

# Against Parthood\*

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In Karen Bennett and Dean W. Zimmerman, eds., *Oxford Studies in Metaphysics*, volume 8 (Oxford: OUP, 2013): 237–93

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I will defend what Peter van Inwagen calls nihilism: composite entities (entities with proper parts) do not exist.<sup>1</sup> This formulation will need to be refined, and, at the very end of the paper, softened a little. But let us stick to the simple, strong version for now.

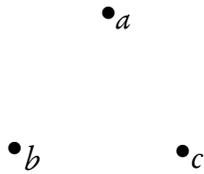
Nihilism may seem absurd. For the world of common sense and science consists primarily of composite entities: persons, animals, plants, planets, stars, galaxies, molecules, viruses, rocks, mountains, rivers, tables, chairs, telephones, skyscrapers, cities... According to nihilism, none of these entities exist.

But it is not absurd to reject such entities if one accepts their noncomposite subatomic particles. Consider three subatomic particles, *a*, *b*, and *c*, arranged in a triangular pattern. According to some, there exists in addition a fourth thing, *T*, which contains *a*, *b*, and *c* as parts. According to me, this fourth thing does not exist. Picture the disagreement thus:

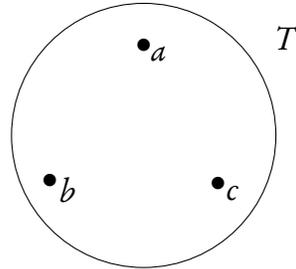
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\*Thanks to Frank Arntzenius, Elizabeth Barnes, Karen Bennett, Jiri Benovsky, Mike Bergmann, Ben Caplan, Ross Cameron, John Collins, Earl Conee, Shamik Dasgupta, Janelle Derstine, Sinan Dogramaci, Cian Dorr, Tom Dougherty, Matti Eklund, Hartry Field, Kit Fine, Anthony Fisher, Pete Graham, Yu Guo, John Hawthorne, Allan Hazlett, Sophie Horowitz, Michael Huemer, Tom Kelly, Josh Knobe, Rob Koons, Martin Lin, Ned Markosian, Kris McDaniel, Trenton Merricks, Jill North, Lewis Powell, Jim Pryor, Josh Schechter, Nico Silins, Steve Steward, Margot Strohminger, Sarah Stroud, Meghan Sullivan, Jason Turner, Bruno Whittle, Dean Zimmerman, to anonymous referees, and especially to Liz Harman for much wisdom and patience.

<sup>1</sup>van Inwagen (1990). “Proper parts” of *x* are parts of *x* other than *x* itself (it is customary to count entities as being parts of themselves). By ‘composition’ I have in mind only mereological composition, i.e., composition by parts, though I do discuss sets in the final section. Other nihilists include Cian Dorr (2002) and Ross Cameron (2010*b*); see also Dorr (2005). See Dorr and Rosen (2002) for a defense—partly overlapping mine—of nihilism against objections. For stylistic reasons I often speak of existence, but as a good Quinean I intend this to be recast in terms of quantification.



According to me



According to my opponents

(But take the picture with a grain of salt: my opponents don't think that  $T$  is encircled by a faint aura, or accompanied by a ghostly " $T$ ".) My opponents and I agree on the micro-description of the situation: on the intrinsic states of the particles (such as their charges and masses) and their spatial arrangement. Our sole disagreement is over whether these particles are accompanied by a further object that is composed of them.

Since I accept the existence of the particles, my denial of an object composed of them isn't absurd. Denying that  $T$  exists *in addition to*  $a$ ,  $b$ , and  $c$  is no more absurd than denying that holes exist in addition to perforated things, or denying that smirks exist in addition to smirking faces. Similarly, denying the existence of persons, animals, plants, and the rest is not absurd if one accepts subatomic particles that are "arranged person-wise" (to use van Inwagen's phrase), animal-wise, plant-wise, and so on.

Indeed, it would seem that ordinary evidence is neutral over whether composite objects or merely appropriately arranged particles exist. Which hypothesis is correct is thus an open philosophical question, like the question of whether there exist holes and smirks.

That is just the first skirmish; a series of battles is yet to be fought. Some say that the existence of persons and other composites is common sense; others say that we know of composites through perception; still others say that the dispute between nihilists and their opponents is merely verbal. But before discussing these and other challenges, I should say why I think that nihilism is true.

## 1. The argument from ideological parsimony<sup>2</sup>

Quine famously distinguished between ideology and ontology.<sup>3</sup> A theory's ontology consists of the objects that the theory posits—the range of its quantifiers, if the theory is to be true. Its ideology consists of the undefined notions it employs, both logical and extra-logical. In addition to eliminating composite objects from our ontology, nihilism also allows us to eliminate the extra-logical (or perhaps quasi-logical) notion of 'part' from our ideology, and this kind of ideological simplification is an epistemic improvement. Nihilism is an ideologically simpler theory, and so is more likely to be true.<sup>4</sup>

This argument from ideological parsimony is, I think, more powerful than the argument that nihilism is ontologically parsimonious. Many agree that simply cutting down on the number of entities one posits isn't particularly important.<sup>5</sup> Also, many defenders of parts say that there is something distinctive about parthood which makes commitment to mereologically complex entities somehow "innocent",<sup>6</sup> a thought which perhaps defends against the argument from ontological parsimony, but not at all against the argument from ideological parsimony.

The argument presupposes an epistemic principle: ideologically simpler theories are more likely to be true.<sup>7</sup> The intuitive basis of the principle is the vague but compelling idea that simplicity is a guide to truth, together with the thought that eliminating primitive notions makes a theory "structurally" simpler. A theory's one-place predicates correspond to the kinds of things it recognizes, and its multi-place predicates to the kinds of connections between things that it recognizes; cutting down on kinds or connections is one way of making a theory structurally simpler.

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<sup>2</sup>This argument was inspired by Cian Dorr's (2005) claim that nihilists ought to regard 'part' as a failed natural kind term.

<sup>3</sup>(1951*a*). The argument from parsimony is akin to Quine's own approach to ontology; see (1948, 1951*b*, section 6, 1960, chapter 7, 1976).

<sup>4</sup>Notice that since "semi-nihilists" like van Inwagen (1990) and Merricks (2001) admit some composites, they cannot eliminate parthood.

<sup>5</sup>See Lewis (1973, p. 87), although see Nolan (1997).

<sup>6</sup>See Lewis (1991, section 3.6); see also Armstrong (1997, section 2.12).

<sup>7</sup>Huemer (2009) considers various ways to justify principles of parsimony, and argues that none of them underwrites the use of parsimony in philosophy. I doubt that the ways to justify parsimony that Huemer considers are adequate to all the uses of parsimony in science, and suspect that principles of parsimony cannot be derived from more fundamental epistemic principles.

The epistemic principle is most naturally paired with a metaphysical realism about ideology. Ideologically simpler theories aren't just more convenient for *us*. The worlds that they purport to describe are objectively simpler, contain less structure. Ideology is a worldly matter, not about ideas at all.<sup>8</sup>

I am writing from a nominalist point of view when I formulate the epistemic principle in terms of ideological simplicity, but a realist about properties could say something similar. The thought behind the principle is that “structurally simpler” theories are more likely to be true; a realist would simply need to understand structural simplicity as being a matter of the properties and relations included in the theory's ontology, as well as the theory's ideology. Thus the realist would be arguing for nihilism on the grounds that it does not require a relation of parthood in ontology.

The epistemic principle should be restricted to theories about the fundamental nature of the world (such as physics and, by my lights, mathematics and fundamental metaphysics). Only for fundamental theories does simple ideology correlate directly with worldly simplicity; and it is far less clear that lean ideology is truth-conducive in biology, economics, and geology, let alone in everyday nonscientific contexts. Thus it is no objection that nihilists must use ideology like ‘arranged plantwise’, ‘arranged dollar-bill-wise’, ‘arranged riverwise’, and so forth to describe reality's biological, economic, and geological features—these predicates are not part of the nihilist's theory of fundamental matters.<sup>9</sup>

When the principle is restricted in this way, the argument from ideological parsimony rests on the claim that nihilism allows us to eliminate ‘part’ from the ideology of our *fundamental* theories. And this claim seems correct. If one's theory of fundamental matters included an ontology of composite objects, then that theory would presumably also need a predicate of parthood to connect those composites to their parts (since there do not seem to be more fundamental predicates in terms of which ‘part’ could be defined<sup>10</sup>); but without the

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<sup>8</sup>See Sider (2011).

<sup>9</sup>Thus I can reply to Bennett (2009, p. 64).

<sup>10</sup>Objection: parthood could be defined in terms of a fundamental predicate of spatial (or spatiotemporal) location:  $x$  is part of  $y =_{df}$  for every point  $p$  of space (or spacetime), if  $x$  is located at  $p$  then  $y$  is located at  $p$ . Replies: i) this gives us no account of parthood relations over space (or spacetime) itself; ii) this presupposes the falsity of supersubstantivalism (see section 9); iii) this presupposes that fundamental theories include a predicate for location that applies to composite as well as simple objects; and if I am right that fundamental theories do not need composites or parthood, then surely they do not need such a notion of location

composites, the predicate isn't needed.

Simplicity is not the only epistemic virtue. Choiceworthy theories must also be compatible with our evidence and predict as much of it as possible. It is only when multiple theories fit the evidence that we turn to simplicity and other epistemic virtues. But this is exactly the situation with nihilism and its competitors, since our best theories of fundamental matters—physics and, I say, mathematics and fundamental metaphysics—have no need for composite objects. Physics, for example, makes predictions based on laws governing simple entities like subatomic particles. Deleting 'part of' and all reference to composite objects in these theories does not weaken their predictive power.<sup>11</sup> So ideological parsimony gives us a reason to accept nihilism.

Given an expansive conception, the realm of the fundamental might include chemical, biological, and other macro-phenomena, in which case fundamental theories could not so easily rid themselves of composite objects and parthood. This is a big issue; here I will say simply that I presuppose a more restrictive conception: despite the existence of genuine explanations in chemistry, biology, and other higher-level sciences, such phenomena are not fundamental.<sup>12</sup>

The principle that ideologically simpler theories of fundamental matters are more likely to be true needs to be further qualified. First, the principle should say that *other things being equal*, the ideologically simpler theory is more likely to be true. For as just noted, we turn to simplicity only when multiple theories fit the evidence; moreover, there may be further super-empirical virtues other than simplicity; and moreover, there is more to simplicity than ideological simplicity—simplicity of laws counts as well, for instance. Second, merely counting primitive notions is too crude a measure of ideological simplicity, since one can always replace many predicates with a single many-placed predicate; the many-placed predicate would be, in an intuitive but elusive sense, a highly complex notion despite being one in number.<sup>13</sup> Counting primitive notions is a better measure when the theories are comparable in other respects—when their laws are equally simple and when their notions are equally simple in the elusive but intuitive sense—but these further comparisons of simplicity can be difficult to assess. Fortunately, the argument from ideological parsimony

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either.

<sup>11</sup>Although see section 11.

<sup>12</sup>The restrictive conception is best coupled with an account of the relation between fundamental and nonfundamental that is neither semantic (in the ordinary sense) nor epistemic; see Sider (2011, sections 7.3–7.8).

<sup>13</sup>See Goodman (1951, chapter 3) for a heroic attack on this problem.

relies only on a quite straightforward comparison of ideological simplicity, that “mere deletion” makes a theory ideologically simpler. Fundamental theories do not need composites or parthood in order to predict the evidence, I have said. Any talk of parthood in fundamental theories is explanatorily superfluous, so that one can simply delete the predicate ‘part’ from a fundamental theory that contains it, together with any laws in which ‘part’ figures, without sacrificing predictive power. And even though comparisons of ideological complexity are generally fraught, it’s comparatively safe to regard this sort of mere deletion as reducing ideological complexity. (The deletion also simplifies the laws, if any of the original laws involved ‘part’. Eliminating the need for fundamental laws of mereology is a further epistemic benefit of nihilism.<sup>14</sup>)

The epistemic principle on which I have relied may be further supported by considering how it illuminates the much-discussed case of neo-Newtonian spacetime. Neo-Newtonian spacetime is a spacetime in which (frame-independent) temporal distances and spatial distances between simultaneous points are well-defined, and in which paths of unaccelerated particles through spacetime are well-defined, but in which spatial distances between nonsimultaneous points are not well-defined, and hence in which absolute velocities are not well-defined. Newtonian spacetime is an otherwise similar spacetime but in which the notion of remaining at the same place—and hence notions of distance between nonsimultaneous points, absolute rest, and absolute velocity—are well-defined. Philosophers of physics generally agree that if Newtonian mechanics had been right, it would have been more reasonable to think that spacetime was neo-Newtonian than to think spacetime was Newtonian. But there is no consensus over exactly why that is so.<sup>15</sup> One popular idea is that the demerit of Newtonian spacetime is epistemic: its facts about absolute velocity would be undetectable. But verificationism is long-dead; why should this epistemic fact in itself count against the theory?<sup>16</sup> A better—and more directly metaphysical—

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<sup>14</sup>Relatedly, consider the objection that adopting parthood in fundamental theories allows the elimination of identity from ideology via the definition “ $x = y =_{df} x$  is part of  $y$  and  $y$  is part of  $x$ ”. The savings in ideological parsimony would be outweighed by increased complexity in the laws, which I take to include laws of logic and metaphysics. The logical laws governing ‘=’ must now be rewritten in terms of the proposed definition, making them more complex; and further, laws of mereology will be needed. Thanks to Steve Steward.

