

Epistemological Objections to Materialism¹

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1. The Definition of 'Materialism'

The term 'materialism' has covered a variety of theses and programs. It has quite a long history, dating back at least to Aristotle's objections to the 'earlier thinkers' who over-emphasize the 'material element' in Book Alpha of his *Metaphysics*. It is relatively easy to identify a chain of paradigmatic materialists: Democritus, Empedocles, Lucretius, Hobbes, d'Holbach, Vogt, Büchner, Feuerbach, Marx, J. C. C. Smart, David Lewis and David Armstrong. Materialism encompasses much more than a thesis or set of theses in the philosophy of mind. It would not be adequate, for example, to identify materialism with the thesis that human beings (or indeed all possible persons) are essentially embodied. This would incorporate only a small part of what materialists have affirmed, and it would include some anti-materialists, like Aristotle or Leibniz (at least with respect to finite and sublunary persons).

Materialism entails the affirmation of at least four central theses:

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(1.1) Everything that exists and has real causal efficacy or an inductively discoverable nature can be located within space and time. Nature forms a causally closed system.

(1.2) All genuine causal explanation has a factual basis consisting of the spatial and kinematic arrangement of some fundamental particles (or arbitrarily small and homogenous bits of matter) with specific intrinsic natures. All genuine explanation is bottom-up.

(1.3) These intrinsic natures of the fundamental material things (whether particles or homogeneous bits) are non-intentional and non-teleological. The intentional and teleological are ontologically reducible to the non-intentional and non-teleological.

(1.4) The existence, location, persistence-conditions, causal powers, and de re modal properties of the fundamental material things are ontically independent of the existence or properties of minds, persons or societies and their practices and interests. Ontological and metaphysical realism.

Given these four principles, there is a relatively simple and homogeneous backing for all veridical causal explanation, and this foundation is independent of and prior to all intentionality, teleology and normativity. Understanding the world consist simply in decomposing all complex phenomena into their constituent parts and uncovering the causal powers of those parts. These parts and their causal powers are of a relatively

familiar and unproblematic sort, harboring no mysteries of merely intentional existence or impenetrable subjectivity.

Anti-materialism falls into several distinct varieties, depending which of these theses are rejected. Interactionist substance-dualism rejects 1.1 and 1.2, as does any sort of theism. The various kinds of anti-realism, including ontological relativity, pragmatism, and idealism, reject 1.4. Finally, theses of so-called ‘strong’ emergence, including the standard interpretation of Aristotle’s hylemorphism, entail the denial of 1.2 and 1.3.

To the extent that materialism represents, not a doctrine or set of doctrines, but something much definite, such as a kind of attitude or orientation toward problems in philosophy, I will have little to say against it, although raising difficulties for the combination of the four theses does make the corresponding attitude less attractive. In the concluding section 7, I will explain why I take thesis 1.4 to be an essential part of the materialist package. In brief, making the material world (including the natures and capacities realized in it) in any way dependent on the human mind undermines in a radical way the monistic simplicity of the realist version of materialism.

2. Epistemological Objections

The epistemological objections to materialism that I will raise fall into two categories: transcendental arguments, and arguments from no-defeater conditions on knowledge. A transcendental argument takes a familiar form:

(2.1) If materialism is true, then human knowledge (or human knowledge of a particular subject matter) is impossible.

This counts as an objection to materialism, as opposed to merely the drawing out of one of its consequences, when this thesis is combined with an anti-skeptical assumption:

(2.2) Human knowledge is possible.

A special case of the transcendental argument is one that charges materialism with being epistemically self-defeating:

(2.3) If materialism is true, then human knowledge of the truth of materialism is impossible.

If thesis 2.3 could be established, we would have shown that materialism is either false or unknowable. Since knowledge entails truth, we can detach the further conclusion that no one knows that materialism is true.

The second category of epistemological objection is that of the violation of no-defeater conditions for knowledge:

(2.3) Anyone who believes in materialism violates the no-defeater condition for knowledge of subject matter M.

A *defeater*, as developed by Chisholm, Pollock (1986), Plantinga (1993), and Bergmann (2000, 2005), for one's belief that p is a fact that overrides or neutralizes all of one's prima facie reasons for believing that p. In other words, suppose that I have various putative reasons r_1, \dots, r_n for my belief that p: my belief that p is based upon my taking the conjunction of r_1 through r_n to provide good reason for believing that p. A defeater for this belief would be a fact q that is such that the conjunction of q with r_1 through r_n provides no reason for believing that p. This could be either because q provides reasons for believing the negation of p that overrides the reasons for believing p provided by r_1 through r_n (a 'rebutting' defeater), or because the fact that q makes each of r_1 through r_n to be no reason at all (all things considered) for believing that p (an 'undercutting' defeater).

A person S violates the no-defeater condition for knowing that p whenever the world as S believes it so be contains a defeater for all of what S takes to be reasons for believing that p. Thus, thesis 2.3 is equivalent to 2.3.1:

(2.3.1) Anyone S who believes in materialism takes the world to include a fact that would, if all of S's beliefs were true, defeat what S takes to be his own reasons for believing anything about subject matter M.

Satisfying the no-defeater condition is a necessary condition of knowledge:

(2.4) Necessarily, if S knows that p, S does not violate the no-defeater condition for p.

Consequently, a successful no-defeater argument establishes that belief in materialism is incompatible with knowledge of subject matter M. That is, 2.3 and 2.4 entail 2.5:

(2.5) Anyone S who believes in materialism lacks knowledge of subject matter M.

A special case of the no-defeater violation argument takes the subject matter M to be the truth of materialism or one of its constituent theses. In this case, the argument's conclusion would be that anyone who believes in materialism does not know materialism to be true. Since belief is a necessary condition of knowledge, this would be a second route to the conclusion that materialism is unknowable.

I will make use of one particular kind of no-defeater violation objection, in which the defeater in question will take the following form:

(2.6) S's belief that p was the product of cognitive processes with a low objective probability of producing true beliefs.

I take the reliability of the underlying cognitive process to be a necessary condition of epistemic warrant. If I believe that my belief that p is unwarranted, then the world as I

take it to be contains no reason for my believing that p, and I have thereby violated the no-defeater condition of knowledge. Since an alethically reliable mode of production is a necessary condition of warrant, then I cannot know that p if I believe that my belief that p was formed in an alethically unreliable way.²

This sort of reliability constraint raises the generality issue: the process producing any given belief is a token of many different types, and alethic reliability applies at the level of types, not tokens. My response is to follow Alvin Plantinga who proposed, in *Warrant and Proper Function* (Plantinga 1993), that the relevant type is drawn from the ‘design plan’ of the believer’s cognitive faculties (defined by means of a teleological notion of proper function). This response is also available to the materialist, since it does not entail that teleology is a fundamental feature of reality.

There are connections between the two sorts of objection (transcendental and no-defeater violation arguments). For example, we might suppose the following principle:

² There are two kinds of defeaters: *rationality* defeaters (that provide grounds that undermine the rationality of basing a belief on certain grounds) and *knowledge* defeaters (that provide grounds that undermine the legitimacy of a claim to knowledge on behalf of a belief based on certain grounds). The two kinds are not mutually exclusive: some defeaters function at both levels, including those that challenge the objective alethic reliability of one’s actual grounds.

