Monism and Gunk

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Introduction

Monism is a view about the fundamental nature of the world. In particular it is the view that fundamentally there exists just one object—the world. While just a few years back such a view would have been casually dismissed, it has recently seen a bit of a renaissance.[1]

Monists needn't deny that there are objects such as coffee cups or electrons in addition to the world; they merely deny that these objects are fundamental.[2] They hold that there is only one fundamental object from which all other objects are then derived. In contrast, pluralists hold that there are many fundamental objects from which all other objects are derived.[3]

One of the main arguments put forward in favour of monism is that it can accommodate the possibility of gunk worlds—worlds where each part divides into further part without end—while their pluralist opponents cannot. It's argued that as gunk worlds are possible, and that as a pluralist metaphysics does not allow for the possibility of such worlds while a monist metaphysics does, monism has an important advantage over pluralism.[4]

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1   This renewed interest is in large part thanks to the work of Schaffer (2007; 2009; 2010) and Horgan and Potrč (2008).

2   Here we can separate out what has been called *priority* monism from *existence* monism. See Schaffer (2007; 2010), where the former is the view that there exists only one fundamental object, but that there also exist a number of other derived/non-fundamental objects, while the latter holds that only one object exists. See Schaffer (2010), for a defence of priority monism and Horgan and Potrč (2008) for a defence of existence monism. In the main text I mean to be talking about priority monism, though the general points extend to existence monism.

3   Analogously to the priority/existence divide within monism, we can separate out priority pluralism from existence pluralism, whereby the former holds that there exist both a plurality of fundamental objects and some derived objects, while the latter holds that there only exist fundamental objects. Compositional nihilists who believe all that exists is a plurality of simple objects would be an example of existence pluralists. See Dorr and Rosen (2002). Again, my focus in the main text is on the priority version.

4   The argument from the possibility of gunk is put forward by Schaffer (2007; 2010).

While I do think that the possibility of gunk worlds (if they are indeed possible) is a problem for the pluralist, I aim to show that the possibility of gunk worlds is similarly problematic for the monist. In the first section I set up the general framework and constraints under which the debate takes place. In the second section I lay out the argument from the possibility of gunk against the pluralist. In the third section I set up a general picture of how parts and their properties can be derived on a monist picture. In the fourth section I show that on this way of setting up the derivation of the parts and their properties from the whole, monism faces problems with the possibility of gunk that parallel those faced by the pluralist. In the fifth and sixth sections I then discuss two alternate ways that the monist may try set up the derivation of parts and their properties to accommodate the possibility of gunk. I argue that the first doesn't give the monist an advantage over the pluralist when it comes to accommodating gunk worlds, and while the second avoids problems similar to those faced by the pluralist, it comes at a substantive explanatory cost. I conclude that the argument from the possibility of gunk does not offer the monist the clear cut advantage over the pluralist that one may have originally thought it had.

1. Metaphysical Priority

The debate between monism and pluralism is one about what is ultimately fundamental: the world or its parts? The monist maintains that the whole world is fundamental and it is from this whole that the parts are then derived. The pluralist holds that the parts (or at least some of the parts) of the world are fundamental, and that it is from these parts that the whole world is then derived.

The debate thereby takes place within a framework of metaphysical priority, whereby some object/s are metaphysically prior (the fundamental object/s) while others are metaphysically posterior (the derived objects). That is, the existence and nature of derived objects metaphysically depends upon the existence and nature (where this can include external relations) of the more fundamental object/s from which they are derived. And when some objects are derived from others, facts about the more fundamental object/s thereby explain facts about the less fundamental objects.[5]

There are then two constraints placed upon this framework: the foundationalist constraint; and secondly, the minimal completeness constraint.

Looking first at the foundationalist constraint on the priority framework:

> 'If one thing exists *only in virtue of* another, then there must be something from which the reality of the derivative entities ultimately derives' (Schaffer 2010, 37)

The foundationalist constraint is that chains of priority terminate; that there is/are some fundamental object/s. It is from the fundamental object/s that all other objects are then derived. And one or more of the following three are reasons that may motivate one to place such a constraint on a priority framework.[6]

The first reason for placing the foundationalist constraint is that without it you may worry that

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5   There is a question whether fundamentality comes in degrees, with some derived entities more or less fundamental than others, or whether all derived entities are equally non-fundamental. While I lean towards the latter view, the main text will remain neutral between these two options.