<sup>15</sup>See Dasgupta (2011, section 6) for an overview.

<sup>16</sup>Dasgupta (2009) argues convincingly that the epistemic argument in favor of neo-Newtonian spacetime should, if accepted, be pursued much further than is customary. Since individual points are in the relevant sense undetectable, he says, we should reject their existence and defend an individuals-free metaphysics (a descendent of the bundle theory of par-

argument is that Newtonian spacetime's undetectable absolute velocities are not themselves problematic, but rather are a sign of an intrinsic defect that is problematic: the theory's spacetime is overly complex. Newtonian spacetime contains more "structure" than is required for the theory to fit the evidence—in particular, more structure than is needed for the formulation of Newton's laws of motion.<sup>17</sup> Neo-Newtonian spacetime is more choiceworthy because it lacks that excess structure.

The principle that ideologically simpler theories are more likely to be true gives us a particularly straightforward way to cash out the thought that neo-Newtonian spacetime is preferable because it contains "less structure". Describing neo-Newtonian spacetime requires a certain ideology, such as the notion of three points being on a straight line through spacetime.<sup>18</sup> Describing Newtonian spacetime requires this ideology and then some further ideology as well: the notion of two points of spacetime being at the same absolute position. Further, Newton's laws, as optimally formulated in the context of Newtonian spacetime, do not mention the notion of being at the same absolute position. Thus the neo-Newtonian theory results from the Newtonian theory via a mere deletion of the notion of being at the same absolute position; and so, given the principle, is less choiceworthy for that reason.<sup>19</sup>

So the situation is this: i) ordinary evidence seems to leave open whether composite objects exist in addition to appropriately arranged subatomic particles; and ii) ideological parsimony (and also simplicity of laws) gives us a positive reason to reject parthood, and thus composites. Does anything counterbalance this case for nihilism?

Many arguments for parts-based ontologies are really just arguments against other parts-based ontologies, and so do not support their intended ontologies any better than they support nihilism. For example, David Lewis's argument from vagueness for unrestricted composition is really just an argument against middling views according to which some collections of objects compose a further object and some do not; it does not threaten the nihilistic view that no

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ticalars). In my view we should turn this argument around (in part because I doubt that the individuals-free metaphysics is a stable stopping point), and reject the epistemic argument.

<sup>17</sup>Earman (1989, p. 46); North (2009, p. 9).

<sup>18</sup>See Field (1980, chapter 6).

<sup>19</sup>This argument does not go through if we are comparing neo-Newtonian spacetime to Newton's own theory, which was not a spacetime theory, but rather a theory of time plus enduring space: neither Newton's own nor the neo-Newtonian ideology is a proper subset of the other. The question of simplicity in this case is far less straightforward.

collections of objects compose a further object.<sup>20</sup> And the familiar paradoxes of coinciding objects, which are so nicely resolved by a temporal parts metaphysics combined with composite objects, are resolved just as well by a nihilist metaphysics.<sup>21</sup> Still, some arguments are genuinely directed against nihilism, including:<sup>22</sup>

1. nihilism goes against common sense
2. knowledge of composites is given in perception
3. the existence of composites is part of our evidence, given Timothy Williamson's conception of evidence
4. we are entitled for Cartesian reasons to believe in our own existence
5. the denial of composite objects is conceptually incoherent
6. nihilism is incompatible with "atomless gunk"
7. parts and composite objects are required by spacetime physics

In what follows I will rebut these arguments. The final argument is the most powerful one, and my response will be tentative. In fact, my response will be to soften the nihilist position a bit: although there do not exist composites in the mereological sense—i.e., objects with proper parts—there do exist "composites" in the set-theoretic sense—i.e., objects with members; i.e., sets. (Also, my

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<sup>20</sup>Lewis (1986a, 212–13). See also Sider (2001, chapter 4, section 9).

<sup>21</sup>Merricks (2001, pp. 38–47). See Sider (2001, chapter 5) for a survey of the issues. McGrath (2005) argues that since nihilists regard claims about composites as at least being *correct* in the sense of section 3 (his word is 'factual'), they still face the paradoxes at the level of correctness. But the shift to correctness (or to nonfundamental languages—again, see section 3) dissolves the paradoxes if some of the claims generating the paradoxes have force only when read as claims about fundamental truth. Consider, for example, those paradoxes that appeal to the principle that composition is unique—that no collection of objects composes more than one thing. The appeal of this principle is "theoretical": it is based on a putative insight into the fundamental nature of the part-whole relation. The principle loses its appeal if it is taken as being merely correct (or as being in a nonfundamental language). For correctness (or truth in nonfundamental languages) is more closely tied to ordinary speech, and ordinary speech is fine with there being particles that, say, compose both a statue and a distinct lump of clay.

<sup>22</sup>There is also the argument that composites are required to support emergent properties. The argument would need to assume that "emergent properties" are perfectly fundamental (otherwise claims about those properties could be "correct" in the sense of section 3 or true in a nonfundamental language) and incapable of being reconstrued as relations over simples (perhaps because the putative relations would have no fixed -adicy). I doubt such properties exist; but if they do, they present a challenge like that discussed in section 11.

response will be conditional on certain issues in the philosophy of mathematics and physics.) But my rebuttals of the earlier arguments are to be independent of this concession; so forget sets until section 11.

## 2. Mooreanism

Recent metaphysics, especially in the tradition of David Armstrong, Saul Kripke and David Lewis, has been dominated by a sort of “Mooreanism”, according to which being “common sense” counts in favor of truth.<sup>23</sup> Theories that are

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<sup>23</sup>This view seems more prevalent amongst metaphysicians than epistemologists. But I do not attribute the view to Armstrong, Kripke, or Lewis (or Moore, for that matter) themselves. Excepting a few passages (notably *Naming and Necessity* pp. 41–2), what has been most influential in their writings is not explicit endorsement of Moorean epistemic principles, but rather a pervasive attitude of respecting common sense (think of the phrase “Moorean fact”). And let me also distinguish what I am calling Mooreanism from some alternatives. Alternative 1 insists merely on the propriety of performances like this: “I have reason to reject the conclusion of your argument, and thus, reason to believe that at least one of its premises is false”. This innocuous point about argumentative dynamics does not threaten nihilism; one would need to establish independently that nihilism’s implications are reasonable to reject. Alternative 2 says that the claims of common sense are justified, but not because they’re common sense. My response here depends on the alleged source of justification (if it’s perception, for example, see section 5). Alternative 3 says that common sense beliefs are pragmatically, not epistemically, justified. 3a: we should believe them because we could not get along without them. 3b: we may continue to believe them because we already believe them and we can’t start from scratch (compare Lewis (1986a, pp. 134–5)). But we *can* get along without belief in tables and chairs, if we believe instead in particles arranged tablewise and chairwise; and this doesn’t require starting from scratch. Alternative 4 is Gilbert Harman’s (1986) conservatism. Conservatism is less of a threat to nihilism than is Mooreanism, because of two points. First point: although conservatism says that one *may* carry on believing what one already believes even in the absence of positive reasons to do so, it does not *prohibit* radically re-thinking one’s beliefs in order to facilitate global improvement in one’s belief state, such as the sort of global improvement promised by the argument from parsimony. And for a nihilist engaged in such a re-think, conservatism does not say that being previously believed gives one a lingering reason to believe the proposition that there exist tables and chairs, whereas Mooreanism says that one always has a reason (defeasible, of course) to believe such commonsensical propositions. Still, even though conservatism allows nihilists the re-think, it also allows their opponents to decline the re-think on the grounds that the promised global improvement of parsimony isn’t worth the disruption. But a second point defuses even this threat. Harman’s conservatism, it seems to me, is appealing insofar as norms of reasoning are conceived in a distinctive way: as being practically implementable. Consider, for example, Harman’s argument that alternatives to conservatism implausibly require us to keep track of all of our justifications. This is convincing only if we conceive of norms of reasoning as practical. Now, I agree that *some* norms

consistent with common sense are preferable to those that contradict common sense; common sense is an epistemic difference-maker. According to some it is nearly decisive; according to others it is one factor among many. Either way, Mooreanism seems to give us an (at least *prima facie*) argument against nihilism, since the existence of tables, chairs, and other composites is as commonsensical as it gets.

But on the face of it, Mooreanism is utterly implausible. Why should the inherited prejudices of our forebears count for *anything*? It's hard to imagine a greater abdication of the founding spirit of philosophy than the exhortation: "believe this because lots of other people do".<sup>24</sup>

We should, of course, trust common sense in some particular domain if there is independent reason to think that it is reliable about that domain. But there is no independent reason to think that common sense is reliable about whether there exist tables and chairs as opposed to there merely existing suitably arranged particles. Our forbears presumably did not even consider the latter possibility. After all, the issue is a subtle one, makes little practical difference, and can even seem empty (see section 8).<sup>25</sup> The Mooreanism I oppose says that we should trust common sense even in the absence of independent reason to think that it is reliable. And that seems no better than the absurd: "believe the masses".

Why are so many metaphysicians Mooreans? Partly because they fear that if we reject common sense, there will not be enough to go by.<sup>26</sup> Both metaphysics and inquiry generally, it is thought, would be paralyzed. Without Mooreanism, we could not reply to the external-world skeptic, for example; we could not dig in our heels and say: *of course* there is an external world!

But again a flat-footed answer tempts. The dictates of common sense are often independently reasonable, and when they are, they do not need backing from common sense. Reason can stand on its own.

Consider, for example, Russell and Quine's answer to the external-world

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should be conceived in this way, but this does not prevent us from recognizing other norms that are conceived differently. In foundational inquiries, for example, such as those undertaken by philosophers, we submit ourselves to demands that would be out of place in ordinary epistemic life, in full realization of the practical difficulties of doing so. Even a conservative might admit that in foundational contexts—such as the one we are in now—we cannot decline the re-think on the grounds that it would be too disruptive. In such contexts, we are governed by norms of reasoning that are less practical, more ambitious (though perhaps quixotic).

<sup>24</sup>This sentence is not present in the published version.

<sup>25</sup>I would also stress these facts in an answer to Korman's (2009) problem of reasonableness.

<sup>26</sup>See, e.g., Zimmerman (2007).

skeptic: it is reasonable to posit a world of external objects because this posit best explains our sensory experiences.<sup>27</sup> However exactly we cash out the notion of inference to the best explanation, this sort of inference need not be rooted in its commonsensicality. Inference to the best explanation is just: reasonable!

The objection to Mooreanism is not that common sense must be shown to be reliable before it can justify. We should not require the reliability of all sources of justification (such as inference to the best explanation) to be antecedently demonstrable; that would apparently lead to skepticism. The objection is a simpler one: commonsensicality is just not a source of justification.

Some Mooreans disavow the form of argument

It is common sense that  $\phi$   
Therefore, (probably)  $\phi$

Instead, they simply insist on:

$\phi$

where  $\phi$  is in fact common sense. They do not infer that tables exist from the fact that common sense says that tables exist; so, it may be thought, they do not rely on the prejudices of our forebears. Rather, they simply take as a premise: there are tables.

This maneuver is just a fig leaf. These propositions that Mooreans simply take as premises exhibit a striking pattern: they include all the dictates of common sense. If Mooreans realize this but are unwilling to regard common sense as a source of justification, it would be unreasonable (and unselfaware) for them to continue insisting on the premises, unless they have reason to believe that there is another source (or sources) of justification for the premises. Consider a man who believes (perhaps defeasibly) whatever his father believes, about a wide range of subjects. He doesn't cite his father's beliefs as evidence, but we detect this pattern in what he's saying, and point it out to him. If he is unwilling to accept that being believed by his father confers epistemic worth, he must surely then accept that there is some other positive epistemic status or statuses shared by these beliefs. If it is unreasonable to accept that there is some other such status or statuses, he shouldn't just continue with his pattern of believing whatever his father believes.

There is a further reason to dislike the Moorean approach to metaphysics; but first we must consider the relationship between nihilism and ordinary language.

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<sup>27</sup>Russell (1912); Quine (1948). See also Vogel (1990).

### 3. Ordinary and fundamental languages

The Moorean argument assumes that nihilism contradicts common sense beliefs about composites. This assumption is incorrect if the ordinary believer and the nihilist mean different things by sentences like ‘there are tables and chairs’, so that the nihilist’s denial of such sentences is compatible with the believer’s assertions. And this may well be the case.