(2.7) If knowledge of subject matter M is possible, and the fact that q is a sufficiently robust truth (something that would remain true if S were to come to believe it), then it follows that it is possible to know something of M while believing that q.

Materialism, if true, would certainly be a highly robust truth. Hence, a successful argument of the no-defeater violation sort would, together with the robustness of materialism and thesis 2.7, provide us with a new transcendental argument against materialism.

Moreover, any valid transcendental argument would, if its premises are believed by S, provide a defeater for S's belief in materialism.

3. Concerning Our Knowledge of Natures and Natural Laws

(3.1) A preference for simplicity (elegance, symmetries, invariances) in the hypothesized fundamental laws of nature is a pervasive feature of scientific practice.

(3.2) Our knowledge of the natures of material things depends on our knowledge of the fundamental laws of nature.

(3.3) Given 3.1, our knowledge of the laws of nature depends on the existence of a causal connection between the simplicity (et al.) of a possible fundamental law and its actuality.

(3.4) Materialism entails that there can be no such causal connection.

Consequently:

(3.5) Materialism entails that we have no knowledge of the natures of material things.

3.1 The Pervasive Role of Simplicity

Philosophers and historians of science have long recognized that quasi-aesthetic³ considerations, such as simplicity, symmetry, and elegance, have played a pervasive and indispensable role in theory choice. For instance, the heliocentric model replaced the Ptolemaic system long before it had achieved a better fit with the data because of its far greater simplicity. Similarly, Newton's and Einstein's theories of gravitation won early acceptance due to their extraordinary degree of symmetry and elegance. The appeal of the electroweak theory was grounded the internal symmetry that it posited between electrons and neutrons.⁴

³ My argument does not depend on simplicity's being genuinely aesthetic in character.

All that is essential is that we rely on some criteria of theory choice other than mere consistency with observed data.

⁴ See, for example, van Fraassen (1988).

In *Dreams of a Final Theory*, physicist Steven Weinberg (Weinberg 1993) detailed the indispensable role of simplicity in the recent history of physics. According to Weinberg, physicists use aesthetic qualities both as a way of suggesting theories and, even more importantly, as a sine qua non of viable theories. Weinberg argues that this developing sense of the aesthetics of nature has proved to be a reliable indicator of theoretical truth.

The physicist's sense of beauty is . . . supposed to serve a purpose -- it is supposed to help the physicist select ideas that help us explain nature. Steven Weinberg, *Dreams of a Final Theory: The Scientist's Search for the Ultimate Laws of Nature* (New York: Vintage Books, 1993), p. 133.

. . . we demand a simplicity and rigidity in our principles before we are willing to take them seriously. (Weinberg 1993, pp. 148-9)

Weinberg notes that the simplicity that plays this central role in theoretical physics is 'not the mechanical sort that can be measured by counting equations or symbols.' (Weinberg 1993, p. 134) Theory choice involves recognizing form of beauty by a kind of aesthetic judgment. As Weinberg observes,

There is no logical formula that establishes a sharp dividing line between a beautiful explanatory theory and a mere list of data, but we know the difference when we see it. (Weinberg 1993, pp. 148-9)

In claiming that a form of simplicity plays a pervasive and indispensable role in scientific theory choice, I am not claiming that the aesthetic or quasi-aesthetic sense involved is innate or a priori. I am inclined to agree with Weinberg in thinking that ‘the universe acts as a random, inefficient and in the long-run effective teaching machine. . .’ (Weinberg 1993, p. 158) Nonetheless, even our aesthetic attunement to the structure of the universe is not mysteriously prior to experience, there remains the fact that experience has attuned us to *something*, and this something runs throughout the most fundamental laws of nature. Behind the blurring’ and buzzin’ confusion of data, we have apparently discovered a **consistent** aesthetic running through the various fundamental laws. As Weinberg concludes,

It is when we study truly fundamental problems that we expect to find beautiful answers. We believe that, if we ask why the world is the way it is and then ask why that answer is the way it is, at the end of this chain of explanations we shall find a few simple principles of compelling beauty. We think this in part because our historical experience teaches us that as we look beneath the surface of things, we find more and more beauty. Plato and the neo-Platonists taught that the beauty we see in nature is a reflection of the beauty of the ultimate, the *nous*. For us, too, the beauty of present theories is an anticipation, a premonition, of the beauty of the final theory. And, in any case, we would not accept any theory as final unless it were beautiful. (Weinberg 1993, p. 165)

This capacity for ‘premonition’ of the final theory is possible only because the fundamental principles of physics share a common bias toward a specific, learnable form of simplicity.

We can come to know the natures of material things only because they fall into repeatable natural kinds, whose causal powers are delineated by the fundamental laws of nature. Hence, our knowledge of those natures depends critically on our use of simplicity and elegance as a guide to the truth. This *epistemic* priority of laws over intrinsic natures would hold true, even if, *metaphysically* speaking, it were the laws that supervened on the individual natures.

3.2 The Need for a Causal Connection

Gettier’s celebrated thought experiments (Gettier 1972) demonstrated justified true belief is not enough for knowledge. There must also be a real, non-accidental connection between the belief and the fact believed in. This remains true when the fact in question concerns the holding of a fundamental law of nature.

Consider the following Gettier-like thought experiment. Suppose that the planets in our local system are moving on invisible rails by means of nuclear-powered engines, with the apparent orbits of the planets fixed as they are in order to satisfy religious rituals completely unrelated to gravity. In this scenario, Newton, building on Kepler’s laws of

planetary motion, would have had justified true belief but no real knowledge of the laws of nature.

Even more to the point, suppose that the fundamental laws of nature had been designed by an omnipotent God, in order to encode certain dietary laws, when those laws were expressed by means of a certain mathematical language. In this scenario, it is sheer, dumb luck that the laws share a common aesthetic quality. Scientists who, as Weinberg described above, used this aesthetic quality as a guide for theory selection would acquire thereby true and justified beliefs about the laws, but no knowledge. Whatever characteristics we use as a screen for viable theories about the laws of nature (as a set that is a *sine qua non*) must have some real connection to the actual holding of those laws. To count as knowledge, our scientific theorizing must track a causal structure that lies beneath or behind the laws, and this is incompatible with the materialist thesis 1.1.

It is the lack of causal connection, and not the contingency of the coincidence, that matters. Even if God's intention to encode certain dietary rules were a metaphysically necessary one, and even if our disposition to prefer certain aesthetic qualities were equally robust, any coincidence between the two would remain merely accidental, in a way that would be incompatible with knowledge.

A materialist who believes in immanent universals might be able to make sense of a causal connection between the natures of material things and the flow of events, and so could perhaps insist that our scientific knowledge of laws be causally connected to the

natures involved in those laws. However, a materialist cannot suppose that the laws themselves are products of some causal process that gives to them a common aesthetic quality, since this would be to extend the reach of the causal nexus beyond the realm of space and time.⁵ Only such a deep causal structure would establish a non-accidental connection between the laws and the aesthetic qualities, and such a connection is required for genuine knowledge.

There are three historically prominent alternatives to materialism, each with its own account of our knowledge of the laws of nature:

- Theism
- Aristotelianism, with a cosmic order of forms
- Nomological anti-realism

The first two posit causal connections between the deep structure of the laws of nature and that of the human mind, either transcending or immanent to nature; the third rejects both causal connections and the mind-independent reality of the laws.