6   I am not here arguing for the foundationalist constraint, I'm merely sketching arguments that may motivate such a constraint. As the monist does accept the foundationalist constraint, for the purposes of this paper I can assume the constraint to hold (though I am sympathetic to the idea that such a constraint does hold on the priority framework).

we're led into vicious regress. For an object to derive its existence and properties from another object, that further object must itself exist and have certain properties. But if every object requires that there exits some further object with properties from which to derive its existence and properties, it's a mystery how the chain of derivation is derived in the first place. If there are no fundamental objects and properties from which other objects can be derived, then it seems no object or property is derived.[7]

The second reason why one may place the foundationalist constraint stems from the idea that derived entities do not bring any extra ontological commitment over and above that brought by fundamental entities.[8] But without the foundationalist constraint, there could be a chain of derived entities, without any fundamental entities in that chain. So two worlds that are duplicates in terms of fundamental objects could differ in whether such a chain exists, while not differing in their ontological commitments. The existence of such a chain would thereby bring no ontological commitment, which is *prima facie* absurd.

The third reason why one may place the foundationalist constraint is if they thought that part of what it is for some entity to be derived is for there to be some fundamental entity. That is, one may think of derived entities just are those that are explained in terms of fundamental entities. Here the notion of fundamentality is built into the notion of derivation from the very start.[9] And if this is the case, the foundationalist constraint simply follows.

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7   For doubts whether such regresses are indeed vicious see Nolan (2001) and Cameron (2008). But see Brzozowski (2008).
8   They're supposed to be 'an ontological free lunch' (Armstrong 1997, 12-13)
9   Compare Lewis (1986) where (at least on some readings) natural properties are those that are defined up from perfectly natural properties. Something like this may be particularly attractive to one who has a more deflationary view of derived entities (for example, if you thought of them as merely truths in a fiction), but it is not limited to deflationary views.

Turning now to the minimal completeness constraint on the priority framework:[10]

In a slogan: no gaps, no overlaps (Schaffer 2010, 38)

While the foundationalist constraint is that there have to be some fundamental objects, the minimal completeness constraint is that fundamental objects (their existence, nature and the relations they stand in to other fundamental objects) fix all the facts about the objects in the world, and do so without redundancy.[11] The fundamental objects form a minimally sufficient base from which to derive all other objects.

Here we can separate out the minimality aspect from the completeness aspect.

Looking first at the completeness aspect of the constraint, the idea here is that fundamental objects must account for all the facts about the world. Given that within the priority framework the derived objects metaphysically depend upon the more fundamental objects from which they are derived, and in turn facts about the more fundamental objects explain facts about the less fundamental objects, our metaphysical theory must account for all the facts of the world in terms of facts about more fundamental objects. If the fundamental objects that we have are not sufficient to derive all the objects, then there is some further fact that our theory has yet to account for. This further fact involves an object that is itself either fundamental or derived. If fundamental, then we need to add it to our base of fundamental objects. If it is derived, then as it is not derived from the fundamental objects that we are

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10 This is meant to be in the same spirit as Schaffer's (2010) tiling constraint, though is more general in that it holds for both objects and properties. As Schaffer's tiling constraint is itself an extension of the property version (see footnote 11), this seems justified.

11 The minimal completeness constraint extends Lewis' constraint on natural/fundamental properties—that 'there are only enough of them to characterize the world completely and without redundancy' (Lewis 1986, 60)—to include fundamental objects.

currently counting, there must be (at least given the foundationalist constraint) some further fundamental object that we need to add to our base of fundamental objects. Fundamental objects must thereby form a sufficient base to derive all other objects. Or put another way, duplicating all the fundamental objects (and the relations between them) of a world must duplicate all the objects of that world.

Where the completeness aspect of the constraint ensured that there are enough fundamental objects to account for all the facts about the world, the minimality aspect is to ensure that there is not an objectionable redundancy of fundamental objects. Minimality here rests on the Humean ban on (metaphysically) necessary connections between (fundamentally) distinct (contingent) existences. This is the idea that fundamental entities should be modally unconstrained, and thereby modally recombinable—if a and b are fundamental contingently existing objects, then it is metaphysically possible for a to exist without b, and *vice versa*. In turn, if there is a metaphysically necessary connection between two objects, it can't be that both of the objects are fundamental (either one is derived from the other, or both are derived from a common source). It follows then that for any two sets of objects, if each is sufficient to necessitate all the contingently existing objects and one is a subset of the other, it is the objects in the subset that are fundamental.[12] If all the objects are necessitated by the objects in the subset, then the objects in the larger set that are not in the subset are necessitated by the objects in the subset, and so are derived (*i.e.,* not fundamental).

