippery the terms are. And noticing this does not trouble us. For example, there isn't any accepted boundary to the brain. Nor does there need to be one. Some theorists include the eye retinas as parts of the brain; others do not (Cairns-Smith, 1996, 160; Churchland, 1986, 101 from Heimer 1983). So the boundary of the brain can be merely conventionally specified. Similarly, how much of the nervous system afferent to and efferent from regions of the brain is to be included in the brain is conventionally decided. In the next section we will return to the fruits of this odd double fact. Here, though, we will merely follow the ontological implications of the absence of natural borders.

We will note, for example, that both our conventional demarcations (for brains, say), and our evolutionarily produced subjective distinctions (between a human being and the rest of the world, say) are, from the metaphysical perspective, vague and messy. The objects cannot be atomically specifiable, nor, a fortiori, sub-atomically specifiable, without arbitrariness. We don't want to think that the exact boundary of the whole human body would have to be merely conventional, and yet science has taught us that setting up a precise boundary would have to be done by mere conventions. And the setting up of such a boundary would involve many arbitrary decisions, too. Given the arbitrariness, it is highly implausible to think that the minds hone in on similar boundaries in or near the conventionally specified brain, or in or near the messily defined edges of the human body, neither of which objects is naturally specifiable. In this way, we have a major demarcation problem for any theory that wants to deny PCC.

There is no natural boundary to a human being, or a human being's brain, so it would be hard to specify a boundary between an (a) region or regions and a (b) region or regions for any one mind. And as for the implausibility of always having non-overlapping (a) regions, all one needs to do is think of the Siamese twins, mentioned earlier, who are joined at the head, with parts of the two brains touching. How do the two independent minds establish non-overlapping boundaries for their respective (a) regions? Or does the opponent of PCC propose that physical evidence (accessible or inaccessible) of mental conflicts over direct physical effects might be present, but only in rare cases, such as when living brains are touching? The preponderance of non-overlapping (a) regions when there are no natural boundaries would be puzzling at least.

Also, if it is proposed that God solve the problem as to what each non-physical mind interacts with, then the proposal faces our central difficulty. God's prescription would be arbitrarily sharp at the human scale despite the remarkable continuities at the micro scale. Similarly, there could be non-deistic hypotheses to sort out the demarcations of the pairings of mental factors to bodily factors

within Buddhism, for example. However, once again, the use of a purported macro-scale neatness of divisions that by no means fits the micro-scale continuities shows the implausibility, despite logical possibility, of the overall proposals that might be put forward. Similarly, the proponent of physical causal incompleteness could claim that the problem of establishing a boundary of the brain or of the human body is a problem of vagueness. But we do function well, even though our concepts are vague in their extensions. Perhaps the non-physical minds subtly select one of the many ways that have been put forward for resolving problems of vagueness (e.g. see Keefe and Smith, 1999, for an anthology of attempted resolutions), and then apply it to the cases at hand. The suggestion would be that the non-physical minds, by such a means, establish the sort of boundary that is required.

However, I doubt that this method would go beyond the merely logically possible. There are many ways of resolving problems of vagueness, and they're quite different from each other. They are also new, and, as far as I can make out, it's unintelligible to suppose that pre-historic humans' conscious minds used such methods. Also, such a method wouldn't integrate with the functional smoothness that crosses the messy boundary between a human body and the rest of the world. Nor would it solve the problem of what we might call *the enlarged person*, since, in some sense, the various techniques for resolving vagueness could also be used to establish indefinitely large somewhat personal bodies. The edge of the human body is vague. So, too, the edge of a human-body-plus-ten-feet-in-every-direction is vague. And if the techniques can be applied in the former case, they can be applied in the latter case too. At any rate, if an opponent of PCC hopes that a vagueness resolution technique could be used to undermine PCC, such an argument still needs to be devised. One way or another, the demarcation problem is a truly serious problem for the proponent of physical causal incompleteness.

Also, application of the demarcation problem to the PCC-denying theories shows how they fail in other ways specific to each theory, and it will be worthwhile to spell out the details, too, though they are prolix. On another occasion I intend to do so. The point here is that the theories all face the same apparently practically insuperable obstacle: how is the mind – presumably, the conscious mind – going to differentiate the region(s) it can directly affect from any other region(s)? It appears that there is no objective basis coherent with the natural continuities for an answer to this question.