⁵ Even if the universals are immanent, and so located in space and time, the interactions between universals that would be required for some common aesthetic to pervade them would require causal interactions unlimited by spatiotemporal propinquity. Connections between universals that correspond to the fundamental laws of nature have to be eternal and, if caused at all, caused atemporally.

According to theism, the creator of the universe actualized the world's natural laws. In doing so, God revealed a stable preference for simple, elegant laws.

On the Aristotelian picture, material things instantiate Forms or essences, which form a tightly integrated cosmic system. The Forms of sublunary things derive their natures from a common source, the 'separate' intelligences (associated by Aristotle with the celestial spheres). This Aristotelian picture (reflecting the mature Aristotle of the middle books of the *Metaphysics*) is thoroughly anti-materialist, since the forms or essences are not spatiotemporally located individuals and yet form a causally connected system, with the Aristotle's 'god' playing the central, unifying role, drawing the other forms into imitating it through final causality.

A final alternative is nomological anti-realism. The most relevant version would be the Ramsey-Lewis account of natural laws. A proposition L is a natural law just in case it belongs to that axiomatized system of propositions that best combines comprehensiveness, accuracy and axiomatic simplicity. Here is the dilemma: either this fails to solve the problem, or it fails to comply with the metaphysical realism of materialist thesis 1.4.

In order to solve the epistemological problem, the Ramsey-Lewis account must take the following form:

(3.6) A proposition L is a natural law just in case it belongs to that system of propositions that, given the actual empirical facts, best satisfies our conventional standards of lawlikeness.

We can know our own conventional standards in ways fully compatible with materialism. Hence, if materialists who accept 3.6 can explain in a materialistically acceptable way how it is possible that we know the laws of nature. However, any view that makes the laws of nature depend on our epistemic practices violates principle 1.4 and thereby counts as a version of anti-materialism. Our knowledge of the nature and powers of material objects comes entirely from our scientific knowledge of the laws connecting the natural kinds: for example, all that we know about the natures and powers of electrons comes from our knowledge of the laws that assign dynamical properties (like charge and mass) to those particles and that describe the influence of those properties on the behavior of electrons and other particles. If the laws lack mind-independence, then so do the natures of the material things, insofar as they are scrutable by us.

What if the Ramsey-Lewis definition is rigidified, as in 3.7?

(3.7) A proposition L is a natural law just in case it belongs to that system of propositions, given the actual empirical facts, best satisfies the standards that are in Alpha (the actual world) the conventional standards for lawlikeness.

In this version (which was Lewis's), the account is metaphysically realist. However, in order to know 3.7, we would have to know that Alpha is an exceptional world: one where the character of the actual laws and the conventional standards of lawlikeness happen to coincide. The problem of accounting for how we could know that Alpha is such a world is exactly the problem materialism cannot solve. Moreover, our conventional standards of theory choice, as they vary from world to world, would not track the features of those worlds' laws.

3.3 Materialism as a Defeater of Scientific Knowledge

In addition to the simple argument that materialism fails to provide a Gettier-proof account of theoretical knowledge, I would add that the lack of connection between the laws and our standards of theory choice that materialism entails provides us with an effective defeater of any claim to scientific knowledge. This is essentially the application of Plantinga's 'evolutionary argument against naturalism to the case of theoretical knowledge of the fundamental laws (Plantinga 1993, Beilby 2002).

(3.8) If materialism is true, then there is no connection between the simplicity of a possible law and its actuality, or, more generally, between the character of the actual laws and the contingent standards of lawlikeness (including the aesthetic sensibilities of humans).

(3.9) Given 3.8, if materialism is true, then the objective probability that these standards of lawlikeness coincide accurately with the character of the actual laws is quite low.

(3.10) Given 3.9, anyone who believes in materialism has a defeater for all knowledge pertaining to the natures of material things.

(3.11) Given 3.10, no one who believes in materialism knows the nature of any material thing.

(3.12) No one who doesn't know the nature of any material thing knows that any material thing exists.

(3.13) No one who believes in materialism knows that any material thing exists.

Since materialism implies the existence of material things, and since knowledge implies belief, we can conclude that no one knows that materialism is true.

4. Concerning Our Ontological Knowledge of Material Beings

As Michael Rea has argued (Rea 2002), anyone who believes in material things and who is a metaphysical realist must believe in individual persistence conditions and individual essences. A persistence condition is a proposition laying out either necessary or sufficient conditions for the continued existence of some material thing. Let's stipulate

that these conditions are logically non-trivial ones. Since it is very hard to see how we could know the persistence conditions pertaining to particulars as such without knowing that the same condition pertains to all the particulars in the same natural kind, we can focus on our knowledge of the persistence conditions corresponding to natural kinds of material things.

If a natural kind of thing has non-trivial persistence-conditions, it is very plausible to assume that they have *de re* modal essences as well. In fact, a persistence condition is itself a kind of modal proposition, stating that it is impossible for something to survive or fail to survive under specified conditions.

One cannot avoid the commitment to non-trivial persistence conditions by adopting either mereological universalism or mereological nihilism, nor does the commitment disappear by combining mereological universalism with a perdurance account of persistence (resulting in a world of arbitrarily disconnected spacetime worms). Here are a range of possible ontologies of persistence:

(4.1) Nothing persists, and simples never compose anything. (Persistence nihilism plus mereological nihilism: a world of space-time punctual things.)

(4.2) Nothing persists, and every set of simultaneous objects compose something. (Persistence nihilism plus mereological universalism: a world of instantaneous time-slices, each arbitrarily connected or disconnected in space.)

(4.3) Every set of simultaneous objects composes something, and every sequence of time-slices of objects constitutes the history of a persisting thing. (Persistence universalism plus mereological universalism: a world of arbitrarily connected or disconnected space-time worms.)

(4.4) Simultaneous simples never compose anything, and every sequence of time-slices of atoms constitutes the history of a persisting thing. (Persistence universalism plus mereological nihilism: a world of temporally extended space-time strings, each arbitrarily connected or disconnected through time.)

These four positions represent the four extremes: our common sense ontology lies somewhere in between, with some composite and enduring things, but with significant necessary conditions on both composition and persistence. It is important to bear in mind that one doesn't avoid the burden of ontological commitment by adopting one or another of the extreme views. Nihilists and universalists bear exactly the same epistemological burdens as do defenders of more common sense ontologies.⁶

⁶ I am setting aside the issue of endurance vs. perdurance: that is, the issue of whether persisting things persist by being “wholly present” (in some sense) at each moment, or whether they do so by having temporal parts or counterparts at each moment (see Sider 2001). The very same epistemological issues will apply in either case. It is hard to see

4.1 Knowing the Persistence Conditions and Individual Essences of Material Things

Materialism excludes the possibility of our knowledge of the composition and persistence conditions of material beings, because it entails the causal inertness of the identity and distinctness of material particulars. According to materialist thesis 1.2, it is only the arrangement of certain *kinds* of material bodies that can play a causal-explanatory role. The identity and distinctness of these bodies with bodies that have existed in the past or will exist in the future are otiose. In addition, it is only the *arrangement* of fundamental particles (or arbitrarily small, homogenous masses) that do all the causal work: whether these simples or masses *compose* anything can make no difference, and neither can it make any difference whether there are particles that persist through time or merely continuous sequences of instantaneous particle-stages, nor whether or not the instantaneous particle-stages compose a four-dimensional ‘worm.’⁷

how materialism could be compatible with knowing either of these positions to be the true one, but materialists might well be able to live with agnosticism on this issue.