To bring out the constraint, consider a world that contains a 4 gram object with only two parts, each with a mass of 2 grams. A metaphysical theory that either held that only the one 2 gram part (and neither the other 2 gram part nor the 4 gram composite) is fundamental or one that

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12 The restriction here to contingently existing objects, as was the case with the Humean constraint, is to remain neutral on worries about whether necessarily existing objects (such as numbers or gods) are fundamental, if they exist at all.

held that both the 2 gram parts and the 4 gram composite are all fundamental would violate the minimal completeness constraint. The former because a fundamental base containing only the one 2 gram object would not be sufficient to fix all the facts about the world (it would mention neither the other 2 gram part nor the 4 gram object), the latter because a base containing both 2 gram parts and the 4 gram composite would not be minimal (once you have both the 2 gram parts as fundamental, this necessitates the 4 gram composite).

2. Pluralism and Gunk

Gunk worlds are worlds where each part of that world divides into further parts. In a gunk world every object is therefore a composite object. In such a world there are no simple (partless) objects, *ipso facto* in such a world there are no fundamental simple objects.[13]

While it's far from obvious that our world is a gunk world, many believe that such gunk worlds are at least metaphysically possible. The reasons put forward in support of the possibility of gunk worlds range from quasi-inductive arguments (whereby the process of scientific discovery of ever smaller entities could go on *ad infinitum*), to gunk worlds seemingly being conceivable (or at least not obviously inconceivable), to the possibility of such gunk worlds been taken scientifically seriously, to such gunk worlds being consistent with various models of classical mereology.[14]

If gunk worlds are possible, the pluralist owes us an account of which objects are fundamental in such a world. And here the pluralist looks to be in trouble. They appear to have three

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13 I am going to speak of worlds where there is only gunk, but this leaves open the possibility of mixed worlds
    that contain both gunk objects and objects made of simples. The same problems arise for such mixed worlds
    as do for the purely gunk world, and so will focus on purely gunk worlds for simplicity of explication.
14 See Lewis (1991), Schaffer (2003; 2010), Sider (1993), Simons (1987).

equally unappealing options: 1. they deny that in a gunk world there are any fundamental objects (*i.e.,* accepting that all objects are derived); or 2. they maintain the in a gunk world all the objects are fundamental (*i.e.,* accepting that no object is derived); or 3. they maintain that some subset of the objects in the gunk world are fundamental, while the others are derived.

The first option violates the foundationalist constraint on the priority framework; if there are no fundamental objects, there are no fundamental objects in the foundation. The second option violates the minimal completeness constraint on the priority framework; as there is a supervenience relation between composite objects and their parts, there would be a necessary connection between fundamental entities. This leaves the third option. Here we have a plurality of composite objects at some intermediate level of the compositional hierarchy as fundamental, and then derive up all the objects that they are parts of, and derive down all the objects that are parts of them. However, such a view appears to be highly unattractive as it both seems wholly arbitrary that one intermediate level of the compositional hierarchy rather than another would be the fundamental and once the pluralist accepts that some composite objects are fundamental and their parts derived, it's hard to see why or how they would resist moving all the way up the compositional hierarchy to a monist metaphysics.

It seems then that if gunk worlds are possible, pluralists are in trouble; they appear to lack suitable fundamental entities in a gunk world. On the other hand, as the monists accept that the composite world is fundamental, they appear to have nothing to fear from the possibility of gunk worlds. In gunk, as in non-gunk worlds, the whole world is fundamental, and all parts are then derived. The monist thereby *prima facie* has an advantage here over the pluralist.

However, while the monists do have the world as fundamental, they still need to derive the

parts and their properties from the whole. And it is here that problems emerge for the monists.

3. Monism and Deriving Parts

On the monist picture, the world is the one fundamental object and it is from this composite object that the parts of the world are derived. For the view to be tenable, the monist must then show that the world provides a suitable base (one with sufficient detail) from which the existence and nature of the parts can be derived.

A promising approach is to hold that the world instantiates a fundamental *distributional* property.[15] Distributional properties are properties of objects that can have either homogeneous or heterogeneous distributions across the object that instantiates them. Being uniformly coloured blue throughout would be an example of a homogeneous distributional property, while being black-and-white checked would be an example of a heterogeneous distributional property.[16] Most pluralists accept (at least implicitly) that there are distributional properties instantiated by composite objects, for example, that chessboards instantiate the distributional property of being black-and-white checked. But, they hold that these distributional properties are derived from a distribution of properties across various proper parts of the composite objects that instantiates the distributional property—that the black-and-white checked property instantiated by the chessboard is derived from having black parts and white parts all arranged in a certain way. Monists, on the other hand, deny that the distributional properties must be derived. Instead, they hold that at least some such