To finish the demonstration, let us enlarge on the point just mentioned, that it is supposed to be the *conscious* mind making decisions, and then communicating the decisions to the body for execution. The conscious minds of the past would have had no ideas about the sorts of boundaries required. Although it is logically possible that the conscious mind is only aware of phenomenal and cognitive states, and that it, somehow, pre-consciously directly communicates the results

of its pre-conscious deliberations to only certain region(s) of the physical world, still such logically available postulates seem to be absurdly *post hoc*. In any case, they draw their power from something other than consciousness. And it was consciousness that fuelled the drive toward physical causal incompleteness in the first place. The baby would be thrown out with the bath water.

Moreover, we need to look at the specifics. For example, we can't talk intelligibly about how some conscious minds sometimes made selections contrary to their own explicit beliefs. Aristotle thought, for example, that it is the heart that is the common sensorium (Aristotle 1912/1972, 656a). Could his mind have influenced his brain without his believing that it was the brain that was doing the sensory processing? Once again, it is the details of the demarcation problem that undermine the physical incompleteness postulate. For this and the many other reasons mentioned, it seems that someone who in our times insists that ontological interactive dualism is still viable, has a *hang-on-to-the-old-system* approach. Such an insistence almost completely ignores the results that many centuries of scientific research came to by the middle of the twentieth century.

We have good reason to believe that the demarcation problem, and the other empirical factors yielded by smooth compositional science, make any energy or information specific means of denying PCC for many human minds highly implausible. The central religious theories requiring such a denial can no longer be considered as seriously as they are being considered unless a detailed defence of some particular energy or information specific way of denying PCC, and of plausibly answering the demarcation problem, are provided.

The converse of the demarcation problem

So far we've seen reasons to believe that it isn't plausible to think that there is a natural boundary in the physical world between what a given non-physical mind can causally affect and what it can't causally affect. We've also seen that a successful causal interactive dualism requires that there be such a natural boundary. So the denials of PCC are, it seems, untenable. But conversely, it might be asked, how do those who accept PCC explain the notion that some physical systems generate consciousness, but other physical systems do not generate consciousness? Proponents of PCC typically assert that there are conscious objects and there are objects that are not conscious. Then there must be natural boundaries, boundaries within the physical world, between the sort of object that is conscious and the sort of object that is not conscious. But then these boundaries should be available to serve as the boundaries that were required, but not found, when we considered the demarcation problem. Hence, we have the converse of the demarcation problem.

In a sense the converse of the demarcation problem poses *the hard problem of consciousness generation*, but it does so in a way that focuses on the physical

boundaries involved. And the physical boundaries do come into the picture because of two factors. We tend to think, given compositional natural science, that something that is conscious is a physical object. And, given the special features of consciousness, we tend to think that a conscious body must have a determinate ontological identity. It follows that there should be a natural boundary of the object. In answer to the converse of the demarcation problem's question, we have to note that there are many PCC-accepting theories that attempt to resolve the hard problem of consciousness generation. Chalmers (1996) devoted himself to the hard problem of consciousness and yet in that work he explicitly accepted PCC (e.g. 161). Ruthless reductionists (their own self-description) also accept PCC (e.g. Bickle, 2003), though they tend to assimilate what have been called the hard problems of consciousness to what have been called the easy problems of consciousness. And mysterians, like Colin McGinn (1989) do not object to PCC. There are many other positions, some functionalist and some anomalous monist, that have implicit or explicit answers to questions about the hard problem of consciousness generation, and that accept PCC.

Clearly, if one wants to ground one's objections to PCC on the absence of adequate PCC-accepting responses to the converse demarcation version of the hard problem of consciousness generation, one must show what is missing in each of the PCC-accepting answers to the hard problem of consciousness generation. The PCC-accepting answers suggest that the boundary between any consciousness generating object and the rest of the world is only vaguely specifiable. So the answer to the converse of the demarcation problem, put simply, is that there is no clear and crisp boundary between the one sort of object and the other. The converse of the demarcation problem suggests that there is a clear and crisp boundary, but is wrong on that point.