⁷ The issue of what is commonly called ‘Aristotelian’ or ‘scientific essentialism’ (as in Ellis) is irrelevant, as Rea has pointed out (Rea 2002). Scientific essentialism is the thesis that there are natural kinds with real essences: that there are clusters of properties that must be co-instantiated if any of their members are instantiated at all. What I am focusing on here concerns the existence and persistence conditionals of *individuals*. Even if, for example, water has a scientific essence (viz., being H₂O), it does not follow that each

Since, as the Gettier-like thought-experiments demonstrate, causality is an essential component of knowledge, the lack of any causal connection between our ontological beliefs and the corresponding facts is fatal to a materialist epistemology of the ontology of material beings. Suppose, to re-use an earlier example, that we inferred true ontological beliefs from a false theological theory. Even if the process were perfectly reliable – the false theory hardwired into our brains, and the ontological truths all necessary – and even if the beliefs were formed in a perfectly reasonable way, the result could not constitute knowledge. Only if the ontological facts figure some way in the formation of our beliefs can those beliefs constitute real knowledge. Moreover, the lack of real connection, on the materialist's story, between the ontological facts and our intuitions gives us good grounds to doubt the reliability of those intuitions, resulting in a defeater (both of knowledge and of rationality).

Some anti-materialists can fare much better. Theists can appeal to the epistemic benevolence of the human mind's designer, together with the omnipotence of that designer with respect to the existence, composition, and persistence of material things, to provide the requisite causal connection. Similarly, Aristotelian forms make composition, generation and destruction, and their contraries, causally relevant to the histories of

watery individual is essentially watery, nor that each watery individual persists so long as it remains watery, nor that any contiguous mass of water molecules does (or does not) compose a single watery thing.

material things. Simples that compose an organism of a certain kind behave differently than they would if they failed to do so (a strong emergence of biological powers). On an Aristotelian picture, the causal laws governing such composition are diachronic: there are substantial, empirically discoverable laws of the persistence (as well as the generation and destruction) of things of the various natural kinds.

Anti-realists can argue that the composition and persistence conditions are determined by our linguistic conventions, or by features of our concepts (understood as contingent features of the human mind). On such a view, we could know the conditions by examining social practices or introspecting the workings of the human mind. However, any such conventionalism or conceptualism would be inconsistent with materialist thesis 1.4, making material entities into mind-dependent things, as Michael Rea has argued (Rea 2002, pp. 85-96).

4.3 The Unavailability to the Materialist of Mind/Brain Identity

Since materialists have no knowledge, either of the intrinsic natures nor of the persistence and composition conditions, concerning material objects, no materialist can have *de re* knowledge of any material thing. As Michael Rea has argued (Rea 2000, pp. 81-85), there seems to be no argument available to the materialist for the claim that there exist any material things at all, given that the materialist can point to no single instance. For the materialist, the category of material things corresponds to a bare epistemic possibility: a domain of *we-know-not-what* that may, for all we know, exist.

Each human being knows that he or she exists. The materialist must claim that each human being is identical to some material being, although he is ignorant of what material thing it is to which the human being in question is identical. In fact, the supposed identity of the material thing with a conscious human being is the only thing the materialist can claim to know about it. This puts the materialist in an impossibly weak dialectical position with respect to the mind/brain (or person/body) identity thesis. Any plausibility to the identity thesis depends on our being able to identify, antecedently, the two things that are to be identified. This is just what the materialist cannot do. He can identify the mind or person, in the usual Cartesian way, but he lacks epistemic access to the supposed material counterpart.

Ironically, it is only anti-materialists, such as theists or Aristotelians, who are in a position to articulate and defend such an identity thesis, since they can legitimately claim to have knowledge of the material side of the ledger, and they can justify the identity thesis on familiar Ockhamist grounds, as effecting a simplification of their ontology. Without a positive ontology of the material, the materialist can make use of no such rationale. The materialist can employ Cartesian grounds for positing the existence of the conscious self but lacks any grounds for positing the existence of any *body* with the sort of composition and persistence that would be needed to match the boundaries and survival conditions of the human mind. Without independent grounds for believing in such bodies, the materialist lacks the resources to defend a mind/brain or self/organism identity thesis.

5. Concerning Our Knowledge of Mathematics and Logic

5.1 The Unavailability of Mathematical Platonism

A materialist who posits mathematical objects (such as the numbers) as real, immaterial entities is barred from supposing that mathematical knowledge is possible, since the required causal connection will always be absent. At best, the materialist can suppose that we have justified true belief about mathematics. Gettier thought-experiments reveal the gap between such justified true beliefs and real knowledge. For example, suppose a mathematician believes the axioms of Peano arithmetic because they can be derived as theorems from an extremely plausible but false set theory (like Frege's inconsistent theory of extensions). The mathematician's beliefs would be true and justified but fall short of knowledge, in a way exactly analogous to the original Gettier cases.

Mathematical knowledge depends on our somehow grasping or seeing (note the causal idioms) the facts that verify our axioms. This would be true even if the mathematical beliefs of humans had no chance of being false: if, for example, humans derived their mathematical beliefs from a false but biologically hard-wired theory.

Similarly, suppose that a mathematician accepts the axioms of arithmetic as self-evidently true as a result of post-hypnotic suggestion (and suppose further that the hypnotist wrongly believes the axioms to be false, intending to deceive the mathematician). Such a mathematician would be in exactly the same phenomenological

state and inclined to grasp the very same fundamental truths as a mathematician who knows arithmetic to be true and yet would lack this knowledge.

Since the materialist cannot accept the existence of a causal connection between mathematical facts and human intuition, materialist must embrace some form of anti-realism about mathematics. As Hartry Field has pointed out (Field 1980, Field 1985), the usefulness of mathematics for theoretical science depends simply on its logical consistency (or, to be more precise, on its being a *conservative extension* of the nominalistic version of the physical theory). Thus, to gain knowledge through applied mathematics, all that is required is knowledge of the logical consistency of mathematics.

This Fieldian strategy could be fleshed in either of two ways: Field's own fictionalist approach, which treats mathematical theories as false but useful because consistent, and modal-structuralist approaches, which treat mathematical assertions as true because asserting merely the (logically) possible existence of certain kinds of mathematical structure.

However, Field and other materialists have provided no explanation of our knowledge of the logical consistency of infinitary mathematical theories. How, for example, could we know that the axioms of Peano or Robinson arithmetic are mutually consistent? It cannot be by being able to find physical models of the axiom systems, since we are acquainted only with finite systems of material things. We know from Gödel's work that any mathematical theory powerful enough to prove the consistency of arithmetic must be at

least as strong as arithmetic, with the result that any such proof would be question-begging. In fact, we are confident that the theory of arithmetic is possibly true simply because we believe that it has an actual model, viz., the natural numbers themselves. As Frege puts it in *The Foundations of Arithmetic*: ‘Strictly, of course, we can only establish that a concept is free from contradiction by first producing something that falls under it.’ (Frege 1959, p. 106)

Field’s response is to claim that we can know the axioms of arithmetic to be logically possible on the basis of our failure over a large number of attempts to derive any explicit contradiction from them (Field 1984, pp. 520, 524). It is obvious that such ‘evidence’ falls woefully short of supporting any claim to knowledge. If we think of our attempts to find a contradiction as some kind of random sample of the theory’s consequences, we face a number of objections: (i) we have no reason to think that our attempts are genuinely a random sample, (ii) even if the sample justified the claim that the ratio of successful derivations of a contradiction to failures to do so was extremely low, this would give us no good reason to suppose that the ratio is equal to zero, and (iii) Field’s evidence presupposes our knowledge of the completeness of first-order logic, which is simply another piece of supposed mathematical knowledge.