Consider Nihilo, god and creator of a world comprised solely of subatomic particles. On the first day Nihilo creates some particles and arranges them in beautiful but lifeless patterns. He becomes lonely, so on the second day he creates some minions (or rather, particles arranged minion-wise). On the third day he tries to teach his minions to speak. But this goes badly. The dim-witted minions struggle to understand Nihilo’s talk of subatomic particles and their physical states. So on the fourth day he teaches them an easier way to speak. Whenever an electron is bonded (in a certain way) to a proton, he teaches them to say “there is a hydrogen atom”; whenever some subatomic particles are arranged chairwise he teaches them to say “there is a chair”, and so on. (Pretend that electrons and protons have no proper parts.)

When the minions utter sentences like ‘there is a hydrogen atom’, do they speak falsely? They do if their language is the same as the language I used to describe the example, since I described Nihilo as having created a world comprised solely of subatomic particles. But perhaps the minions’ language is different; perhaps what the minions mean by ‘there is a hydrogen atom’ is consistent with I meant in my description of the example when I said “the world is comprised solely of subatomic particles”. Perhaps, for example, by ‘there is a hydrogen atom’ the minions mean a proposition that is true if and only if, as I (and Nihilo) would put it, some electron is bonded to some proton.<sup>28</sup> In that case the minions speak truly.

So there’s a question of whether the minions speak truly or falsely. But even if the minions speak falsely, there is an important distinction to make amongst their falsehoods. Nihilo taught them to utter “there is a  $\phi$ ” in certain circumstances; call such utterances *correct* if and only if the specified circumstances in fact obtain. Correct utterances, even if untrue, play a role in communication and thought that is similar to the role played by true ones. For example, telling a visiting philosopher-minion from Iowa riding the N train that “The NYU

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<sup>28</sup>If Nihilo had created a world more like the world I believe in (see section 11), containing impure sets as well as subatomic particles, then another possibility would be that the minions’ sentence is true iff there is a set containing an electron and a proton bonded to each other.

philosophy department is near the 8<sup>th</sup> street stop” will have the desired effect (since the particles arranged NYU-philosophy-department-wise are indeed near the particles arranged 8<sup>th</sup>-street-stop-wise); telling her that “The NYU philosophy department is near the Astoria-Ditmars Boulevard stop” would not. Neither sentence is true, but the first and only the first is correct; usefulness here tracks correctness, not truth. Again: if confronted, in ideal perceptual conditions, by particles arranged chairwise, a minion would be warranted in thinking to himself “there is a chair”, and saying this to others—or at least, more warranted than thinking and saying various alternatives, such as “there is an elephant”.

If nihilism is true, we speakers of ordinary language are like Nihilo’s minions. We’re trying to find our way in a world whose ontology is minimal, we know little if any particle physics, and we certainly don’t have enough computational power to derive useful conclusions from what we do know about particle physics. It’s useful to say things like “there is a chair” when there are some subatomic particles arranged chairwise, even if there really aren’t any chairs—just as it’s useful for the minions to speak as instructed on the fourth day. Indeed, it would be sensible for creatures like us to adopt a system of conventions or norms that prescribe saying things like “there is a chair” in appropriate circumstances. Perhaps we speak falsely (though correctly) when we say such things. But perhaps instead we speak truly. Just as there’s a question of whether the minions’ sentence ‘there is a hydrogen atom’ is true if and only if (as Nihilo and I would put it) some electron is bonded to some proton, so there’s a question of whether the same is true for English.

My last few sentences threaten paradox. I defend nihilism, which I defined as the claim that there are no composite entities. Wasn’t I speaking English when I said this? If so, how can I be open to the possibility that English sentences like ‘there is a hydrogen atom’ and ‘there is a chair’ are true?

Distinguish what ‘there is’ and other quantifiers mean in English from what ontologists use them to mean. In my definition of nihilism, ‘there is’ was intended in the ontologist’s sense. If the ontologist’s sense differs from the ordinary English sense, then nihilism is consistent with the claim that ‘there is a hydrogen atom’ is true in ordinary English. Perhaps, for example, the truth-condition for this sentence in ordinary English is that it be true in the ontologist’s sense that some electron is bonded to some proton.

More and more ontologists are coming around to the view that taking their subject seriously requires making some sort of distinction between ordinary

and ontological understandings of existence-claims.<sup>29</sup> It's not only defenders of minimal ontologies who find the distinction useful. Even defenders of fuller ontologies sometimes deny the existence of *some* ordinary things, so to speak, such as holes and shadows (McDaniel, 2010), propositions and numbers, or economies and organizations, and may wish to say that ordinary claims about such ordinary things are true.

It's not enough merely to distinguish ordinary language from the ontologist's language; ontologists also need an asymmetry between them. If there's nothing special about the ontologist's language—if it's just one language among many—then why make such a big deal over what's true in it? Ontologists have therefore tended to say that their language is distinguished by being *fundamental*. It gets at the facts more “directly” or “perspicuously” than do nonfundamental languages; it expresses the facts that “underly” all other facts.

(What “underlying” amounts to is a complex issue. Here I will say only that ordinary speakers needn't have any idea of what unfathomably complex reality underlies their ordinary utterances, just as they needn't have any idea of the fundamental physics that underlies their ordinary utterances.)

It might be objected that since ontology has traditionally been about *what there is*—i.e., what there is in the ordinary sense—I have simply changed the subject. But I think that fundamental ontology is what ontologists have been after all along. It's what they've been fumbling for with misguided talk of what “strictly” or “literally” exists. And it's certainly in line with the traditional conception of metaphysics as inquiry into the ultimate nature of reality.

There are subtle questions about how exactly to understand this notion of fundamentality (see Sider (2011, chapter 7)). Although I will generally remain neutral on such questions, I should mention one conception of fundamentality, and one construal of the dispute over nihilism, that I reject. Jonathan Schaffer (2009) construes ‘fundamental’ as a predicate of entities: some entities are fundamental and others are not. (He defines this predicate in terms of ontological dependence: fundamental entities are those that do not depend on other entities.) Moreover, according to Schaffer, in disputes over ontology, all sides ought to accept that the disputed entities *exist*; the only question is whether the entities are fundamental. So on Schaffer's construal, all participants in the dispute over nihilism agree that there are composite entities; what nihilists

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<sup>29</sup>See Cameron (2010a,b); Dorr (2005); McDaniel (2009); Sider (2009, 2011, 2014); Turner (2010). A seminal work is Fine (2001), which argues that a related distinction is needed throughout metaphysics; see also Fine (2009).

think is that only simple entities are fundamental.<sup>30</sup> For me, on the other hand, ‘fundamental’ is not a predicate of entities, but rather attaches to concepts such as quantification; and for me, the question of nihilism is whether, under the fundamental sort of quantification, there are composite entities. So my picture is not that there exist both composite and noncomposite entities, with only the latter enjoying a certain status; it is rather that there are different ways to take ‘exists’, and in the fundamental sense of ‘exist’, there simply do not exist any composite entities. To reject nihilism thus construed, you don’t have to think that “tables and chairs are fundamental entities”. You just have to think that in the fundamental sense of ‘exists’, there exist tables and chairs. You might even combine this with the view that tables and chairs are in some sense “nonfundamental entities” (perhaps in the sense that all of their properties are nonfundamental).<sup>31</sup>

The distinction between existence in the ordinary sense and existence in the fundamental sense should not be thought of as “arising from within natural language”, so to speak. It is to be drawn with distinctively metaphysical concepts, not everyday linguistic concepts or concepts from empirical semantics. For example, the distinction is not supposed to derive from any ambiguity or context-sensitivity of natural-language quantifiers. Any such ambiguity or context-sensitivity (such as contextual variation of quantifier domains) is irrelevant. For another example, “exists in the fundamental sense” should not be equated with “strictly and literally exists”, as it’s often put. If ‘I exist’ is true in English then its truth is both strict and literal, in any normal sense. “Literal” is opposed to things like metaphor and hyperbole; “strict” casts off things like quantifier domain restriction and loose talk (as when people who live in Cherry Hill, New Jersey say they’re “from Philadelphia”<sup>32</sup>); and ‘I exist’ is neither metaphorical nor hyperbolic nor restricted nor loose. The distinction is metaphysical. There are two quite different sets of facts one might be getting at with talk of “existence”. The facts in one set are what we express with ordinary talk of what “exists”; the facts in the other set are much more fundamental, and may only be expressible by shifting to an entirely different language introduced with stipulations like this: “quantifiers are not to mean what they mean in

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<sup>30</sup>Schaffer (2009, p. 361) This is not the only possible construal given the conception. Someone who regarded ‘fundamental’ as a predicate of entities, and did not admit a distinction between fundamental and nonfundamental quantification as I do, could still hold that, under the one and only sort of quantification, there simply are no composite entities.

<sup>31</sup>See Sider (2009, section 9).

<sup>32</sup>See Sperber and Wilson (1986); Wilson and Sperber (2004).

English, but rather are to mean something perfectly fundamental, albeit with a similar inferential role”<sup>33</sup>

In light of this section, then, we should reformulate nihilism as the view that *in the fundamental sense*, there are no composite entities.<sup>34</sup>

#### 4. Mooreanism again

Mooreanism assumes that inconsistency with common sense makes an epistemic difference. Common sense consists of propositions believed by ordinary people; and the propositions that ordinary people believe are those expressed by ordinary sentences. In the case at hand, these are ordinary sentences like ‘there are tables’. So according to Mooreanism, in order to decide whether to accept nihilism, we must ascertain whether nihilism allows such ordinary sentences to be true. If it does then it passes the Moorean test, and we have no common-sense-based reason to reject it. But if nihilism prohibits their truth (albeit allowing their correctness), then it fails the Moorean test, and we have our common-sense-based reason to reject nihilism.

Whether nihilism allows these sentences to be true turns on a difficult issue

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<sup>33</sup>See Sider (2014).

<sup>34</sup>The language of this formulation cannot be a perfectly fundamental one since it contains ‘composite’, which is defined in terms of ‘part’. The language must instead be a mixed one, with fundamental quantifiers but nonfundamental predicates. But there are arguments purporting to show that all such languages are suspect (see my 2007*a*, section 2.7 and 2011, section 9.6.1). Also, in this mixed language, ‘part’ might be semantically empty, since it might have no suitable basis in the fundamental. (Entire sentences containing ‘part’ in the language of the minions can be given a basis in the fundamental, but that language’s quantifiers are not fundamental.) The latter concern could be addressed by making the claim metalinguistic: “‘there are composites’ is not true”. This is an improvement but doesn’t capture the form of nihilism discussed at the very end of the paper, which identifies ordinary objects with sets: on this view, ordinary objects like tables and chairs *do* exist in the fundamental sense (since they’re sets), and they satisfy the nonfundamental predicate ‘composite’ (their “parts” are their subsets). So perhaps we should return to a perfectly fundamental language, give up on a *general* formulation of nihilism, and instead formulate particular nihilistic ontologies, such as “Everything is a fundamental particle”, “Everything is a point of spacetime”, “Everything is either a point of spacetime or a set”, and so on. (These formulations must be cleaned up since ‘point of spacetime’, ‘fundamental particle’, and ‘set’ are probably not fundamental predicates. The third one, for example, can be cleaned up as follows: “There is exactly one thing that has no members but is not a member of any open thing [this is the null set]; everything else either has a member [and so is a set], or is a member of some open thing [and so is a point of spacetime]”).

in metasemantics.<sup>35</sup> Recall Arthur Eddington's (1928) claim that because of the mismatch between our ordinary conception of solidity and the scientific fact that matter is largely empty space, the ordinary notion of solidity has no application in our scientific world—ordinary objects like tables aren't really solid. Most philosophers nowadays agree with L. Susan Stebbing's (1937) reaction at the time: Eddington was wrong about the table; tables are indeed solid; it's just that common sense was wrong about what it takes to be solid. Of course, even Stebbing and her contemporary followers will admit that an Eddingtonian stance is *sometimes* appropriate. However commonsensical it was that mental illness is caused by demonic possession, that simply wasn't (and isn't) true.<sup>36</sup> The Stebbingsonian will not say: "mental illness *is* caused by demonic possession, it's just that common sense was wrong about what it takes to be possessed by a demon". The difficult issue in metasemantics is this: how distant from our ordinary ways of talking can the underlying facts get, before what we say counts as false?

As with Eddington's table, nihilism implies a mismatch between our ordinary conception and the underlying reality. According to our ordinary conception of existence, simple and composite things exist in the same way. We ordinarily think of "there are tables" and "there are subatomic particles" as getting at facts that are similar save that one concerns being a table and the other concerns being a subatomic particle. But according to the nihilist, "there are subatomic particles" gets at a fact of fundamental singular existence, whereas there are no such facts in the vicinity of "there are tables" (the only facts in the vicinity are facts such as that there are things arranged tablewise). Thus our ordinary conception, which embraces similar macro- and micro- existential facts, fails to match the underlying nihilist reality.