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15 In what follows, I am for the most part going to speak as if the world only instantiates a single fundamental distributional property (though the nature of such a distributional property would be as of a distribution of what we would normally think of as distinct properties, such as mass and charge, *etc*.). But nothing that I say rests on this assumption, and it should all be compatible with a world instantiating more fundamental distributional properties (*i.e.,* a separate mass distributional property, and a separate charge distributional property, *etc*.).
16 Parsons (2004) introduces distributional properties into the literature.

distributional properties can be taken as fundamental and instantiated by the whole world.[17] If

the world instantiates a suitable fundamental distributional property, this may then serve as a

base for deriving a distribution of parts and their properties.[18]

The fundamental distributional property the monist appeals to should not just consist in a

higher-level distribution (a distribution as of various macro-physical objects and properties),

as such higher-level distributions do not entail any particular lower-level (or micro)

distributions. For example, in a world with a black-and-white checked distributional property,

if this is a fundamental distributional property, then even if this fixes the black-and-white

checked distribution, it tells us nothing about the distribution of the properties across the

proper parts of the checks (*e.g.,* the distribution of mass and charge across the proper parts

that compose these checks, if there even is such a distribution).[19] To bring out the worry, it

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17 One could however deny that distributional properties are derived, yet not be a monist. Parsons (ibid.) would
   be one such example, where he has non-reductive distributional properties instantiated by extended simples
   that are fundamental proper parts of the world.
18 Schaffer (2010) adopts fundamental distributional properties as his preferred view in defending monism. One
   may however worry that while fundamental homogeneous distributional properties seem somewhat plausible,
   fundamental heterogeneous distributional properties look to be less so. Schaffer, in addressing this worry,
   allows that if one denies the existence of fundamental heterogeneous distributional properties, the monist can
   instead hold that the distributional properties are derived from homogeneous properties that are either a
   complex of property and location (i.e., derived from the properties black-here and white-there), or from
   monadic properties that have location built into their instantiation (i.e. black instantiated-here and white
   instantiated-there). These other two options are familiar from the literature on the metaphysics of persistence
   of objects through change. Endurantists, those who believe (roughly) that an object persists by being wholly
   located at different times, are faced with the objection that if something is red at time t1 and then undergoes
   change at time t2 and is then at t2 green, by Leibniz law (if x = y then Fx iff Fy), if it is the very same thing at
   t1 and at t2, then that thing is both red and green. But, the thought goes, being red and being green exclude
   each other, so, on pain of denying Leibniz's law, endurantism is false. The standard endurantist replies are
   then either 1) that properties had by objects are a complex of property and location in spacetime, so the same
   object is red-at-t1 and green-at-t2, and these properties do not exclude each other, or 2) that properties have
   location in spacetime built into their instantiation, where the same objects instantiates-at-t1 being red and
   instantiates-at-t2 being green, and that the properties only exclude one other if instantiated at the same time.
   Those who reject endurantism usually don't find either response plausible, and so the debate continues. A
   worry however for the monist in taking one of these other options is that appealing to such distributions of
   properties seems to take away from the spirit of monism, for the monist now has to appeal to a fundamental
   plurality (of properties) to derive objects. It then seems that what is doing most of the work is an underlying
   pluralism (though of properties). Of course, this is not to say that this is in any way inconsistent with
   monism, as monism here is a thesis about concrete objects. But it does seem to take away some of the
   motivation for monism. Further, the problems I raise for the monist both in this section and in the next would
   extend to these other options.
19 This is not to say that it is not possible for there to be a world where the fundamental distributional property
   is a higher-level distributional property, just that such a world would not be sufficient to fix the lower-level

seems highly plausible that higher-level (macro) properties can be multiply-realized by different distributions of lower-level properties. If the fundamental distributional property of the whole world just contained higher-level distributions, there would then be a failure of supervenience of the lower-level distribution on the fundamental distributional property (as two worlds could be the same in respect to distributional properties that had higher-level distributions, yet differ in lower-level distributions). And supervenience is required if the world is to serve as an adequate base from which parts and their properties are derived. The fundamental distributional property instantiated by the world must therefore be more fine-grained. It should have something like a lower-level distribution upon which higher-level distributions (including certain properties of the whole world, such as the mass of the world) supervene.[20] We'll call this fine-grained distributional property a *minimal distributional property*.[21] A world instantiating a fundamental minimal distributional property thereby *prima facie* provides a supervenience base from which parts and their properties are derived.

4. Monism and Deriving Gunky Parts I

A world instantiating a fundamental minimal distributional property however does not yet show that the monist can provide a suitable supervenience base for a gunk world. The problem is that it's unclear how the fundamental minimal distributional property instantiated by the world provides a base sufficient to derive a gunky decomposition.