To know that the axioms of arithmetic are logically consistent or logically possible is itself a piece of *mathematical* knowledge, knowledge at least as strong in content as the knowledge of arithmetic itself. Hence, retreating to consistency or logical possibility

offers no epistemological advantages whatsoever. The mystery of mathematical knowledge is left precisely where it was.⁸

Once again, we can deploy Plantinga's evolutionary defeat argument here. Since there is no connection between our beliefs in the truth, possible truth, or logical consistency of our mathematical theories and the corresponding mathematical facts, the objective probability that our beliefs correspond to the facts is extremely low. In addition, since natural selection is interested only in reproductive fitness, and there is no plausible linkage between reliable mathematical intuition about infinitary systems and the reproductive fitness of our ancestors in the remote past, we have good grounds for doubting whether the human brain is a reliable instrument for detecting such mathematical truths. As long as the inconsistencies in our mathematical beliefs do not reveal themselves in the sort of simple situations encountered regularly by primitive human beings, mistaken intuitions of consistency would be biologically harmless.

5.2 Knowledge of Logical Implication & Necessity

In the case of our knowledge of logical necessity (and the associated properties of implication and inconsistency), the materialist is in a somewhat stronger position but still faces serious obstacles. Here again, if materialism is true, there is a lack of causal

⁸ For more details, see *Realism Regained* (Koons 2000, pp. 169-193) and my review of Field's book (Koons 2003).

connection between the logical facts and our beliefs and practices. Consider, for example, someone who believes the law of excluded middle only because of the assurances of astrology, or because the law is deducible from an inconsistent logic. Such a reasoner would lack knowledge of the law, on Gettierian grounds.

Are logical beliefs subject to Gettier-like conditions? It is plausible to argue that some are not: the core principles of a minimal logic, the common ground between classical and ‘deviant’ logicians (e.g., defenders of intuitionist, relevantists, sub-structuralist, paraconsistentist, or quantum logics). These core beliefs cannot be reasonably doubted, and the combination of unvarying belief with necessary truth might be considered adequate to secure a non-accidental connection. However, this supposition will not secure all of the logic required for classical mathematics: the law of excluded middle, double negation removal, distribution of conjunction over disjunction, *ex falsum quodlibet*. These ‘peripheral’ principles of logic are not indubitable. We know that they can be doubted, because reasonable people have in fact doubted them.

Moreover, even in the case of the stable core of minimal logic, the materialist faces a problem of defending our knowledge of the *modal status* of logical truths. We not only know that the law of excluded middle is true: we also know that it is true as a matter of logical necessity. The materialist, however, cannot ward off a Plantinga-style defeater for this modal knowledge. The materialist cannot suppose there to be any causal connection between logical necessities and the bounds of human conceivability. Natural selection could very easily have resulted in a brain that is bound by some constraints of

conceivability that do not correspond to any logical necessity. In fact, it almost certainly has done so: inconceivability is, in general, a fallible guide to impossibility. Thus, the objective probability that any given constraint of conceivability does correspond to a logical necessity is low or inscrutable, resulting in a defeater of our modal beliefs about core logical truths.

An anti-materialist, in contrast, can take inconceivability as a reliable indicator of logical impossibility, by relying on the supposition that we can (through introspection or reflection on our thoughts) discern that certain things are *absolutely* unthinkable (following Aristotle's argument for the law of contradiction). This assumption in turn depends on conscious thought's having a real *nature*, and this the materialist must deny. For the materialist, introspection can, at best, reveal something about the constraints on the physical realization of thought in the human brain, but absolute unthinkability does not follow from being merely unthinkable-by-us. There are a variety of possible explanations of the fact that we find the denial of the law of contradiction to be unthinkable, many of which have nothing to do with its truth.

The materialist might reply that we wouldn't count something as *thought* if it didn't follow the core principles of logic. However, this distinction between thought and near-thought cannot be supposed to cut nature at the joints, since it is in itself causally otiose. On this view, if I recognize the unthinkability of the denial of the law of contradiction, I am merely reflecting on our conditions for the use of the word 'thought', and this cannot secure the relevant sort of reliability. Although I cannot *think* the law of contradiction to

be false, I can *nearly-think* so, where nearly-thinking involves a physical structure close to the actual structure of the brain that fails merely to satisfy all the conventional standards for *thinking*.

In contrast, the anti-materialist can suppose that conscious thought has a real essence, one that could reveal itself in through introspection and the exercise of imagination. One could then discover that it is absolutely unthinkable (by any form of consciousness) that certain laws fail to hold. If truth lies in a correspondence between the mind and the facts, then absolute unthinkability excludes the possibility of falsehood and could secure the reliability of a judgment of logical necessity.

If materialism lacks the resources for an account of our knowledge of logical possibility and necessity, then it cannot be combined with any account of mathematical objectivity (such as fictionalism or modal structuralism) that relies on logical modality. Tarski's work is thought to have de-mystified logical modality for materialists by showing that claims about logical necessity or possibility can be understood as ordinary mathematical claims (about the existence or non-existence mathematical models of certain kinds).

Fictionalists and structuralists hope to de-mystify claims about mathematical object by showing that they can be understood as assertions of the logical consistency of sets of axioms and of the logical implication by those axioms of mathematical theorems.

However, one cannot simultaneously claim that talk of logical modality is merely talk about mathematical objects in disguise, and that talk of mathematical objects is merely

talk about logical modality in disguise. Once again, the materialist is trapped in a vicious circle.

6. Concerning the Constitution of Epistemic Normativity

Epistemology is inherently normative. A non-normative ‘epistemology’ (such as Quine’s naturalized epistemology) is merely a branch of empirical psychology and abandons any attempt to answer the unavoidable questions of epistemology, such as: what does rationality in respect of our opinions and affirmations? Epistemological notions such as *knowledge*, *justification*, and *rationality* are all normative in essence. If the price of materialism were the utter disavowal of all epistemology, this price would be unacceptably high, as Jaegwon Kim has argued (Kim 1988).

Here is the problem: what, for materialists, do facts about normativity consist in? A materialist could embrace G. E. Moore’s non-naturalism, asserting that normative facts involve properties and relations that are fundamentally non-physical. However, this creates two difficulties: first, by making normative facts both causally inert and independent of all physical facts, the materialist could have no account of how we might come to know them, and, second, by positing a weird and inexplicable dichotomy within

the world, with inexplicable metaphysical connections (i.e, the strong supervenience of the normative on the non-normative) between the two realms.⁹

In addition, the combination of Moorean non-naturalism with materialism undermines the possibility of normative knowledge, for the same kind of reasons discussed above.