As I say, the general question of how much mismatch it takes to undermine truth is a hard one. Now, one response to the Moorean argument against

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<sup>35</sup>Caveat: suppose 'there exists' in ordinary English functions analogously to theoretical terms in science—it is intended to mean something fundamental, whatever fundamental is "in the vicinity", regardless of whether it satisfies our ordinary conception of the term. I doubt this is the case; but if it is, then given nihilism, 'there are tables' will be false regardless of how much metasemantic tolerance there is, and the argument of this section won't apply. (But Mooreanism is even less plausible for claims phrased using theoretical terms.)

<sup>36</sup>Nor was it or is it correct. This case is not meant to be analogous to the case of solidity, in which the metasemantic conservative ought to say that truth and correctness come apart. It is rather meant to be a case in which reality differs so drastically from our ordinary conception that even the metasemantic liberal will think that truth is not present; and in such a case, the conservative should not claim that correctness is present.

nihilism would be to take a stand on this hard issue, argue for a liberal conception of when ordinary sentences are true in a hostile metaphysical environment, and conclude that nihilism doesn't after all conflict with common sense.<sup>37</sup> But this is not how I want to respond to the Moorean argument (though I wouldn't be surprised to learn that the liberal conception is right). My response is rather that what we say about the hard issue cannot possibly have the epistemic significance that Mooreanism requires it to have. The question of when Eddingtonian views are true is of no deep epistemic importance; so the important question of whether it's reasonable to believe nihilism can't turn on how we resolve it; so Mooreanism can't be right.

It's an interesting question whether Eddington was right that the ordinary sentence 'tables are solid' is falsified by modern atomic theory. But how we resolve this question surely carries no weight when one is deciding whether to believe modern atomic theory. It is intuitively clear that, rather than using our prior beliefs about whether tables are solid to decide what to believe about the atomic theory, we ought instead to decide on independent grounds whether the atomic theory is correct, and whether Eddington was right about the connection between the atomic theory and solidity; and we ought then to use our answers to those questions to decide whether to believe that tables are solid.

The Eddingtonian question is that of how much "metasemantic tolerance" there is—how much error there can be in our ordinary conception of a term before paradigmatic sentences containing the term become false. Its answer lies in metasemantics, in how semantic facts are determined. Consider how we determine how much metasemantic tolerance there is. We think about our reactions to Eddington's argument, and our reactions to metasemantic thought experiments (like: if the things we think are cats were discovered to be robots, would they still be rightly called 'cats'? (Putnam, 1962)) Surely our reactions to these thought experiments carry no weight when it comes to deciding what to believe about the atomic theory, or about nihilism.

It might be objected that my argument illegitimately semantically ascends. I construed the Moorean as demanding consistency with *the truth of certain sentences*. But, it might be claimed, what she demands is rather consistency with my having a hand, with the existence of tables, with murder being wrong.... If so, Mooreanism does not concern sentential truth, and so, it may be thought, Mooreanism does not make epistemic value depend on metasemantics.

This response is like the fig-leaf maneuver at the end of section 2. Moore-

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<sup>37</sup>Cameron (2010b) and perhaps van Inwagen (1990, chapter 10) take this approach.

anism says that reason demands that we accept certain propositions  $p_1, p_2 \dots$ . Although these propositions are exactly the propositions that are expressed by the sentences of common sense, the Moorean now insists that it's not under this description that reason demands that we accept them. But then, under what description *does* reason demand that we accept them? To refuse to answer would be unsatisfying. And to answer that the  $p_i$  are justified by some further feature they have—that they best explain our evidence, say—would be to give up on Mooreanism.

The Moorean might answer that the  $p_i$  are justified because they're *propositions of common sense*, where this status attaches directly to the propositions, and is not due to the fact that they're expressed by commonsensical sentences. But this would render Moorean justification implausibly precarious in the following way. Suppose for the sake of argument that nihilism is true and that English is a metasemantically intolerant language, so that 'there are tables' is in fact false. The Moorean says that the proposition that there are tables is a proposition of common sense, and that we therefore have a common-sense-based reason to reject nihilism. But imagine we had spoken a slightly different language,  $L$ , which is a lot like English but differs in its metasemantic tolerance, so that 'there are tables' is true in  $L$  (this sentence is true in  $L$  if and only if there are things arranged tablewise). We could, I think, easily have spoken such a language simply by using 'true' and other semantic vocabulary more liberally in conjunction with reflective discussions of Eddington's table, thought-experiments about robot cats, and the like (while continuing to use such semantic vocabulary disquotationally, insofar as we actually do). The difference between being a speaker of  $L$  and being a speaker of English would only show up in highly theoretical contexts, for example contexts in which the speaker is aware of the question of nihilism and the distinction between fundamental and nonfundamental uses of language. Think, now, of the plight of speakers of  $L$ . They are cut off from the justification to reject nihilism that we speakers of English possess. For that justification comes from the fact that nihilism is inconsistent with the proposition that there are tables; and ordinary speakers of  $L$  have no sentences that express this proposition. (Their sentence 'there are tables' is true if and only if there are things arranged tablewise, and so does not express that proposition.) Only philosophically sophisticated speakers of  $L$  could even formulate the proposition that there are tables (using the sentence 'there are, in the fundamental sense, tables'), and it's hard to see why they should recognize the proposition in this guise as one of common sense. The problem with this Moorean answer, then, is that it makes our access to Moorean justification

implausibly precarious; we could not have accessed it if we had used semantic vocabulary in an innocuously different way.

At the beginning of this section I refrained from defending nihilism by appealing to a liberal view about metasemantic tolerance. I did so not only because I am not sure whether liberalism is correct, but also because I doubt that the reasonableness of nihilism could turn on whether it is. For the remainder of the paper I will continue to not appeal to liberalism in my defense of nihilism, but rather will assume the conservative view for the sake of argument. This gives nihilism the strongest possible defense (since the objections typically presuppose the conservative view), and it avoids the risk of overinflating the significance of metasemantics to epistemology.

## 5. The perceptual argument

A further objection to nihilism is that we have perceptual evidence for the existence of composite things like tables and chairs: we see, hear, smell, touch, and taste them.

A natural first reply is that we have no such perceptual evidence because our perceptual experiences would be exactly as they are in fact if subatomic particles were arranged as they actually are but composed nothing.<sup>38</sup> Perceptual experiences are determined by interactions between subatomic particles (those in our sensory apparatus, the perceived object, and the environment); and these interactions are unaffected by whether the particles compose further entities.<sup>39</sup> But this first reply is not decisive, since it might be argued that it's just a fact about justification that we are justified in believing our senses—and this despite the fact that things would appear the same even if our senses were deceived.

A recent view of this sort has been put forward by James Pryor (2000).<sup>40</sup> According to Pryor, if it perceptually seems to me as if  $p$ , then I have an “immediate justification” for believing  $p$ —immediate in that the justification doesn't rest on any further evidence or justification. In particular, I needn't be able to independently rule out alternative hypotheses that are also consistent

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<sup>38</sup>See, for example, Merricks (2001, pp. 8–9). Note that this claim might be false if the contents of perceptual experiences include singular propositions about particular external objects. For an overview of issues about the contents of perception, see Siegel (2005).

<sup>39</sup>Even a dualist about consciousness can accept this since the states of subatomic particles can include the holding of irreducibly phenomenal relations.

<sup>40</sup>See also Burge (2003); Huemer (2001); Pollock (1974).

with my perceptual experiences, such as the hypothesis that I am a brain in a vat that is stimulated to have those experiences.

Given this view, someone might argue that seeming to see a table<sup>41</sup> immediately justifies believing that there is a table, even if one can't rule out the nihilistic hypothesis that the visual experience is caused by particles arranged tablewise rather than by a table. To be sure, this immediate justification for believing in the table might be outweighed by other evidence (such as philosophical arguments in favor of nihilism). But at least it provides *some* evidence against nihilism, according to the objector. (And, the objector might say, philosophical arguments are invariably weaker than evidence supplied by perception.)

My response to this argument will be based on examples like the following. Suppose you are just learning of the scientific evidence for the modern atomic theory of matter. And suppose further that—and you know this—Eddington was right that the atomic theory implies that tables are not solid. You then walk into your kitchen and perceive a table as being solid. It would be closed-minded and irrational to say: “the table looks solid, so the atomic theory must be wrong!” Rather, to the extent that the scientific evidence for the atomic theory is strong, you should take that evidence to show that your perception of solidity is unreliable.

Further, the scientific evidence doesn't merely *outweigh* the perceptual evidence in favor of solidity in the overall balance of reasons. Rather, the original perceptual evidence simply “vanishes”. For imagine that the scientific case for the atomic theory had been equivocal. Your degree of confidence in the atomic theory should not then have been attenuated because the table looked solid! It should have been as high as the scientific case warranted. To put it in terms of all-or-nothing belief: no matter how weak the scientific case had been, provided it was stronger than the opposing case, you should have believed (albeit tentatively) the atomic theory. A mediocre scientific case for the atomic theory could not have been overcome by the fact that the table looks solid.<sup>42</sup>

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<sup>41</sup>Note that Pryor construes the contents of perception “thickly”, so that they include propositions about physical objects (and not sense-data, say); see (2000, pp. 538–9).

<sup>42</sup>Could this be because sources of justification are lexically ordered, with scientific evidence outranking perceptual evidence? But “scientific evidence” is partially constituted by perceptual evidence; moreover, perceptual evidence is normally thought to be very strong. Further, even if the example is changed so that the scientific evidence in favor of the atomic theory is replaced with some other form of evidence—testimonial evidence, say—it still seems that the evidence, however weak, would not be overcome by the perception of solidity.

This example does not conflict with the idea that perception is a source of immediate justification. It merely shows that the notion of immediate justification must be properly understood, so as to allow immediate justification to be capable of vanishing in this way. Pryor himself says that the immediate justification delivered by perception is merely *prima facie*, and that *prima facie* justification can be “defeated or undermined by additional evidence” (2000, p. 534). Perhaps the atomic theory’s challenge to the apparent perception of solidity is akin to John Pollock’s (1986) notion of undercutting defeat. For present purposes, it isn’t important exactly how the vanishing is conceptualized;<sup>43</sup> what is important is that no matter how weak the scientific evidence gets, if it favors the atomic theory, that is what we should believe.

The conflict between apparently perceiving a solid table and the atomic theory of matter is, I think, analogous to the conflict between apparently perceiving composite objects and nihilism. To anyone who understands the challenge of nihilism and takes it seriously, any prior perceptual justification in favor of tables vanishes. Arguing against nihilism on the basis of perception is no better than arguing that the atomic theory of matter must be false because tables look solid.

It might be objected that the cases are disanalogous because the scientific evidence for the atomic theory was so much stronger than the alleged philosophical evidence for nihilism. But recall how the perceptual evidence for solidity vanished, and was not merely outweighed, once the atomic theory was on the scene. No matter how weak the scientific case for the atomic theory had been, I claimed, it would not have been overturned by the apparent perception of solidity. (Notice that this is so even if the scientific case for the atomic theory relied heavily on super-empirical considerations such as simplicity.) So the strength of the philosophical case for nihilism does not matter. Regardless of its strength, overturning it because of perceptual experience is no better than overturning a scientific case with similar strength for the atomic theory because “tables look solid!”

Here are some further examples to bolster my response to the argument.

- An astronomer considers the theory that a certain star has just gone nova. Then she looks into the nighttime sky, and it visually seems to her that the star is now twinkling. She realizes that light takes time to reach Earth from distant stars, and hence that the star would appear to twinkle even

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<sup>43</sup>Caveat: like many forms of epistemic defeat, it is unclear whether this vanishing can be construed in Bayesian terms. See Pryor (2011).

if it no longer existed. Nevertheless her experience as of the star now twinkling persists.

- A physicist considers the special theory of relativity. Then he seems to perceive two events as being simultaneous. He understands the relativistic explanation of what is going on; nevertheless his experience as of simultaneity persists.
- A student begins to rethink her racist upbringing. Nevertheless she still seems to perceive The Other as inferior. (The belief is not inferential; it forces itself on her immediately, as with more mundane perceptual beliefs.) She understands that deeply ingrained prejudice can be slow to dissipate; nevertheless, her racist experience persists.<sup>44</sup>

In each example, it seems to me, the perceptual experiences have no justificatory force, not even outweighed force. In each example, no matter how weak we imagine the conflicting evidence to be, it would not be overcome by the perceptual experience. In the first example, for instance, it would be absurd to try to overturn a weak but winning case from astronomy by pointing out that the star appears now to be twinkling. These examples—and that of the atomic theory of matter—are, I say, analogous to the situation we are in with nihilism. The important points of analogy seem to include (but may not be exhausted by) the following. One, a proposition is given in perception but conflicts with a theory. Two, the theory is one that we're taking seriously—we aren't merely idly considering its possibility. Three, the theory has some evidential support.<sup>45</sup> Four, the theory provides a specific, reasonable account of why perception is unreliable in the case at hand. In the examples, it is intuitively clear that any perceptual justification in the proposition vanishes, and is not merely outweighed. I conclude that the same is true with nihilism.