(or micro) facts of a world like ours. Whether such a world would then have lower-level (or micro) parts is unclear.

20 Or at least this should be the case for worlds like ours where there appear to be lower-level micro-physical facts. Also, it may not be that all higher-level properties metaphysically supervene upon lower-level properties, for example, if dualism about phenomenal properties is true (Chalmers 1996). The monist could in such cases either add an extra fundamental higher-level phenomenal distributional property, or could amend the lower-level distributional property to be a mixed lower-level/phenomenal distributional property.

21 A more formal way to understand the fundamental minimal distributional property is to take as input x number of particles with y properties in a spatiotemporal arrangement of z dimensions, with the resulting translation outputs of a world as a xyz-dimensional configuration space. So imagine we have ten particles with six fundamental physical parameters in a four-dimensional spacetime, then all this information can (trivially) be represented in a two-hundred-and-forty-configuration space (Schaffer 2007, 187)

To bring out the worry, consider a world that instantiates a higher-level distributional property as of a distribution of properties across disjoint objects (a distributional property as of some single level in the compositional hierarchy).[22] For example, consider a world that instantiates a distributional property as of a number of disjoint objects each with 4 grams mass. Let us assume then that this distributional property supervenes upon some lower-level distributional property as of a distribution of finer-grained properties across disjoint objects (a level below the former in the compositional hierarchy, namely the proper parts of the former composites)—a distributional property as of halves of the previous objects, each instantiating 2 grams mass. And, let's assume that there is then yet another even lower-level distributional property (one even more fine-grained), upon which both of the previous distributional properties supervene—a distributional property as of halves of those halves, each with 1 gram mass, and so on. In a world that has a decomposition into simples, we reach a distributional property with a nature as of a distribution of properties across simples (and perhaps as of certain emergent properties) which does not supervene upon some further lower-level distributional property—a distributional property as of a distribution of simples each with n grams mass. This would provide a minimal distributional property which is then the fundamental distributional property from which the other higher-level distributional properties are derived (and in turn, it fixes the parthood structure and distribution of properties across that structure). This minimal distributional property therefore grounds the higher-level distributional properties—so far so good for the monist. However, when we turn to a gunky world, each such distributional property as of some level in the compositional hierarchy will be non-minimal. Each such distributional property is a higher-level distributional property relative to some further lower-level finer-grained distributional property, with the former

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22 In what follows, I set out the worry in terms of derived distributional properties instead of in terms of derived objects. This is just as it makes the discussion slightly less awkward, and the same worry holds if things are set up in terms of derived objects instead.

supervening upon the latter. So unlike the example above with the distributional property as of simples, here for any distributional property as of disjoint objects each with mass n there is some finer grained distributional property as of disjoint objects each with mass $n/2$ grams.[23] But now, problems similar to those that the pluralist was faced with in light of the possibility of gunk worlds in the previous section seem to arise for the monist.

On the one hand, if higher-level distributional properties (*e.g.,* as of a distribution of objects with n grams mass) are derived from lower-level distributional properties upon which they supervene (*e.g.,* as of a distribution of objects with $n/2$ grams of mass), then—as in a gunk world each distributional property is higher-level to some further lower level-distributional property—there is no fundamental minimal distributional property. So, much as was the case with the pluralist who held that all objects in a gunk world are derived, we're led down a regress, violating the foundationalist constraint.

On the other hand, if higher-level distributional properties (*e.g.,* as of a distribution of objects with n grams of mass) are not derived from the lower-level distributional properties on which they supervene (*e.g.,* as of a distribution of objects with $n/2$ grams of mass), and given that the lower-level distributional properties are not derived from the higher-level distributional properties (as discussed in §3, the higher-level distributional properties do not entail any particular lower-level distributional property), and so instead all are fundamental, the monist avoids violating the foundationalist constraint. But then much like the pluralist who in the gunk world held that all the objects were fundamental, the monist here holds that the world instantiates a number of fundamental distributional properties (one for each level of the compositional hierarchy) and thereby violates the minimal completeness constraint.

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23 Ignoring, for sake of simplicity, any emergent non-supervening properties the world may have. See footnote 20.

And finally, trying to maintain that one of the distributional properties as of some level of the compositional hierarchy would be arbitrary, as was the case with the pluralist. But worse, for the reasons just discussed, it would itself simply not provide a sufficient supervenience base from which the gunk parts and their properties can be derived—any such property would allow objects to be derived up, but not down the compositional hierarchy.