Without a causal connection between objective norms and our normative beliefs, justified normative beliefs, even if true, fall short of knowledge on Gettier grounds. In addition, we would have good grounds for doubting the reliability of our normative beliefs, resulting in a universal defeater of claims to normative knowledge, including knowledge about what constitutes good scientific and philosophical practice.

6.1 The Impossibility of Constructivist or Projectivist Accounts

⁹ Isn't it chutzpah for the anti-materialist to charge the Moorean materialist with a 'weird' metaphysics? It's not the case that normative facts are inherently weird: the weirdness I'm pointing to lies in the mismatch between normative facts and all the other facts acknowledged by the materialist. Irreducibly normative facts have a much more natural home within an anti-materialist cosmos, whether theistic, dualistic or Aristotelian. In addition, if there are strongly emergent biological entities (organisms) and activities (behaviors, modes of exploiting the environment), of a sort incompatible with materialism, then the prospects of a reduction of the normative to the non-normative along the lines of Wright and Millikan are much greater.

Besides normative anti-realism and Moorean dualism, the materialist has only two remaining options: to claim that all norms are somehow a projection of human practices and preferences, or to provide a physical basis for normativity that is independent of our deeds and attitudes. There is a simple and compelling objection to all projectivist and constructivist accounts of normativity:

(6.1) Some doxastic or prescriptive intentionality is ontically prior to all social conventions, practices, attitudes, preferences, etc. (since the existence of social conventions, practices, etc. depends on certain beliefs and intentions on the part of the participants).

(6.2) Some normativity is not ontically posterior to any doxastic or prescriptive intentionality (since a certain kind of normativity is inherent in all intentional representations: there being something normatively defective about misrepresentation).

(6.3) Ontic priority is transitive and irreflexive.

Therefore:

(6.3) No social conventions, practices, attitudes or preferences are ontically prior to all normativity.

By ‘doxastic’ intentionality I mean the intentionality of states of belief, opinion and knowledge, while ‘prescriptive’ intentionality is that which characterizes intentions, preferences, wants and desires. Thesis 6.1 is clearly true, I think. Only doxastic and prescriptive intentional states or practices incorporating such intentional states are capable of projecting or constructing normative facts. Brute behavior, described in physical terms, does not such thing. The argument turns, then, on the plausibility of thesis 6.2: the inherent normativity of all doxastic and prescriptive intentionality.

In both cases, there is a proper fit between the state and the world: beliefs are supposed to be true, and intentions are *supposed to be* carried out (at least prima facie so, and provided that they are not themselves normatively defective in some way), desires are (other things being equal and with similar provisos) *supposed to be* satisfied, and so on. The normative aspects of these states are almost certainly essential to them and play an indispensable role in our folk-psychological specifications of them.

Moreover, the only possible accounts of intentionality that are available to the materialist ensure that some normativity is not posterior to all intentionality. A materialist account of intentionality must secure the distinction between veridical representation and misrepresentation. This distinction must be grounded either in some form of pre-representational normativity (such as biological teleology) or in the conventional norms of interpretation (that is, the norms governing the best assignment of content to representational states). The first alternative corresponds to the teleosemantics (e.g., Millikan, Dretske and Papineau) and the second to David Lewis’s best-interpretation

semantics. In both cases, there are normative facts that are explanatorily prior to the facts about intentionality, as 6.2 requires.

There is, however, a devastating problem for the best-interpretation model: vicious circularity. If we are supposed to be in a position to know what the canons of good interpretation are, these must be founded on social convention or prescription. This contradicts 6.2. If, on the contrary, the canons of good interpretation are consist in fully objective facts about certain functions, and these functions are merely picked out rigidly by our conventions in the actual world, then we have no reliable knowledge of them, since our transworld conventions of ‘good interpretation’ don’t track these objective facts. Thus, the materialist is left with some form of naturalized teleology as the only viable account of normativity.

6.2 Problems for the Materialist with Naturalized Accounts of Normativity

Accounts of naturalized teleology all make use of causation. For example, on the account first developed by Larry Wright (Wright 1972) and followed, in general terms, by Millikan (Millikan 1984) and Papineau (Papineau 1993):

(6.4) The property P of organism O is *supposed to* bring about effect E iff the complete causal explanation of O’s existing and having property P includes the fact that being P tends to cause E. (Wright 1972)

A variant of 6.4 applies the same idea to the carrying of information by, for example, beliefs and perceptual states.

(6.4.1) The property P of organism O is supposed to carry the information that E iff the complete causal explanation of O's existing and having property P includes the fact that P carries (or tends to carry) the information that E.

An alternative, more Skinnerian approach, connects normativity with positive reinforcement:

(6.5) The property P of organism O is *supposed to* bring about effect E iff O's being P tends to cause E, and the complete causal explanation of O's being P (or having been P in the past, or being disposed to be P in the future) includes the fact that O's being P tends to cause E.

(6.5.1) The property P of organism O is supposed to carry the information that E iff O's being P carries the information that E, and the complete causal explanation of O's being P includes the fact that O's being P carries the information that E.

In both cases, causation plays a dual role: linking P as cause to E as effect (or linking P with the information that E), and linking the P to E connection to O's being (or continuing to be) P. At this stage, I will propose a dilemma for the materialist, and I will argue that on either horn of the dilemma, the materialist account of normativity must fail.

Humean vs. Anti-Humean Accounts of Causation

The dilemma turns on the question of whether the materialist embraces a Humean or anti-Humean conception of causation. On the Humean account, a causal connection between two events or between the aspects or properties of two events consists simply in a relation between the event-types or property-types in question. On the anti-Humean account, there is, in addition to and not supervenient upon all such facts about types, a connection or *nexus* at the level of token-events or token-properties (or tropes). This non-Humean causal tie could consist in a primitive sort of entity, as in Michael Tooley's *Causation: A Realist Account* (Tooley 1987), or it might consist in the persistence of a trope, as in Douglas Ehring's *Causation and Persistence* (Ehring 1997), or in some token-token modal connection, such as the asymmetric necessitation of the existence of the cause-token by the existence of the effect-token, as in my own *Realism Regained* (Koons 2000). A causal-powers metaphysical theory would also count as anti-Humean, with the connection between tokens provided by the primitive, irreducible relation of *the exercise of a causal power*.

For Humeans, there are no such token-token causal ties. Instead, the existence of a causal connection between two events or event-aspects consists entirely in some kind of counterfactual covariation of the events (without reference to non-qualitative individual

haecceities), or some regular or nomic concatenation¹⁰ of the two types. For example, David Lewis's counterfactual theory of causal influence (Lewis 1973, Lewis 2001) is paradigmatically Humean. Event C causes event E just in case, had C not occurred, E would not have occurred either. The semantics of the Lewisian counterfactual makes no reference to the individual essences or non-qualitative haecceities of the two events: instead, we look at worlds that are similar to the actual world, both in exact match in the distribution of qualities over regions of space and time, and in the law-like regularities that are more or less perfectly observed. Thus, the presence or absence of a causal connection between two events, for the Humean, turns only on their intrinsic qualities, their spatial and temporal proximity, and on the laws of nature (both strict and non-strict) in which the events' types figure.

The Difficulty with Humean Materialism: Radical Indeterminacy

The central problem with a Humean-materialist account of teleology is that of a radical indeterminacy of content. The indeterminacy has two sources: (i) the mismatch between insensitivity of the causal context and the fine-grainedness of the content of norms, and (ii) the circularity of the account.