However, more interesting in this context is to note the way in which the converse of the demarcation problem explicitly raises the issue of the boundary that is so psychologically deep in human life between self and non-self. Both ontological physicalists and ontological dualists grow up with a worldview in which the first person has a human body. The human body is, for each person, thought of as 'me', or 'uniquely mine'. That is, a physicalist will say, 'this human body (or a part of it, namely, the brain) is me'. An ontological dualist will say, 'this human body is, as far as human minds are concerned, uniquely mine'. And, of course, a physicalist will say, 'the rest of the world is not me', while an ontological dualist will say, 'anything else in the physical world is not part of my body'.

On the other hand, as has been frequently observed, functional properties go across, or seem to go across, the divider between what is internal to an object and what is external to it (e.g. Teller, 1995, 680). Recently Andy Clark and David Chalmers (1998) argued that cognitive processing to some extent occurs external to the human body. From this it follows, or seems to follow, that beliefs are external to as well as internal to the human body, and so, too, mind, and self are, to

some extent, it seems, external to as well as internal to the human body. Clark and Chalmers acknowledge, though, that vagueness issues make neat answers to questions about what is self and what is not-self difficult or impossible to provide.

However, others would be unhappy with the intuition that the self is only vaguely defined. Either way, though, there are religious mystical systems adaptable to acceptance of PCC that reject the everyday view that, as it might be put, ‘the human body is me or uniquely mine while everything else is not me or not uniquely mine’. Indeed, religious mystical systems can be adapted so that they readily acknowledge that what seems at the age of two or three to be naturally fully distinct entities, like a human body and the region of air around the human body, are not naturally (non-arbitrarily) distinct entities. To acknowledge this deeply is psychologically challenging, but, then, the psychological challenge isn’t a theoretical problem. There always are deep psychological challenges within religious mysticisms. Reforming our worldview, so that either there is no fundamental self, or so that All is the fundamental self (though vaguely and multiply functionally and experientially centred) is challenging. But given the experiential strengths of the perennial wisdom traditions, the hopes for such reformations of our worldviews are not to be lightly denied.

Buddhist teachings based on denial of the fundamental self can be interpreted as consistent with the view that personal functioning is vague in its extent. And the Buddhist viewpoint can be adapted so as to be consistent with PCC. An adapted Yoga-Vedanta system would allow us to keep the intuitions for a sharp fundamental self, indeed, a universal fundamental self, while we also recognize the vaguenesses of multiply centred experiential and functional states, and while we accept PCC. Judaism, Christianity, Islam, and other religions with a healthy philosophically mystical component can be adapted so as to allow for strong forms of religious experiential transformation and for acceptance of PCC. I have begun such adaptation processes, especially for Judaism, and, to a degree, for Christianity (1994, 1997, 2002). I hope that others who are persuaded of the strength of PCC, and are in favour of religious mysticisms, will participate in the multi-faith task of adapting religious doctrines so as to accommodate the recent scientific discoveries.

Conclusion

Anthropomorphic, top-down, mental-causal-power intuitions produced animism, polytheism, God-human interactive monotheism, and mind–body interactive ontological dualism. Given compositional science, evolution theory, the absence of contrary empirical evidence, Ockham’s Razor, *and*, crucially, the demarcation problem, all the current bases on which one may try to defend an ontological interactive causal dualism wherein many minds causally interact with respective regions of the physical world, are, despite logical possibilities,

insuperably abductively implausible. When mind–body ontological interactive dualism is faced with the demarcation problem as well as the others, it is rendered highly implausible or, at the very least, deeply problematic.

At long last, I hope, religious philosophers will face the concrete reasons PCC is so broadly accepted in mind–body philosophy. No longer can it be just boldly asserted that PCC is one of the ‘grand myths of the modern academy’, a myth such that it would be part of a good education that one escapes the mythology (Yandell, 2003, 362). Rather, the case for PCC needs to be faced head on. The demarcation objection to any specific proposal for the failure of PCC needs to be countered, or PCC needs to be accepted and a theistic or other mysticism-based religious philosophy developed therein.³

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Notes

1. As we'll see, information selection is the option for quantum-physics-based approaches.
2. Some philosophers maintain that one can account for the emergence of evolutionary properties and distinctions by appealing to activities of God. See, for example, Richard Swinburne (1991), 196–199.
3. Many thanks to the anonymous referees for this journal, and to Peter Byrne, for their generous help in the preparation of this paper.