As things stand, it seems that neither the pluralist nor the monist can comfortably accommodate the possibility of gunk worlds, and for what seem to be much the same reasons. But unlike the pluralist, the monist here seems to have further options. And I turn to these now.

5. Monism and Deriving Gunky Parts II

The worry for the monist above is that our focus was limited to distributional properties that are each as of a distribution at a single level in the compositional hierarchy. But the monist may instead hold that such distributional properties (each as of a distinct level of the compositional hierarchy) are *all* derived from some further fundamental distributional property instantiated by the world. Of course, the question now is: how do we make sense of this further fundamental distributional property from which all other distributional properties are derived?

In this section and the next I provide the outline of two possible answers.

For the first, assume that the fundamental minimal distributional property instantiated by the

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whole world has a fine-grained distribution as of properties instantiated over (an infinite number of) points, from which other higher-level distributional properties are then derived (as of properties instantiated over non-pointy objects). However, unlike before, deny that the existence of objects (and parthood structure) is derived from the fundamental distributional property, and so deny that such a world need be a world with simple pointy objects. Instead, assume that in addition to fundamental distributional property, a world instantiates a distinct fundamental compositional property, one that fixes the parthood structure of that world, from which the existence of objects is derived. Now, if this compositional property is one where the decomposition terminates in simple points, then in this world the existence of pointy objects composing further objects would be derived, with the properties of these points and that of the objects they compose then derived from the fundamental fine-grained distributional property. However, if the compositional property is gunky, then this world would not have simple pointy objects, but instead gunky objects would be derived, with the properties of these gunky objects derived from the various distributional properties which are themselves derived from the fundamental fine-grained distributional property. That is, as an infinite series of higher-level distributional properties (each as of properties instantiated over ever smaller non-pointy objects) are derived from the fundamental distributional property (as of a distribution of properties instantiated over points), there will be a mapping between these derived distributional properties and levels of the gunky compositional hierarchy derived from the fundamental compositional property, but as the fundamental compositional property is gunky, there will be no mapping of objects onto the fine-grained distributional property. The fundamental fine-grained distributional property then fixes the properties of objects, the fundamental compositional properties fixes their existence. In this case, it seems that the monist is then able to accommodate the gunk worlds.[24]

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24 Thanks to an anonymous referee.

In response, one may be unhappy with the idea of having to introduce a fundamental compositional property in additional to the fundamental distributional property (instead of having the compositional structure derived from the distributional property), but I'll put that worry aside. A more salient worry for our purposes (in the context of whether the monism gains a substantial advantage over pluralism in that they can better accommodate gunk worlds) is that as on this view the fundamental distributional property has a fine-grained distribution as of properties instantiated over points (which is required to derive up the infinite series of higher-level properties), it's unclear that the monist really does here gain an advantage over the pluralist. The worry is that the pluralist is able to capture something very much like the monist's gunk world. To see this, consider that where the monist has the fundamental fine-grained distributional property as of properties instantiated over points, the pluralist has the existence of such fundamental pointy objects instantiating properties. And where the monist has the infinite series of higher-level distributional properties derived from the fundamental distributional property, the pluralist has an infinite series of composite objects and their properties derived from the fundamental pointy objects and their properties. And finally, where the monist has the fundamental gunky compositional property which fixes the gunky structure of the world (over the infinite series of distributional properties derived from the fundamental distributional property), the pluralist can simply restrict their quantifiers to composite objects (the infinite series derived from the fundamental pointy objects) thereby capturing the very same gunky structure (and properties instantiated by that structure) as the monist. Of course the pluralist still has the existence of simple pointy objects (when their quantifiers are not restricted) while the monist only has the appearance of simple pointy objects (from the fundamental distributional property as of properties instantiated over points), but it's hard to see why anyone would believe that this gives the monist any real

advantage over the pluralist. It seems that monists, if they are to claim any advantage over pluralists from better accommodating gunk worlds, must look elsewhere.

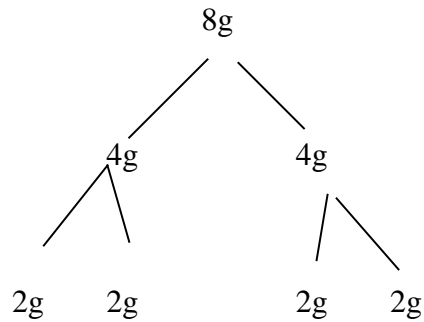*6. Monism and Deriving Gunky Parts III*

Turning then to the second way that monists could accommodate gunk worlds in terms of some further distributional property, assume that each distributional property that marks out a level in the compositional hierarchy is derived. In addition, assume that the world instantiates a *maximally specific distributional* property (msd-property), which is a fundamental distributional property from which *all* the other distributional properties (each level) are then derived. This msd-property however is *not* the lowest-level distributional property (that is, it is not a minimal distributional property as of properties instantiated over points), for the lowest-level property (if there is one) is here itself a derived distributional property (derived from the msd-property). Instead, the msd-property is a fundamental feature of reality encoding *each* level. All the other distributional properties (and objects and their properties), each of a level of the compositional hierarchy, are then derived from this msd-property. [25]