Pryor says that although perceptual justification can be defeated by certain *ordinary* challenges, *skeptical* challenges don't defeat perceptual justification (2000, p. 534). Suppose it appears to me that a computer screen is in front of me, but a skeptic points out that my experiences would be the same if I were a brain in a vat. In the face of this skeptical challenge, even though I have no independent reason for thinking that the vat scenario is not actual, I can,

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<sup>44</sup>Pryor's view is limited to what he calls *perceptually basic* beliefs. Someone might argue in this case (or even others) that the beliefs in question are not perceptually basic.

<sup>45</sup>This is arguably inessential.

according to Pryor, continue to justifiably believe in what I perceive (hence his name for his position: dogmatism). Might it be argued that the nihilistic hypothesis is a skeptical challenge to perceptual beliefs in composites, not an ordinary challenge, and hence that perceptual justification in composites does not vanish in the way that I have been arguing? There's no reason to think that Pryor intended the notion of a skeptical challenge to be understood in this way; but might this position be defended?

The nihilist's challenge differs from the skeptical one in that, intuitively, it is a real contender to be believed, whereas the brain in a vat hypothesis is a mere possibility—something that is hard to independently rule out but for which we have no positive evidence. It is hard to make this distinction precise, but the following factors seem relevant. 1. By ordinary standards, nihilism is supported reasonably well by the evidence (so long as that evidence is construed neutrally; but see the discussion of Williamson below), whereas the vat hypothesis is not. 2. Nihilism gives a satisfying explanation—again, by ordinary standards—of our perceptual experiences; the vat hypothesis does not. 3. There are positive reasons to believe nihilism, but not the vat hypothesis.<sup>46</sup>

Are these differences enough to rebut the idea that the nihilist's challenge is a skeptical one? The notion of a "skeptical challenge" is not a precise one, so it is hard to say anything definitive here. But perhaps the following bird's-eye remarks constitute progress. There is a point to having a concept of justification that allows skeptical challenges to be summarily dismissed: namely, to avoid the stultification of inquiry. If explanation-givers needed to be able to answer the challenge posed by each and every alternate explanation, including the brain-in-the-vat "explanation", then we would never get anywhere. But a concept allowing nihilism to be dismissed in this way would also be stultifying. It would encourage tunnel-vision, limiting our attention to the familiar, and discouraging the consideration of radically new approaches to old problems. (Indeed, openness to unfamiliar viewpoints is part of what philosophy is most concerned to teach.) I don't think our existing concept of justification is stultifying in this way, so I don't think the nihilistic challenge can be dismissed in the way that the skeptical challenge can. But if this is wrong as a descriptive matter, then so much the worse for our existing concept of justification. We ought then to adopt a better concept that is more tolerant of challenges to the

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<sup>46</sup>Compare Pryor: "I don't want to claim that you never have to rule out skeptical hypotheses... [Prima facie justification for perceptual beliefs] can be undermined or threatened if you gain *positive empirical evidence* that you really are in a skeptical scenario." (2000, pp. 537–8, my emphasis).

status quo.<sup>47</sup>

Incidentally, the preceding discussion yields a defense against the following thought: philosophy is less secure than science and ordinary thinking—so much so that it couldn't possibly overturn scientific or ordinary beliefs in composites. The defense is this: once the question of nihilism has been seriously engaged, it becomes an open question just what science and ordinary thinking deliver. Before nihilism was in question one might be forgiven for assuming that verdicts on whether tables and chairs exist are delivered. But once nihilism is in question, one can no longer assume this—to do so would be like continuing to assume that perception favors the solidity of tables once the atomic theory of matter is in question. One must instead treat what is secure in science and ordinary thought as being more neutral propositions, such as the proposition that there exist things arranged tablewise.

## 6. Williamson

In chapter 7 of *The Philosophy of Philosophy*, Timothy Williamson addresses the question of what our evidence is, when we ask philosophical questions. This is relevant to our discussion since nihilism would be refuted if the evidence we must accommodate in philosophy included such propositions as that there are tables. Williamson's discussion is compelling in many ways; and it is clear that his sympathies do not lie with radical philosophical views like nihilism. But in the end, Williamson's arguments do not refute nihilism, since a nihilist can consistently embrace Williamson's conclusions.

One of Williamson's central aims is to oppose the psychologizing of philosophy. The following trend, Williamson argues, is common but misguided. A radical philosophical position like nihilism is under discussion. In an attempt not to "beg questions", only "neutral" evidence is admitted. Propositions such as that there are tables are not neutral (since they immediately rule against nihilism); so philosophers turn instead to certain propositions about mental states, such as the proposition that there appear to be tables. And in addition to psychologizing the evidence, some philosophers go further and psychologize the very question under discussion, construing it as being about language or concepts rather than the external world. Williamson argues that we should psychologize neither the evidence nor the subject matter. The question un-

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<sup>47</sup>Someone who regarded epistemic justification as metaphysically fundamental, or close to it, might feel less free to so cavalierly consider changing our existing concept.

der discussion squarely concerns the external world: do there exist composite entities? And while psychologizing the evidence would protect nihilism from immediate refutation, it would also, Williamson argues, lead to skepticism.

Thomas Kelly (2008) bolsters Williamson's case here by appealing to a general requirement of total evidence: one ought to form beliefs based on *all* of one's evidence. Mundane examples show that forming conclusions based on only some of one's evidence leads to trouble; but if the requirement of total evidence is generally correct, then it remains so even in philosophy. Rather than following the "Cartesian" procedure of using only propositions meeting some higher, more rarified standard deemed more appropriate for philosophical questions, we ought always to utilize all of our evidence, even if the evidence concerns "dialectically inappropriate" propositions such as the proposition that there are tables. Moreover, Williamson argues elsewhere (2000) that every proposition one knows is part of one's evidence. So if objectors to nihilism, and uncommitted but interested bystanders, do indeed know that there are tables, then this becomes part of the evidence that their philosophical theories must accommodate, and for them, the case against nihilism is immediate and decisive.

These claims—that we should psychologize neither the evidence nor the subject matter, and that all known propositions should enter into the evidence used to decide philosophical questions—threaten nihilism only if the objectors and bystanders do in fact know that there are tables. And why think that they do? After all, they have no independent reason to reject nihilism.

The mere fact that they have no independent reason to reject nihilism does not by itself show that they do not know there are tables. We apparently have no independent reason to think we are not brains in vats, but this does not deprive us of all knowledge of the external world.<sup>48</sup> To put it vaguely, knowledge does not require the ability to independently rule out all conflicting hypotheses.

But it surely requires the ability to independently rule out a great range of conflicting hypotheses. Pointing out certain alternatives that an opponent has not and cannot independently rule out is a paradigmatic, perfectly ordinary way of showing that one's opponent does not know. Imagine a scientist who has put forward a theory to explain certain data, but then discovers a rival theory, put forward by a respectable colleague, that she cannot rule out. The

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<sup>48</sup>In general, Williamson (2007, chapter 7) draws on the many analogies between radical philosophical positions like nihilism, on the one hand, and skepticism on the other, to defend ordinary claims of knowledge from attacks.

scientist does not know that her theory is true. This kind of undermining of knowledge is utterly ordinary and commonplace. Granted, one needn't be able to independently rule out all the conflicting claims of skeptics, cranks, and perhaps even nonskeptical, noncranky alternative hypotheses that one simply hasn't considered, in order to know.<sup>49</sup> But nihilism is not a skeptical hypothesis, it's not the claim of a crank, and here we are considering it. It's hard to know how to define "skeptical hypothesis" or "crank". But rather than tackling such difficult general questions, just consider the analogies between the challenge that nihilism poses to ordinary claims to knowledge (such as the claim to know that there are tables), on the one hand, and perfectly ordinary, nonskeptical challenges to knowledge like the example of the unexcluded alternative scientific theory just mentioned. Or consider again the analogy between nihilism and the challenges to the status quo considered in the previous section (the atomic theory of matter, the twinkling star, the perception of simultaneity, and the racist).

Or better, consider the even closer analogy between nihilism and certain challenges to the status quo presented by physicists and philosophers of physics. One example is like the example of simultaneity considered earlier. According to the special theory of relativity, on its Minkowskian conception anyway, physical reality consists of matter in four-dimensional space-time, rather than consisting of matter in three-dimensional space as we used to think. It would have been inappropriate for a turn-of-the-century curmudgeon to object to Einstein and Minkowski by claiming that her evidence includes the proposition that two finger-snaps are objectively simultaneous. Moreover, surely the curmudgeon did not know that proposition. This is not merely because Einstein and Minkowski were right. For imagine that they are wrong; there is such a thing as objective simultaneity after all. Still, assuming the curmudgeon understood what Einstein and Minkowski were saying, she surely did not know that the finger-snaps were objectively simultaneous. For a second example, consider "configuration space realism", a serious theory about the foundations of quantum mechanics according to which reality ultimately unfolds, not in a space of three or four dimensions, but rather in the many-dimensional configuration space of quantum mechanics, where that space is conceived not as an abstract mathematical formalism but rather as the concrete space of reality.<sup>50</sup>

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<sup>49</sup>And one needn't be able to independently rule out the "conflicting hypothesis" of  $p$ 's negation in order to know  $p$ .

<sup>50</sup>See Albert (1996); North (2012). Actually the term "configuration space realism" includes

This view is perhaps more threatening to ordinary beliefs about physical objects than nihilism is, for no part of configuration space can be straightforwardly identified with ordinary three- or four-dimensional space or spacetime.<sup>51</sup> Yet it seems clear that the view cannot be refuted simply by appeal to knowledge of the existence of ordinary three- or four-dimensional things. Once the view has been taken seriously, we no longer know that such things exist.

Nihilism's challenge to the status quo is like the challenges in these examples, which cannot be answered by citing the status quo as evidence, and which are not like the challenges posed by skeptics and cranks.

There is another argument against nihilism that can be based on Williamson's views about evidence. We noted above Williamson's claim that every proposition one knows is part of one's evidence. Williamson (2000) also accepts the converse: all evidence must be known.<sup>52</sup> Since 'knows' is factive, it would follow that evidence must be true. But given nihilism, one might think, most if not all of our perceptual beliefs are false. So nihilism implies that we have little if any perceptual evidence.<sup>53</sup>

A nihilist could, of course, respond by challenging the claim that all evidence is known. Alternatively, a nihilist could argue that the contents of perceptual experiences do not concern ordinary external objects. Perhaps they are non-propositional or perhaps they concern appearances or sense data; either way, nihilism would allow plenty of perceptual evidence after all. But a nihilist can concede more to the objection and still escape.

The trick is to extend the distinction between truth and correctness. Correctness was claimed in section 3 to be an adequate substitute for truth in our epistemic and cognitive lives. We can introduce corresponding substitutes for other factive concepts such as knowledge and (given Williamson's view) evidence. "Quasi-knowledge", let us say, is the substitute for knowledge: quasi-knowledge is to knowledge as correctness is to truth. Similarly, "quasi-evidence" is the substitute for evidence. I cannot define these notions, but I hope the intuitive idea is clear: the conceptual or theoretical role of these concepts is to be like that of the originals, except with correctness substituted everywhere for truth. (For instance, if part of the knowledge role is that knowledge

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also a view that is perhaps less threatening to the status quo: the view that *both* ordinary space and configuration space are fundamental. See Dorr (2009).

<sup>51</sup>See Ney (2012).

<sup>52</sup>For similar views see Meyers and Stern (1973); Unger (1975, chapter 5).

<sup>53</sup>A cautious person might (try to) form only nihilist-friendly perceptual beliefs (e.g., that some things are arranged tablewise). But the case of less cautious people remains.

be “safe” from error, as Williamson (2000) says elsewhere, part of the quasi-knowledge-role is that quasi-knowledge be safe from incorrectness.) Even if nihilism precludes most perceptual evidence, then, it allows us a rich array of quasi-evidence.

## 7. The Cartesian argument

A familiar Cartesian idea is that one can be certain of one’s own existence. Given the further (and much less Cartesian!) premise that one is not a mereologically simple entity, one can infer that nihilism is false.

Nihilism allows sentences about our own existence to be correct even if they are untrue, just as it allows sentences about hydrogen atoms to be correct even if untrue. So the alleged certainty cannot be of the mere correctness of the claim that we exist. The Cartesian objector must claim to be certain that, in addition to there being particles arranged thinking-cogito-wise, she herself exists. It’s hard to see why she should be so certain—or even justified. The preceding sections establish, I take it, that we are not entitled to conclude on Moorean, perceptual, or Williamsonian grounds that ordinary things like tables and chairs exist. What further grounds are there for concluding that we ourselves exist, as opposed to there merely existing appropriately arranged particles?

Van Inwagen (1990, chapter 12) seems to suggest that further grounds lie in the nature of mentality. He concedes that the correctness (or truth, given a liberal metaseantics) of ‘there is a table’, ‘there is a hydrogen atom’, and so on, demand nothing more than appropriately arranged particles; but, he says, the correctness (or truth) of ‘I am thinking’ demands more. It demands that there be a thinker that is me. Mentality is metaphysically singular.