¹⁰ It's enough, as David Lewis noted (Lewis 1973), for the two types to be linked by a defeasible, *ceteris-paribus* law.

The charge of indeterminacy based on the insensitivity of causation to subtle distinctions of content is not a novel one: it is simply to point out that ‘natural selection’ is merely a metaphor. Its literal sense would require a reified, purposeful Nature to do the selecting. Once we unpack the metaphor, realizing the ‘Nature’ is nothing but a name for the totality of physical factors, we should see that Nature cannot select for features with the kind of fine-grained sensitivity that is required for an adequate account of human intentionality (as Jerry Fodor has argued in a recent paper – Fodor 2007).

If understood in Humean terms, causation is a relatively crude instrument, a blunt weapon incapable of distinguishing features that co-vary in a regular way across nearby worlds. If feature A and feature B are co-extensive in the historically relevant situations across the set of relevantly close possible worlds, then one can be substituted *salve veritate* for the other in a counterfactual conditional, and, for the Humean, in a causal context. The result is an intractable mismatch between the semantics of causation, on the one hand, and the hyper-intensional notion of intentional content.

It is the liberality with respect to substitution that gives the Humean a ready solution to the problem of mental causation. Even if mental types are not identical to physical types, and even if all causal laws involve only physical types, the instantiation of a mental type can still (for the Humean) be causally relevant by virtue of the substitutability of mental terms for physical terms within the relevant counterfactuals. This liberality is a virtue in the case of mental causation, but a damning vice in the case of providing a causal account

of normativity and intentionality. As Fodor argued in an earlier essay (Fodor 1990, p. 73):

. . . appeals to mechanism of selection won't decide between cases of *reliably equivalent* content ascriptions; i.e., they won't decide between any pair of equivalent content ascriptions where the equivalence is counterfactual supporting. To put this in the formal mode, the context: *was selected for representing things as F* is transparent to the substitution of predicates reliably coextensive with *F*. . . In consequence, evolutionary theory offers us no contexts that are as intensional as 'believes that . . .' If this is right, then it's a conclusive reason to doubt that appeals to evolutionary teleology can reconstruct the intentionality of mental states.

When this limitation on the Humean approach is run through the purported reductions of normativity in propositions 6.4 and 6.5, the result is that all norms are radically indeterminate in content. If *N* is a norm, *A* is a property involved in *N*, and property *A* and *B* are nearly co-extensive in relevant situations across nearby worlds, then *N'* will also count as a norm, where *N'* results from replacing *A* with *B* in *N*. The Humean account of normativity falls into the grip of what Fodor has called the 'error problem' or the 'disjunction problem': 'such theories can't distinguish between a true token of a symbol that means something that's disjunctive and a false token of a symbol that means something that's not.' (Fodor 1990, p. 59)

Suppose, for example, that there is an epistemic norm that, when one believes that there are m A's that are B, and n A's that are not B, one should believe that there are at least $m+n$ A's altogether. The property of there being $m+n$ A's is co-extensive in the historically relevant situations with the property of there being m *quus* n A's, where *quus* differs from *plus* only on pairs of numbers that human beings have never before added before (see Kripke 1982). As a result, the Humean account entails that there is a norm enjoining quaddition in such situations.

Again, suppose that there is an epistemic norm that, when one is appeared to greenly, one should believe (in the absence of contrary evidence) that one is seeing something green. The property of being *grue* (Goodman 1973) is co-extensive in historically relevant situations in nearby worlds with the property of being green. There would be, therefore, a norm enjoining belief in one's seeing something *grue* under those conditions. Similarly, if there is an epistemic norm that enjoins believing that one sees a horse when one is appeared to horse-ly, so there will be a counterpart norm enjoining that one believe that one is seeing a horse-or-equine-looking cow when one is appeared to horse-ly, so long as the disjunctive type of horse-or-equine-looking cows and the type of horses have been co-extensive in the historically relevant situations across nearby worlds. The Humean is thus forced to recognize in each case two, mutually inconsistent norms as equally binding. Any particular belief that violates an epistemic norm will also accord with a counterpart of that norm, and vice versa. The Humean will be unable to distinguish epistemically normal from epistemically abnormal beliefs and inferences, rendering the account of normativity vacuous.

The second source of indeterminacy of the Humean-materialist account of normativity and intentionality is this: the Humean account of *causation* is an ineliminably mind-dependent one. As I have argued in section 6.3, the materialist must adopt an anti-realist conception of the laws of nature: what counts as a law of nature depends on what we take to be an adequately eloquent formulation of a possible law. Moreover, as David Lewis showed in *Counterfactuals* (Lewis 1973), the standards of relative ‘closeness’ of possible worlds are determined by our own interests and intentional practices.¹¹ However, as we have seen, the normativity that is constitutive of intentionality cannot be ontically posterior to any intentionality. The Humean materialist offers a viciously circular reduction, making intentionality depend on causation, and causation depend on intentionality.

The Humean-materialist account of normativity is circular in a second way: by its tacit appeal to phenomenologically grounded properties and event-types. Given materialist

¹¹ Could the Humean materialist deviate here from Lewis and posit an ontologically primitive, metaphysically privileged relation of counterfactual closeness? No, for two reasons. First, such an account would leave us no explanation for the epistemic role of our beliefs about scientific laws in shaping our judgments about counterfactual conditionals. Second, because such primitive facts about relations between worlds would themselves have no causal efficacy and so would leave our supposed knowledge of them vulnerable to Gettier-like refutation.

thesis 1.2, it is only the fundamental, microphysical types that truly carve nature at the joints. Only they correspond to natural properties. However, the causal account of normativity must appeal to macroscopic features of human behavior and the human behavior: response-dependent features like color, visible shape, basic bodily movements. All of these types are, for the materialist, mere projections of human intentionality. Since intentionality is inherently normative, the materialist cannot legitimately make use of such types in providing a reductive account of normativity.

The Humean can avoid this circularity, as indeed David Lewis did,¹² by insisting that our practices of picking the ‘best’ system of laws and the ‘appropriate’ transworld similarity relation fix the reference of these terms *rigidly* – picking out a fully objective fact about those systems and those relations (e.g.. the fact that they correspond, as inputs, to the maxima of some fixed utility function). This avoids the ontic circularity, but it introduces a new semantic or metalinguistic circularity (with the result of a radical indeterminacy of content). Since we are attempting to fix the reference of terms in our theory that are prior to and constitutive of intentionality itself (namely, ‘proper function’ and ‘causation’), there had better be something in the world that is especially ‘eligible’ (to use David Lewis’s term)¹³ – a reference magnet on the side of the world that provides the terms with reasonably determinate extensions. However, a Humean account of causation and a Lewisian account of counterfactuals and laws provide no such magnets, and neither does

¹² This was pointed out to me by Michael Rea.

¹³ In Lewis 1983 and 1984.

the microphysicalist's account of macroscopic properties. The functions that pick out (from the point of view of the actual world) the best laws, similarity relations and macro-properties belong to continua of functions without sharp boundaries. (For obvious reasons, the materialist cannot appeal here to an ontological primitive intentional reference relation.)