To get a better grip on the picture, let us compare a few different worlds. The first world *W1* has a composite with 8 grams of mass; which then has two proper parts each with 4 grams of mass; each of these proper parts have two proper parts each with 2 grams of mass. [26] In diagram form:

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25 Thanks to Jonathan Schaffer for helpful discussion here. It's important to note that while I spell out one way that all the properties can be derived from some further property in order to bring out the general idea, the objection I make to the view is an objection to the more general idea of all the properties being derived from a further non-minimal property, not merely to the specific way of spelling this idea out.
26 As parthood is transitive, the composite with 8 grams does not only have two parts, as the parts of the two parts are also its parts, but I'll keep speaking loosely in what follows for sake of brevity.

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                              8g
                            /    \
                          4g      4g
                         /  \    /  \
                       2g   2g  2g   2g
```

(Numbers represent objects instantiating the amount of mass corresponding to the number;
Lines represent parthood).

This world instantiates the msd-property 8:44:2222 (this msd-property encodes both all the
mass distributed *and* how it is distributed). A number of distributional properties are then
derived from the msd-property: as of an object with 8 grams mass; as of two objects with 4
grams mass; as of four objects each with 2 grams mass.

We can then think of another world *W2*, which instantiates the msd-property 8:62:3311. This
would be a world that has a composite with 8 grams mass; which has two proper parts with 6
grams mass and 2 grams mass respectively; each with two proper parts, the 6 gram objects
with proper parts that each have 3 grams mass, the 2 grams objects with proper parts that each
have 1 gram mass. *W2* is then similar to *W1* in that both instantiate the derived property as of
having an object with 8 grams mass, and both have the same compositional structure. They
however differ in all other distributional properties.

Consider then a world *W3* that instantiates the msd-property 8:44:2222:11111111. This world
has a composite with 8 grams of mass; which then has two proper parts each with 4 grams of
mass; each of these proper parts have two proper parts each with 2 grams of mass; each of
which has two proper parts each with 1 gram mass. This world is qualitatively very much like

W1, in that the two worlds also have mostly the same derived distributional properties: as of one object with 8 grams mass; as of two objects each with 4 grams mass; as of four objects each with 2 grams of mass. However, they differ in that *W3* has an even finer decomposition than *W1*, and has the derived distributional property as of eight objects each with 1 gram mass, while *W1* does not have such a distributional property.

Let us now turn to a fourth world *W4*. Imagine this world instantiates the msd-property 8:44:2222:11111111:.5.5.5.5...*ad infinitum*. This world would be very much like *W1* and *W3* at the top levels, but then has a finer grained decomposition, one that gets finer and finer grained *ad infinitum*. *W4* will however have some of the same derived distributional properties as both *W1* and *W3*: as of one object with 8 grams mass; as of two objects each with 4 grams mass; as of four objects each with 2 grams of mass. *W3* and *W4* (but not *W1*) then also both have the derived distributional property as of eight objects each with 1 gram mass. But *W4* then has a whole lot of other derived distributional properties that neither *W1* nor *W3* have, such as the derived distributional properties: as of sixteen objects each with .5 grams of mass; as of thirty two objects each with .25 grams of mass; and so on, one for each finer and finer grain of the compositional hierarchy, without end. *W4* then differs from *W1*, *W2*, and *W3* in that *W1*, *W2*, and *W3* all have a lowest level derived distributional property, while in *W4*, for each derived distributional property, there is some lower-level (finer grained) derived distributional property. And so, unlike *W1*, *W2*, and *W3* that all have decompositions into simple objects, *W4* is a gunk world.

The monist here looks to have a way to accommodate the possibility of gunk world: if the msd-property is gunky (as in *W4*), the world is gunky. As the msd-property is not meant as a lowest level distributional property, but instead encodes each level from which all the other

distributional properties are then derived, it can be fundamental and so does not violate the foundationalist constraint. And, as all the higher-level and lower-level distributional properties of the compositional hierarchy are *derived* distributional properties, the monist does not violate the minimal completeness constraint.

The monist, unlike the pluralist, appears then to be able to accommodate the possibility of gunk worlds without violating either the foundationalist constraint or the minimal completeness constraint. But, as we'll see, this accommodation comes with an explanatory cost; the monist is unable to explain the supervenience of the properties of composite objects upon the properties of their proper parts.