But why think this? What is wrong with saying that the correctness (or truth) of ‘I think’ is a matter of arrangements of particles? It’s not enough to emphasize how justified or certain ‘I think’ is, or the immediacy of our awareness of it. The arrangement of particles constituting its correctness (or truth) might be one that is especially immediate, both epistemically and psychologically.

Rejecting materialism about the mind would not on its own support metaphysical singularity. Irreducible or nonsupervenient mentality could consist of irreducible or nonsupervenient mental relations which relate many subatomic particles, rather than irreducible or nonsupervenient mental properties that are instantiated by single entities.

Perhaps van Inwagen's belief in metaphysical singularity has something to do with the character of conscious experience? A subject's simultaneous experiences are experienced by that subject as being in some sense part of one conscious episode, and as experienced by a single subject. But it is unclear why these aspects of phenomenology could not be due, metaphysically, to states of particles.

## 8. The deflationary argument

Certain "ontological deflationists" argue that the dispute over nihilism is not a substantive one. Rather than concerning the objective nature of the world, it is merely verbal or conceptual or notational. Some even claim that nihilism is conceptually incoherent, on the grounds that it's a conceptual truth that composites exist if subatomic particles are appropriately arranged.<sup>54</sup>

Ontological deflationism challenges all philosophical ontology, not just nihilism. If it's a conceptual truth that composites exist if subatomic particles are appropriately arranged, then it's presumably also a conceptual truth that holes exist if objects are perforated, that propositions exist if sentences are synonymous, that directions exist if lines are parallel, and so on. But then it's incoherent to deny the existence of holes while accepting perforated objects, to deny the existence of propositions while accepting synonymous sentences, to deny the existence of directions while accepting parallel lines, and so on. The practice of ontology presupposes the coherence of such denials, and so is quite generally undermined by ontological deflationism. A full discussion of this issue would take us too far afield and would repeat what has been said elsewhere.<sup>55</sup> But in brief: my reply to the deflationist is that even if sentences like 'composites exist if subatomic particles are appropriately arranged' are conceptual truths of *ordinary* languages, they're not conceptual truths of the ontologist's fundamental language. And so, since nihilism is formulated in a fundamental language, it is not conceptually incoherent.

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<sup>54</sup>Writings in this ballpark include Carnap (1950); Chalmers (2009); Hirsch (2011); Putnam (1975, 1987); Thomasson (2007, 2009).

<sup>55</sup>Dorr (2005); Eklund (2007, 2009); Hawthorne (2006, 2009); Sider (2009, 2011, chapter 8, 2014).

## 9. Gunk

An object is “gunky” if and only if each of its parts (including itself) has proper parts. Nihilists must obviously reject talk of gunk in fundamental languages, since they think those languages do not contain ‘part’. But they must also reject talk of gunk in *non*fundamental languages. For talk of composite objects in nonfundamental languages rests on fundamental talk about simple subatomic particles; recall how the minions were taught to speak of hydrogen atoms when protons are bound to electrons. The rules given to the minions make no provision for talking about proper parts “all the way down”. Similarly, since the correctness (section 3) of talk of parthood and composite objects rests on fundamental talk of simple subatomic particles, nihilists cannot admit that talk of gunk is correct or that talk of tables and chairs could be correct despite gunk. Nihilists simply cannot admit gunk.

But is there any reason to think that gunk exists? (I.e., that gunk *actually* exists; the next section discusses the possibility of gunk.) Traditional arguments that point-sized things are somehow conceptually incoherent are unconvincing since we now know that theories of point-sized things are mathematically coherent (and anyway, the arguments wouldn’t immediately imply gunk—mereologically simple things might be larger than point-sized). But there is a more compelling recent argument in favor of gunk. Frank Arntzenius (2008) argues that a physics based on a gunky space or spacetime has the advantage of collapsing certain distinctions to which the laws of nature are insensitive, for example the distinction between open and closed regions. (Arntzenius doesn’t regard this as a decisive case for gunk, but rather as a reason to pursue a certain formal project, namely, that of seeing whether physical theories based on gunk can be fully developed.) I have no particular response to this argument, except to say that the added complexity of countenancing a fundamental part-whole relation must be weighed against the benefit Arntzenius adduces, and moreover, that the attraction of the gunk-based theory will depend in part on the simplicity of its ideology and also on how simply the laws of nature may be formulated in terms of that ideology. So my case for nihilism must be tentative at this stage.

There is a further argument one might offer in favor of gunk: an inductive argument that there are no smallest particles.<sup>56</sup> Historically, the following pattern has been repeated several times: a type of particle was discovered; the

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<sup>56</sup>The remainder of this section overlaps Sider (2011, section 7.11.2).

particles were first thought to be simple; but scientists later concluded that the particles are in fact made up of smaller particles. Physicists first posited molecules as the ultimate particles, but molecules gave way to atoms, which gave way to protons, neutrons and electrons, which have given way to quarks, leptons, and gauge bosons. Each time a new type of particle was discovered, physicists posited new features of the newly discovered particles, whose distribution accounted for, but could not be accounted for in terms of, the distribution of the distinctive features of the older, larger particles. This historical progression of theories will probably continue forever, the argument continues, so there are no ultimate particles on whose features everything depends. But this argument is bad, for a number of reasons.

First, induction from four cases is unimpressive. Second, the argument at best supports the claim that there are no smallest bearers of physical magnitudes; but there might yet be smallest things. Third, by moving from initial “finite” observations to an “infinite” conclusion, the argument makes a big leap. Compare it to the argument that there must be infinitely many people, since for each person we’ve observed, there exists a taller person.<sup>57</sup> Fourth, the argument assumes a particle ontology. I have been writing as if a particle ontology were indeed correct; but a better approach, I think, rejects particles in favor of points of spacetime (or points of some “higher-order” space such as configuration space). Spacetime (or some higher-order space) must be posited regardless in order to support fields. But then the particles are gratuitous; and moreover one would need additional ideology, such as the predicate ‘particle  $x$  is located at point  $p$ ’, to connect the particles to spacetime. (Although I believe this “supersubstantialist” view to be correct, I’ll go back to writing as if what exists fundamentally are subatomic particles.)

There is also a fifth and subtler problem, though it depends on certain assumptions about the nature of fundamentality. Assume that i) we can speak of the fundamentality of features (such as the property of having unit negative charge), and that ii) fundamentality is all-or-nothing, rather than a matter of degree. The historical progression of physical theories that is cited by the inductive argument may then be formulated as follows:

Theory 1: The fundamental features are those of molecules

Theory 2: The fundamental features are not those of molecules, but are rather those of atoms

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<sup>57</sup>Thanks to Jason Turner and Cian Dorr for these last two points.

Theory 3: The fundamental features are not those of atoms, but are rather those of protons, neutrons, and electrons

Theory 4: The fundamental features are not those of protons, neutrons, and electrons, but are rather those of quarks, leptons, and gauge bosons

These theories, notice, concern which features are fundamental, and not just the existence of composite entities. (It might be objected that the inductive argument could ignore the facts about fundamentality and consider merely a progression of theories about the existence of composite entities; but it is bad inductive practice to draw conclusions based on arbitrarily selected subsets of one's evidence.) Now, we are asked to inductively draw a certain conclusion from the fact that scientists have been led to accept, and then subsequently reject, Theories 1–4. But what conclusion?

Two possibilities suggest themselves:

Conclusion 1: it's parts all the way down, but there is some mereological level at which all the fundamental features reside. The features of all other objects (including objects at mereologically smaller levels) depend on these fundamental features.

Conclusion 2: it's parts all the way down, and there is no such level. For every mereological level, mereologically smaller parts have distinctive fundamental features.

But *neither* conclusion is inductively suggested by the initial pattern.

Conclusion 1's postulation of smaller objects beyond the level on which everything depends is gratuitous, so it's hard to see why it would be inductively suggested.

Conclusion 2 is a very bizarre hypothesis (a kind of infinite ideological complexity). And it isn't inductively suggested by the initial pattern. Conclusion 2 might seem at first to be suggested because it has the superficial appearance of a kind of limit point of the initial pattern, if that pattern were infinitely extended. By moving through Theories 1–4, so the idea goes, scientists have been moving closer and closer to Conclusion 2. But this impression vanishes upon closer inspection. Each Theory in the progression does not *add* a new layer of fundamental features, but rather *replaces* the previous Theory's layer (since it regards the previous layer as just depending on the newly hypothesized layer). Extending the pattern indefinitely results in a series that simply has no

intuitive limit. For comparison, imagine a countably infinite series of chairs:  $c_1, c_2, \dots$ . Suppose first that in scenario 1,  $c_1$  is filled; in scenario 2, chairs  $c_1$  and  $c_2$  are each filled; in scenario 3, chairs  $c_1, c_2$ , and  $c_3$  are each filled; and so on. I suppose there's a sense in which the limit of this series is a scenario in which all the chairs are filled. But consider a second series in which only  $c_1$  is filled in scenario 1, *only*  $c_2$  is filled in scenario 2, *only*  $c_3$  is filled in scenario 3, and so on. This series has no intuitive infinite limit, and certainly not one in which all the chairs are filled. The imagined infinite extension of the progression through Theories 1–4 is like the second series. It has no intuitive infinite limit, and certainly not Conclusion 2.

The assumption of all-or-nothing fundamentality is crucial to this criticism. If fundamentality came in degrees we could redescribe Theories 1–4 as follows:

Theory 1a: Molecules have certain distinctive features

Theory 2a: Atoms have certain distinctive features, which are *more fundamental than* those of molecules

Theory 3a: Protons, neutrons, and electrons have certain distinctive features, which are more fundamental than those of atoms

Theory 4a: Quarks, leptons, and gauge bosons have certain distinctive features, which are more fundamental than those of protons, neutrons, and electrons

If continued infinitely, this progression *does* seem to have an infinite limit, namely:

Conclusion 3: it's parts all the way down, and for every mereological level, mereologically smaller parts have distinctive features that are *more fundamental than* the features of the previous level

A full discussion here would require delving into difficult questions about the nature of fundamentality. Here I'll make just two brief points. First, there are reasons to reject comparative fundamentality (Sider, 2011, chapter 7). Second, the friends of comparative fundamentality are likely to argue that comparative fundamentality must be well-founded; it cannot be that for each feature there is a more fundamental feature. (This stance does not on its own rule out gunk. Gunk is infinite descent in the part-whole relation; the stance rules

out infinite descent in the fundamentality-over-features relation.<sup>58</sup>) Given well-foundedness, Conclusion 3 is guaranteed, on independent grounds, to be false.

## 10. Possible gunk

So with the possible exception of Arntzenius's argument, I don't think there are good arguments that gunk is actual. But the alleged *possibility* of gunk is sometimes thought to threaten nihilism.<sup>59</sup>

Gunk is, I suppose, epistemically possible. Maybe scientists will one day tell us that there is gunk after all; or maybe Arntzenius's argument will prove decisive. I don't pretend to know that these things won't happen. But defenders of nihilism can happily grant that nihilism itself is epistemically possibly false. Substantive metaphysics is not a search for epistemic first principles, compatible with whatever the future might bring; it can be held hostage to empirical fortune. This is the price a metaphysician pays for regarding her speculations as substantive hypotheses about the real world. If the future brings evidence for gunk, I will reduce my degree of belief in nihilism accordingly.

A quite different threat comes from the alleged "metaphysical" possibility of gunk. If gunk is metaphysically possible, then nihilism is not metaphysically necessarily true (let all modalities be understood as metaphysical henceforth). But nihilism is a "proposition of metaphysics"; and such propositions are noncontingent; they are necessarily true if true and necessarily false if false. So nihilism is necessarily false, and so it is actually false.<sup>60</sup> I have no clear definition of 'proposition of metaphysics', but I have in mind propositions about abstract and general questions that metaphysicians debate, such as "numbers exist", "any charged object instantiates the property of being charged", "time is like space", and so on.

The argument from the possibility of gunk faces a challenge. Consider this argument for the opposite conclusion: "nihilism is possibly true; nihilism is a proposition of metaphysics and hence is noncontingent; so nihilism is necessarily true; so nihilism is true". This argument assumes the possibility of nihilism

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<sup>58</sup>If one construed fundamentality as applying to *facts* rather than features, then the assumption that relative fundamentality is well-founded might prohibit gunk on its own. See Sider (2011, section 7.7).

<sup>59</sup>See, I'm afraid, Sider (1993).

<sup>60</sup>The alleged possibility of emergent properties raises some of the same issues.

and concludes that nihilism is true; the previous paragraph's argument assumes the possibility of gunk and concludes that nihilism is false. Anyone who wants to defend the previous paragraph's argument needs an asymmetry between gunk and nihilism, a reason to think that gunk is genuinely possible but nihilism is not.<sup>61</sup> But I won't press this point, since in my view the argument fails for a more basic reason. All such arguments from possibility are undermined by what I believe to be the correct metaphysics of modality: modal "Humeanism".<sup>62</sup>

The Humean theory assumes that necessity and other modal notions are not fundamental. It further gives the following reduction of necessity: to be a necessary proposition is to be a proposition that is i) true, and ii) of an appropriate type, where the appropriate types are given by a list that I will specify in a moment. More carefully, to be necessary is to be a logical consequence of the true propositions of the types on the list. For example, one of the types on the list is the type *mathematical proposition* (i.e., proposition purely about mathematics); thus, the necessity of the proposition that  $2 + 2 = 4$  involves nothing more than the fact that i) two plus two in fact equals four, and ii) the proposition that  $2 + 2 = 4$  is a mathematical proposition.