One might try to render the semantic circularity harmless by proposing a **simultaneous** definition of *law*, *counterfactual closeness*, *macroscopic similarity* and *normativity*. We would then use a fixed-point construction to identify the acceptable interpretation of the set of simultaneously-defined terms. However, fixed points don't always exist, and, when they do, they are typically not unique. In this case, there is real doubt about whether any fixed point exist, since it is unclear (as I argued earlier) that nature could select for the capacity to recognize the actual laws of nature and (consequently) the causal powers of things. If we assume, however, that nature can select for this capacity, then we have good grounds for believing that there are an infinite number of fixed points, which together span the entire space of possible norms.

This strategy of simultaneously defining causation, counterfactuals, laws, normativity and content is vulnerable to Hilary Putnam's model-theoretic argument for the radical indeterminacy of content (Putnam 1981). There are infinitely many, widely divergent functions that fit our actual practice equally well and that are mathematically and (on Humean grounds) ontologically on a par. For each bizarre, 'gruesome' assignment of lawlikeness and counterfactual closeness, there is a correspondingly bizarre interpretation

of mental content and norms such that it is plausible to suppose that (under the stipulated theory of laws and causal relations) nature has selected humans for the capacity to form beliefs with the corresponding content. The fundamental problem for the Humean materialist is that the facts left in the ontological basis of the theory (the ‘Humean mosaic’ of microphysical qualities distributed across spacetime) is simply too thin to constrain in any meaningful way the vast superstructure of scientific laws, causation, intentionality, and normativity (to say nothing of phenomenology).

The Difficulty with Anti-Humean Materialism: The Causal Irrelevance of the Macrophysical

A popular idea in recent philosophy, the introduction of so-called ‘truth-makers’, can be enlisted in the construction of a non-Humean alternative account of causation. These truth-makers are concrete parts of the world that are responsible for grounding the truth-values of statements and propositions. They can be conceived of as either situations or states of affairs (something like the atomic facts of the logical atomism of Russell and Moore) or as tropes (abstract particulars, scholastic individual accidents). For my purposes here, further specification of these truth-makers, states of affairs, or tropes is not needed.

If, on this non-Humean view, there are non-physical aspects of events that genuinely enter into causal explanations of physical events, then the physical domain cannot be causally complete. This means that materialism is inconsistent, thanks to theses 1.1, 1.2

and 1.3, not only with mental causation, but with causation associated with any of the special sciences (i.e., with anything except fundamental microphysics).

Consider again the teleofunctional account of normativity of the Wright-Dretske-Millikan variety. Teleofunctional accounts of proper functions assume that gross, macroscopic properties can be causally explanatory. For example, the teleofunctionalist's explanation for why the proper function of the wing is to support flight depends on the assumptions that having wings is part of the causal explanation for flight, and that flight is part of the causal explanation for the successful survival and reproduction of birds, bats, insects, and so on.

However, as Trenton Merricks (Merricks 2001) has argued, a materialist (who rejects any emergent causation at the macroscopic level) should reject the existence of all macroscopic objects (including wings). All the considerations that motivate physicalism also motivate microphysicalism, the view that the *microphysical* world is causally closed. All the causal work supposedly to be done by wings is actually done by a large number of fundamental particles arranged wing-wise. Analogously, the macroscopic *property* of being arranged flight-wise or being arranged wing-wise does no causal-explanatory work, given the anti-Humean view of causation. For the anti-Humean materialist, all of the real explanatory work is done by simply aggregating the microphysical properties of a large number of particle-trajectories. Macroscopic properties like being wing-shaped or flying do not cut the world at its causal joints. They are, for the anti-Humean materialist, grue-like, massively disjunctive, gerrymandered properties. They seem natural to us only from

an anthropomorphic perspective. When we describe a bird as flying, we are thinking of it from the perspective of reverse engineering: we are imposing upon the bird a hypothetical design plan. We are projecting upon the bird the intentions that we would have if we were trying to design such a creature for the tasks of survival and reproduction. The anti-Humean materialist cannot imagine (given thesis 1.3) that describing natural things in this way reveals genuine, mind-independent causal connections.

Thus, except for microscopic functions, like hemoglobin's function of binding and releasing oxygen molecules, the teleofunctional account cannot account for biological proper functions, if anti-Humean materialism is assumed. A fortiori, it cannot account for the mental functions of brain states.

The materialist must suppose that natural selection and operant conditioning work on a purely physical basis (without presupposing any prior designer or any prior intentionality of any kind). According to anti-Humean materialism, only microphysical properties can be causally efficacious. Nature cannot select a property unless that property is causally efficacious (in particular, it must causally contribute to survival and reproduction). However, few, if any, of the biological features that we all suppose to have functions (wings for flying, hearts for pumping bloods) constitute microphysical properties in a strict sense. All biological features (at least, all features above the molecular level) are physically realized in multiple ways (they consist of extensive disjunctions of exact physical properties). Such biological features, in the world of the anti-Humean

materialist, don't have effects -- only their physical realizations do. Hence, the biological features can't be selected. Since the exact physical realizations are rarely, if ever repeated in nature, they too cannot be selected. If the materialist responds by insisting that macrophysical properties can, in some loose and pragmatically useful way of speaking, be said to have real effects, the materialist has thereby returned to the Humean account, with the attendant difficulties described in the last sub-section. Hence, the materialist is caught in the dilemma.¹⁴

7. Conclusion

¹⁴ I am not claiming that all macroscopic properties are *equally* unnatural. Some are definable in terms of microphysical properties in relatively simple and direct ways: primary qualities (like mass, velocity, shape and net electric charge), mineralogical properties (crystalline structure), thermodynamic features (entropy), or chaos-theoretic features (within a strange attractor). There are two reasons why such relatively natural microphysical properties are of no use to the materialist. First, the features of behavior, organic processes and ecological factors that are relevant to the definition of macroscopic biological functions (and, a fortiori, of psychological functions) are not even remotely natural. Second, even though the macrophysical properties are *relatively* natural, their instantiations still consist in nothing over and above the arrangement of microphysical tropes, and, for the anti-Humean, it is only the latter that can stand in causal relations to each other.

Apparently, the majority of Anglophone philosophers would accept 1.1, 1.2 and 1.3, but reject 1.4 (metaphysical realism). Is it coherent to combine metaphysical anti-realism (which amounts to a form of idealism) with a thoroughgoing materialism about the contents of the phenomenal (constructed or projected) world? Surely this involves some sort of vicious circularity. If A totally depends on B, then B cannot be wholly constituted by A.

To put this in another way, the causally fundamental features of the world must be intrinsic to the things that bear them. They cannot be simultaneously fundamental (in the causal order) and mere projections (metaphysically speaking). What is a mere projection can do no real causal work. If the existence and fundamental nature of the whole realm of material things depends on some features of the human mind, then it is those features of the mind, and not the so-called 'natures' of material things, that must carry the load of causal explanation. Neither the causally fundamental features of a thing, nor the very existence of the thing bearing these fundamental features, can consist in some extrinsic facts about other things, like human minds or societies.¹⁵ Given these principles, thesis 1.2 must entail 1.4, ruling out the hybridizing of materialism and idealism. The failure of many to see this is due to a failure to step back and simply look at the big picture.

¹⁵ In addition, Michael Rea has developed a fascinating argument to the effect that any form of anti-realism entails the truth of something in the neighborhood of theism (Rea 2002, 147-155)/

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