The monist accommodates the possibility of gunk worlds by encoding each level into a msd-property m:nn:oooo:pppppppp:qq... from which all other distributional properties (either m, or nn, or oooo, or pp...) are derived. As higher-level distributional properties are here not derived from lower-level distributional properties, and instead both higher-level and lower-level distributional properties are derived from the same msd-property (that encodes them all), the higher-level distributional properties and the lower-level distributional properties only line up (in the way that would be required for supervenience) when the msd-property happens to be such that it lines them up. But how then does such a monist picture guarantee the supervenience of the properties of composite objects on the properties of their proper parts?

To bring out the problem, consider *W2* again, with the msd-property 8:62:3311. From this msd-property the other distributional properties are derived, where each level lined up with the level below it—with the 8 grams object having one 6 grams part that has two parts of 3 grams each, and one 2 grams part that had two parts of 1 gram each. But consider a world *W5*

that instantiates the msd-property 8:26:3311. Here, instead of deriving a 62 distributional property as in *W2*, a 26 distributional property is derived, which unlike the 62 distributional property in *W2*, does not line up with the lower level 3311 distributional property. Therefore, in *W5* the monist lands up with an 8 gram composite object with one 2 grams part that has two parts of 3 grams each, and one 6 grams part that has (only) two parts of 1 gram each. Worlds W2 and W5 thereby differ in distributions of properties over composites while not differing in the distribution of properties of the proper parts, so supervenience of the properties of composite objects on the properties of their parts fails.

The monist will want to deny that an 8:26:3311 world is possible (while allowing a 8:62:3311 world).[27] They may then claim that the supervenience holds because there are no such deviant worlds. But this does not explain the supervenience, it just asserts it. We can still ask, why aren't such worlds (where the nature of the msd-properties don't line things up in the right way) possible? And of course, saying that such deviant msd-properties are not possible because they would undermine supervenience is then just to stipulate that what calls out to be explained.

If instead the fundamental distributional property was as of the lowest-level distribution (a minimal distributional property), such as the distributional property 3311, from which the higher-level distributions were derived, the monist would have an explanation of the higher-level distribution in terms of the lower-level distribution. That is, from a fundamental distributional property 3311, 62 distributional properties are derived while 26 distributional properties are not (an explanation that piggybacks on the pluralist's explanation). But as we saw in the previous section, this would then put the monist back in violation of the

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27 The monist could always just deny the supervenience, but that would then itself be a substantial cost to maintaining monism over pluralism.

foundationalist constraint with regard to gunk worlds (as with gunk there is no lowest-level distributional property from which to derive up all the higher-level distributional properties). To accommodate gunk, the monist has to build more information into the fundamental distributional property, resulting in a fundamental msd-property from which all the levels of the compositional hierarchy can be derived. Higher-level distributional properties are then not derived from lower-level distributional properties, so the instantiation of the former cannot be explained in terms of the latter. Instead, all are derived from the msd-property, and so no such explanation of how it is that composites must have such and such properties given that they have proper parts with certain properties is available.

The supervenience of higher-level facts on lower-level facts calls out for explanation. But on a monist picture that appeals to msd-properties from which all other distributional properties are derived, no such explanation is forthcoming. The monist must fix the supervenience by brute stipulation (that deviant worlds are not possible). They thereby accommodate gunk worlds only by incurring an explanatory cost.

Conclusion

Appeal to the possibility of gunk worlds seemed to give the monist a substantial advantage over the pluralist. But for the monist to accommodate gunk worlds, more is needed than just stating that there is a fundamental whole; the fundamental whole must provide a sufficient base from which to derive the gunky parts. And it's unclear that a monist whole can provide such a base without incurring certain costs. On one way of spelling out the nature of the base, when faced with a gunk world the monist must either deny the foundationalist constraint or deny the minimal completeness constraint, in which case they are no better off than the pluralist. On the other way of spelling out the nature of the base, while the monist is able to

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accommodate gunk worlds, they do so either by appealing to a pointy structure similar to that of the pluralist or at the expense of being able to explain the supervenience of the properties of composite objects on the properties of their parts. It's therefore unclear that appeal to gunk worlds really does provide the monist with an advantage over the pluralist. The pluralist must either reject gunk worlds or reject one of the constraints on the priority framework. The monist does have an extra option, but one that comes with an explanatory cost. It therefore seems that an appeal to accommodating gunk worlds can't really be made in support of monism over pluralism.

Acknowledgments

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