What types of propositions go on the list? The list is given by our use of 'necessary'; nothing metaphysically deep unifies it. (Thus the Humean theory is in a sense deflationary: it says that there is much less to modality than most philosophers think.) Given the way 'necessarily' is typically used—by philosophers, in the sense of metaphysical necessity anyway—the list clearly includes at least these types:

1. propositions expressed by analytically true sentences
2. propositions of mathematics
3. "natural kind" propositions (such as: *all water is made of H<sub>2</sub>O*)
4. propositions of metaphysics

Consider, now, type 4: propositions of metaphysics. (Similar remarks apply to types 2 and 3.) The inclusion of this type on the list corresponds to the dogma

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<sup>61</sup>Our "intuition" of possibility might be claimed to be stronger in the case of gunk. Alternatively, the possibility of nihilism might be rejected on the grounds that it clashes with the principle of universal composition, a principle that may be alleged to flow from the very nature of the part-whole relation (see Sider (2007b)).

<sup>62</sup>See Sider (2011, chapter 11) for a fuller and more careful presentation.

mentioned above: the metaphysical is a noncontingent subject matter.<sup>63</sup> The truth of this dogma is a shallow matter, according to the Humean; it is simply the result of our decision to mean by ‘necessary’ a property of true propositions given by a list including the type *proposition of metaphysics*.<sup>64</sup> (This is not to say, where *M* is a metaphysical proposition, that *M* itself, or the proposition that *M* is necessarily true, is *about* that linguistic decision, or that its truth is counterfactually dependent on the decision.)

I won’t try to defend the Humean theory here, except to say that it seems to me the most promising form of modal reductionism. The leading alternatives are Lewisian modal realism and conventionalism. But modal realism is very hard to believe, and conventionalism requires the discredited notion of truth by convention.<sup>65</sup>

Assume for the sake of argument that the Humean theory is true. The problem for the argument from the possibility of gunk is then intuitively the following (I will lay out the argument more carefully in a moment). Given the Humean theory, to be necessary is to be true and to fall under a type on the list. But *proposition of metaphysics* is one of the types on the list. So for a proposition of metaphysics such as nihilism, necessity just boils down to truth. But then, the only way to support the claim that nihilism isn’t necessary is to argue directly that nihilism is false, in which case the argument from possibility plays no distinctive role.

No one argues from possibility for mathematical propositions; no one tries to argue against Goldbach’s conjecture by asserting its possible falsity and then citing the noncontingency of mathematics. Perhaps this is because we realize that in mathematics there is no distance between truth and necessity, and so we cannot support the possible falsity of Goldbach’s conjecture except by directly supporting its actual falsity. At any rate, this is the situation that I think obtains for propositions of metaphysics.

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<sup>63</sup>There are some dissenters. According to Cameron (2007), for example, it’s contingent whether mereological composition is unrestricted. On my view, the list of types of propositions can vary with the speaker’s context; Cameron’s statement is true in a somewhat nonstandard but still linguistically allowable context, namely, one in which the kind *proposition of metaphysics* is dropped from the list. In this context the argument from the possibility of gunk remains unsound, now because the premise that nihilism is noncontingent is false. The argument is unsound for the same reason if the Humean decides that since some metaphysical disputes are contingent (over Humean supervenience or dualism, say; see below), not all propositions of metaphysics go on the list, provided atomism-related propositions are thus left off the list.

<sup>64</sup>And also that this type is closed under negation.

<sup>65</sup>See Sider (2003).

More carefully. The objector's premise is that gunk is possible; or, equivalently, that (mereological) *atomism* is not necessary. Now, consider the dialectical situation in which the objector and the nihilist both accept the Humean theory of modality. It is then common ground between them that what it is for the objector's premise to be true is for the following to be true:

- (P) atomism is not a logical consequence of any true propositions that fall under one or more of the kinds on the list

I will argue that there is no distinctively modal way for the objector to support (P). Only by arguing directly that atomism (or some related proposition) is *actually* false can she support (P). But if she could do that, she would have no need for the argument from possibility, since she could argue directly from the actual falsity of atomism to the falsity of nihilism. The argument from possibility is superfluous.

The point is clearest if atomism is itself a proposition of metaphysics. In that case atomism itself falls under a kind on the list, in which case it's hard to see how (P) could be supported other than by directly arguing that atomism is false. (If atomism is true then atomism would be a true proposition that falls under a kind on the list, and which implies atomism.) And if we had a direct reason for thinking that atomism is (actually) false, that would on its own give us a reason to reject nihilism, without the need for modal considerations.

The situation is a little more complex if atomism isn't a proposition of metaphysics.<sup>66</sup> To reduce complexity, let me make a few assumptions, which I'll take to be common ground between the nihilist and the objector. First, this discussion is being conducted in a nonfundamental language (so that talk of parts is dialectically appropriate). Second, this language contains the means to state nihilism (recall that nihilism is a thesis about what is fundamentally the case). And third, if nihilism is true then the following conditional is analytically true: "if nihilism is true then atomism is true". (Recall the point from the beginning of section 9: if nihilism is true then nonfundamental talk of composites is governed by rules of use that rest all talk of parts on talk of simple subatomic particles.) Given these assumptions, the only way to support (P) would seem to be by directly arguing that atomism is false. For both sides agree that if nihilism is true then nihilism and the proposition expressed by "if nihilism is

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<sup>66</sup>Not that anything deep is at stake in the question of whether atomism is a proposition of metaphysics; the notion of a proposition of metaphysics is vague and not particularly fundamental.

true then atomism is true” are both true propositions that fall under some kind on the list.

Return to the first, simpler, case in which atomism itself is assumed to be a proposition of metaphysics. I claimed that the only way to support (P) in this case is to argue directly that atomism is false. This is not merely because atomism implies that (P) is false, or even that it’s common ground in the dialectical situation that this is so. (It can be common ground that the conjunction of the premises of an argument implies its conclusion without its being the case that the only way to support the conjunction of the premises is to directly support the conclusion.) It is rather based on inspection of (P). All (P) says is that atomism isn’t a consequence of a certain class of propositions, a class that is simply defined as the class of all true propositions of a certain type *T*; and atomism is admitted by all hands to be of type *T*. Compare (P) to the claim:

The number 2 is not identical to any member of the set of numbers that are both i) amongst Ted’s favorite numbers, and ii) even

It’s hard to see how one could support this claim without directly arguing that 2 isn’t one of Ted’s favorite numbers; similarly, it’s hard to see how the objector could support (P) without arguing directly that atomism is false.

How else could the objector support (P)? What reason could the objector offer for thinking that atomism is not a logical consequence of any true propositions falling under some kind on the list? I suppose the objector might claim that her belief that atomism is not necessary is such a reason (since for atomism to fail to be necessary is precisely for it to fail to be a logical consequence of these propositions), thereby reversing what I think is the proper way to form beliefs here. Relatedly, someone might criticize me for recasting the question of whether atomism is non-necessary as the question of whether (P) is true. The Humean theory of modality says that what it is for atomism to not be necessary is for (P) to be true; but, the critic might point out, epistemic features do not in general transmit across “what it is to be *F* is to be *G*”; thus the mere truth of the Humean theory does not imply that the only way to support the claim that atomism is not necessary is to support (P). To be fair, I began by assuming that the Humean theory is “common ground” between the nihilist and the objector, and not merely that it is true. But, it might be objected, even if one believes a metaphysical analysis, it does not follow that one’s attitudes towards the analysandum are equivalent to one’s attitudes towards the analysans. (*Perhaps* this follows if one *knows* the analysis; but surely no one knows that the Humean analysis is right.)

These concerns are serious, but ultimately not compelling. For a rational approach to modal argumentation surely should be informed by reasonable beliefs about the underlying nature of modality. Imagine a time before you ever considered the question of the nature of modality. Suppose you then thought that atomism might well be true, or at any rate took yourself to have no reason to think that atomism is false; but nevertheless, you also believed that atomism is not necessary. (Why? Perhaps you noted that the falsity of atomism is conceivable, doesn't seem like standard examples of conceivable impossibilities, and even seems epistemically possible, and so you concluded that it's probably possible.) At that time, you didn't believe (P), nor did you take yourself to have any reason to believe (P). After all, you would have said, atomism is a proposition of metaphysics, and might well be true, in which case atomism itself would be on the list, in which case (P) would be false. But now, suppose you later come to believe the Humean view, and hence that *what it is* for atomism to not be necessary is just for (P) to be the case. Unless your reasons for coming to believe the Humean view somehow give you reason to believe (P) (and how could they?), you should surely then abandon your former belief that atomism isn't necessary. Insofar as your belief in the Humean theory is tentative, the abandonment should be tentative; but the stronger you reasonably believe the Humean theory, the stronger the abandonment ought to be.<sup>67</sup>

Taking a step back: given the Humean theory, conceivability is no guide to possibility when it comes to propositions of metaphysics. For as we have seen, the necessity of such propositions boils down to truth; and conceivability is no guide to the *truth* of propositions of metaphysics. (Conceivability might yet be a guide to possibility for certain other types of propositions. Perhaps our ability to conceive of a proposition's being false is good evidence that it isn't expressed by any analytically true sentence; in that case, this ability would be good evidence for its not being necessary if we know that the proposition doesn't fall under any of the other types on the list.)

Taking a further step back: I believe that those who argue from possibility for propositions of metaphysics typically make two presuppositions. First, modal facts are "further facts": a proposition's being necessary involves its

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<sup>67</sup>My argument here is what Mark Johnston (1997) calls an "argument from below"; it assumes that, in this case anyway, we should look to the underlying metaphysical nature of a proposition to decide what attitude to take toward that proposition. (Johnston criticizes certain other arguments from below.) Acceptance of my argument here does not require accepting all arguments from below.

possessing some further fundamental feature, beyond its merely being the type of proposition that it is. And second, conceivability gives (defeasible) evidence concerning the presence of this further feature. Perhaps such arguments have weight, given these presuppositions. But given the Humean theory of modality, the presuppositions are mistaken—there is no such further feature.

My reply to the argument from the possibility of gunk has assumed the Humean theory of modality. Here are some brief remarks about how a nihilist might reply without making that assumption. First, the defender of the argument from the possibility of gunk must overcome the apparent symmetry mentioned earlier between gunk and nihilism itself: each is apparently conceivable, so why is only the first possible? Second, it is particularly difficult to maintain both the conceivability/possibility link in fundamental metaphysics, and the claim that propositions of fundamental metaphysics are noncontingent. Consider the fundamental nature of time: is a spatializing theory correct, or a presentist theory, or some other theory? For each theory we can apparently conceive of its falsity; if conceivability implied possibility in fundamental metaphysics then each theory would be possibly false, leading via the noncontingency assumption to the absurd conclusion that each theory is actually false. Third, I have been writing as if propositions of metaphysics are universally regarded as noncontingent. But two exceptions from David Lewis's writings come to mind: Humean Supervenience (1986*b*, introduction) and materialism (Lewis, 1983). Lewis's claim of Humean Supervenience was a contingent one, made only with respect to an "inner sphere" of possible worlds that include no fundamental ("perfectly natural", in his terms) properties or relations beyond those that are actually instantiated; and his claim of materialism was similarly qualified. Lewis regarded these views as contingent because they are claims that the actual world lacks fundamental properties or relations of certain sorts (nonlocal qualities, fundamental mental properties), and because he had a generous view about what fundamental properties and relations are possible. But now notice that nihilism—as I have developed it, anyway—could be regarded as being contingent in exactly the same way. The key nihilist claim that 'part' is not fundamental ideology—or to put it less nominalistically, that there is no fundamental part-whole relation—could be restricted to the inner sphere of worlds. Outside the inner sphere, a nihilist could say, there are fundamental two-place relations that are distinct from all actual fundamental relations, and which play "the parthood role"—they obey suitable axioms of mereology and otherwise behave the way that opponents of nihilism think the part-whole relation behaves. And in some worlds outside the inner sphere, the nihilist

could say, one of these relations is “non-atomic”: each thing in that world bears the relation to some distinct thing in that world. In this sense the nihilist could allow that nihilism is contingent and gunk is possible.<sup>68</sup>

## 11. Composites needed in physics

The final argument I will consider is, to my mind, the most formidable one. Our best physical theories include a physical geometry—a theory of the intrinsic structure of physical space or spacetime (or some higher-order space). But, it might be argued, physical geometries quantify over paths and regions, not just points; paths and regions are composite objects containing points as parts; and so, such theories must employ ‘part’. Our best physical theories are our best guide to the correct fundamental ontology and ideology. So, ‘part’ is likely part of fundamental ideology, and composites are likely part of fundamental ontology.

Let’s look more closely into the alleged need for parthood. Some geometric notions apply only to points, and thus are nihilist-friendly. In Tarski’s axiomatization of solid geometry, for example, the primitive predicates ‘between’ and ‘congruent’ relate only points (Tarski and Givant, 1999). But consider the topological notion of an open region: a region where, intuitively, each point is surrounded in all directions by further points in the region. (An example of an open region is the spherical region consisting of all points strictly less than one meter from a given point  $p$ . The “closed sphere” consisting of all points less than or equal to one meter from  $p$  would not be open, since the surface of the sphere is part of the closed sphere, and points on the surface are not surrounded by points in the closed sphere. The first, “open”, sphere includes points that are arbitrarily close to the surface, but not points on the surface itself.) The predicate ‘open’ is a predicate of regions, and thus is not nihilist-friendly. And it cannot be replaced with a multi-place predicate relating the points that are part of that region, since open regions can contain infinitely many points. (One might formulate topology in a language with plural quantifiers, and take ‘open’

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<sup>68</sup>Someone channeling Dorr (2005) might object that ‘part’ is a failed natural kind term and is therefore semantically empty; so the outer-sphere relations playing the parthood role are not really parthood; so the “non-atomic” world does not really contain gunk. (There is a parallel argument, in the case of materialism, that nonphysical fundamental properties playing “the mentality role” in the outer sphere are not really mental properties.) I’m not sure whether the argument is sound; but if it is, there is surely no good reason to think that the genuine claim, as opposed to the mere role-claim, is possible.

to be an irreducibly plural predicate. That would eliminate the need for composites and ‘part’, but at the cost of increased complexity in logical ideology. We will return to this trade-off below.)

It is common to divide geometric structure into different “levels”: topological, differentiable, affine, and metric. We have been discussing an apparent need for regions at the topological level. However, on some views, there is no need to regard topological structure as metaphysically fundamental. For example, Tarski’s predicates ‘between’ and ‘congruent’, which generate affine and metric structure, induce a topology. So if an adequate geometry for physics could be built solely on Tarski’s predicates, there would be no need for composites of points.

However, Tarski’s approach—which is designed to apply to flat spaces—takes metric facts to be direct connections between distant points. Such facts emerge from the holding of Tarski’s congruence predicate (‘congruent( $x, y, z, w$ )’ means that the distance from  $x$  to  $y$  is the same as the distance from  $z$  to  $w$ ). But in the curved spacetimes of general relativity, the metrical facts are normally taken to be *path-dependent*. That is, the distance between two points is not taken to be a direct connection between those points, but is rather defined in terms of path-length: the distance between two points is the length of the shortest path connecting them.<sup>69</sup>

The anti-nihilist argument would be immediate if distances under the path-dependent conception emerged from something as simple as comparative predicates of paths (such as: ‘path  $p_1$  is longer than path  $p_2$ ’). But the mathematics in question—the mathematics of tensor fields on differentiable manifolds—is not that simple. Moreover, this mathematics characterizes geometry in highly “extrinsic” terms, using mathematical objects that are, intuitively, not part of the underlying geometric facts. What is needed is a “synthetic” development of differential geometry. We need what Tarski gave us for flat spaces: a theory using purely geometric predicates that can be regarded as underlying (via representation theorems) the usual mathematical development of differential geometry. Given such a synthetic development, we could look to see whether predicates of regions (or other composites of points) are needed. Unfortunately, very little work has been done on this topic. But it seems inevitable that a synthetic development of differential geometry will require predicates of regions, given the centrality of the notion of the geometry of “infinitesimal neighborhoods” around points. Moreover, the only attempt at

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<sup>69</sup>See Bricker (1993); Maudlin (1993, p. 196).

constructing a synthetic differential geometry of which I know—Arntzenius and Dorr (2011)—does indeed employ predicates of regions and a predicate for parthood. So I will assume that the geometry of curved spacetimes does indeed call for something like predicates of regions.

In sum: to do physical geometry we need a way to attribute a feature (such as openness or path-length) to a collection of infinitely many points. And the natural way to do this is to posit a “gathering entity”, an entity that somehow incorporates those points, and then attribute the features to the gathering entity. (The paths and regions mentioned above were gathering entities.) If the gathering entity must be a composite that contains the points as parts, then we need composites and parthood to do physical geometry.

But the gathering entity could be a set instead. We could construe fundamental geometric features of paths and regions as being features of sets, not mereological composites, of points. In topology, for instance, we can take ‘open’ as a predicate of sets. It’s of course commonplace to take ‘open set’ as the undefined expression in purely mathematical topology; but what I am recommending is taking ‘open’ as the *metaphysically fundamental* notion for *physical* topology—the topology of physical space.

My reason for preferring the set-theoretic conception of physical topology is that it is ideologically more parsimonious since we need set-theory *anyway* in our fundamental theory of the world. And my reason for thinking the latter is just the familiar indispensability argument,<sup>70</sup> but construed as an argument for a set-theoretic fundamental ideology in addition to an ontology of sets. According to this argument, our best fundamental theory includes mathematical physics; and the best theory of the foundations of mathematical physics—that is, our best theory of the fundamental nature of the world that contains mathematical physics (or something very much like it)—is set-theoretic. The set-theoretic foundational theory is a theory whose ontology includes sets and whose ideology contains, in addition to the ideology of first-order predicate logic, a primitive predicate for set-membership,  $\in$ . Given this ontology and ideology, set-theoretic topology then requires only a single added primitive predicate, namely ‘open’, whereas mereological topology also requires the predicate  $<$  for parthood. The addition of  $<$  would be gratuitous.

I won’t defend this form of the indispensability argument in detail, but let me comment briefly on two issues. First, the present perspective on ideological parsimony is that ideologically simpler theories aren’t just more convenient

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<sup>70</sup>Putnam (1971); Quine (1951*b*, section 6) and (1960, chapter 7).

for us. They're more likely, other things being equal, to be true. So when evaluating a competitor to the proposed (first-order) set-theoretic foundation for mathematical physics, one must take into account the competitor's ideology as well as its ontology. A modal structuralist such as Hellman (1989), for example, saves on the ontology of sets but requires a primitive ideology of modal operators and higher-order quantifiers. Relatedly, compare my approach, in which  $\in$  is fundamental ideology, with Lewis's (1991) structuralist mereological approach to set theory, which replaces  $\in$  in fundamental ideology with  $<$ , plural quantifiers, and 'is one of'. (However "ontologically innocent" the language of plural quantification is, it isn't ideologically innocent.) This replacement seems to be an ideological step backwards. (For what it's worth, additions to logical ideology such as the plural quantifiers seem particularly destructive of "simplicity".) The tradeoff between ontology and ideology is familiar; but once ideological commitments are regarded as "worldly", as contributing to the complexity of the world one is positing, then I believe that the simple ideology of (first-order, nonLewisian) set theory makes it more attractive than its competitors.<sup>71</sup>

Second, one of the biggest challenges to the indispensability argument is Hartry Field's program for nominalizing physics. In *Science without Numbers* Field shows how to reformulate certain portions of physics using an ideology consisting solely of that of first-order predicate logic, plus some physical predicates, plus the predicate  $<$  for parthood.<sup>72</sup> If this program succeeds quite generally then we could *replace*  $\in$  with  $<$  in our fundamental ideology for physical geometry, rather than adding  $<$  to an ideology that already contains  $\in$ . My argument from ideological parsimony for nihilism would thus be undermined.

My defense of nihilism, therefore, is conditional on whether Field's program ultimately succeeds. Here I will make only one brief comment. A prominent worry due to David Malament (1982) is that the program doesn't naturally

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<sup>71</sup>The simplicity of laws—including logical laws—is also relevant. Sider (2011, section 9.15) argues against a fundamental ideology of plural or higher-order quantifiers.

<sup>72</sup>I mean the theory  $N_0$  he introduces in chapter 9; the earlier theory  $N$  uses stronger logical notions (see Shapiro (1983); Field (1985) for discussion). Field uses further notions to define conservativeness: in Field (1980), the notion of logical consequence; in Field (1984), undefined notions of logical modality and infinitary conjunction. But the notion of conservativeness does not occur in the nominalized physics; it is rather used in Field's justification of the practice of using mathematics to draw out nominalistic conclusions from nominalistic premises. It's an interesting question whether Field might insist that in his fundamental theory (if he's happy to talk this way), the further notions do not occur; they're only needed in his justification of the use of mathematics, and that part of his theory needn't be fundamental.

extend to quantum mechanics and other theories that make heavier uses of set theory than the bits of physics that Field discusses in *Science without Numbers*. But this criticism could be answered by configuration-space realists, who, as we saw earlier, regard configuration space in quantum mechanics not as an abstract set-theoretic representation, but rather as a manifold of sui generis points.<sup>73</sup> Now, Malament argues that substantivalism about configuration space should offend nominalist scruples. But suppose that the source of nominalist scruples is opposition to the ideology and laws of theories of abstracta ( $\in$  and the axioms of set theory, in the case of sets). Then substantivalism about configuration space would not offend, since the needed ideology and laws would just be mereological and geometrical.

Instead of challenging the indispensability argument, an objector might grant the existence of sets but resist the idea that the fundamental facts about physical geometry involve sets. Sets are *abstract* after all!

The abstract/concrete distinction behind this objection is a relic of a certain theory. According to this theory, reality divides into two realms—abstract and concrete—in a way that is significant on various fronts. Epistemic: we know about the abstract a priori. Modal: facts about the abstract are necessary. Causal: the abstract is causally inert. Spatial: abstract entities are not in space and time. But this is just a theory, nothing more. It's not sacrosanct; nothing supports it other than tradition; and it should stand aside if it obstructs an attractive simplification of ideology.<sup>74</sup>

If you don't like the idea of fundamental notions of physical geometry applying to sets, perhaps you're not really taking set theory seriously as a piece of metaphysics. But this is exactly the idea. For me, sets and  $\in$  are rock-bottom, just as composites and  $<$  are rock-bottom for the compositionalist. Given this, why would it be worse to regard openness and path-length as applying to sets than to regard them as applying to regions and paths construed as sums?

Sometimes the threat of arbitrariness at the fundamental level stands in the

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<sup>73</sup>As noted earlier, Dorr (2009) defends one version of configuration space realism; and Dorr himself is (or was) a nihilist. As a nihilist, Dorr would need to think of distance and topology as somehow emerging from direct point-to-point relations. If such an approach were viable, and compatible with Field's program, then one could get by with *neither*  $<$  nor  $\in$ , and the argument from ideological parsimony for nihilism would be reinstated. Dorr's (2011) most recent work on physical geometry (co-authored with Arntzenius), however, makes use of parthood.

<sup>74</sup>Also, I personally doubt that the contrasts involved in the theory run very deep: modal notions are not fundamental; the a priori/aposteriori distinction is problematic; and reductionism about laws is true.

way of regarding abstracta as being involved in fundamental facts. For example, someone who regarded distances as grounded in a fundamental function from pairs of points to real numbers would need to choose, it seems, a distinguished unit of measure. But this worry isn't present here; there's no arbitrariness in 'open set', or 'paths  $p_1$  and  $p_2$  are congruent', anyway.

"If you're willing to apply physical predicates like path length and openness to sets, why not go all the way to Pythagoreanism, and identify particles and points of spacetime with pure sets?"<sup>75</sup> Note that this identification would simplify neither ideology nor the laws: we'd still need the same primitive physical predicates (now construed as applying to pure sets) and the same physical laws governing those predicates (since the predicates are primitive, the laws could not be derived from the laws of pure set theory). Thus the identification has only ontological parsimony going for it, which as noted earlier is less important than other sorts of parsimony. And the identification has a big strike against it: arbitrariness. There is no single collection of pure sets with which it is particularly natural to identify particles and points of spacetime. A theory based on any particular identification would thus be unattractively arbitrary.

So: my reply to this section's objection is that composites containing spacetime points as parts are not needed for physical geometry; sets of spacetime points will do just as well. This reply is more tentative than the rest of the paper, since it is based on largely undefended claims about the foundations of physical theories. It also represents a softening of the nihilist position, because I now admit "composites" of a sort, namely sets, and a fundamental form of "composition", namely, set-membership. Since I have accepted the existence of sets, I suppose I could now go back and respond differently than I did earlier to the Moorean, perceptual, Williamsonian, and Cartesian arguments against nihilism. For I can now identify ordinary objects—tables and chairs, planets and molecules, we ourselves—with sets, either of particles or points of spacetime. Given this identification, ordinary objects do exist in the fundamental sense after all. I'm not going to do this because I think that my earlier responses suffice even without an ontology of sets. Moreover, some of the earlier dialectic would still need to be replayed, for example in the face of Moorean insistence that "I'm not a set, dammit!"

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<sup>75</sup>Thanks to Kit Fine here.

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