Monism and Statespace Structure*

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Exotic ontologies are all the rage. Distant from common sense and often science as well, views like mereological essentialism, nihilism, and four-dimensionalism appeal to our desire to avoid arbitrariness, anthropocentrism, and metaphysical conundrums.[1]

Such views are defensible only if they are *materially adequate*, only if they can "reconstruct" the world of common sense and science. (No disrespect to the heroic metaphysicians of antiquity, but this world is not just an *illusion*.) In the world of common sense and science, bicycles survive changes in their parts, billiard balls strike one another, and nothing travels faster than light. The mereological essentialist denies the first, but offers this replacement: "there exist successions of numerically distinct, but appropriately related, bicycles with different parts" (Chisholm, 1976, chapter 3). The nihilist denies the second, but offers this replacement: "there exist Xs and Ys such that the Xs are arranged billiard-ball-wise, the Ys are also arranged billiard-ball-wise, and the Xs strike the Ys".[2] The four-dimensionalist denies the third, but offers this replacement: "no sequences of matter-stages that are related by genidentity travel faster than light".[3] There is room for disagreement over what exactly "reconstruction" amounts to, but at a minimum: when a metaphysical theory reconstructs ordinary sentences $\phi_1 \ldots$ as replacement sentences $\psi_1 \ldots$, ordinary and scientific evidence must not refute the view that, strictly speaking, it is $\psi_1 \ldots$ rather than $\phi_1 \ldots$ that are true. The metaphysician needs reconstruction in order to face the tribunal of experience.

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[1] See Sider (2001, chapter 5) for a survey.

[2] Peter van Inwagen (1990) develops this strategy to defend a close relative of nihilism.

[3] See Hudson (2002) for the argument that four-dimensionalists must accept this; see Sider (2001, section 6.5) on genidentity.

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An intriguing newcomer to the contemporary scene is the ancient doctrine of monism, the claim that "reality is one".[4] I will argue that, contrary to initial appearances, monism can be made materially adequate. But the monist's reconstruction of common sense and science will reveal some troublesome commitments.

1 Existence and Priority Monism

Let's follow Jonathan Schaffer in distingushing two sorts of monism:[5]

Existence monism Only one object[6] (concrete particular) exists: the world-object

Priority monism The world-object may not be the only object, but it is "prior to" all other objects

There are various ways of making sense of "priority", and of related notions such as metaphysical fundamentality and basicness. On my favored conception, the central notion is (a generalization of) David Lewis's notion of *naturalness*.[7] According to this conception, there is an objective distinction between those features (properties, relations, or quantities) that are natural (fundamental, basic) and those that are not. The fundamental facts consist of the facts that specify which objects have which natural features. All facts in some sense reduce to or supervene on these fundamental facts. Given this conception, priority monism may be stated

[4] Related recent work includes: Hawthorne and Cortens (1995); Horgan and Potrč (2000, 2002); Parsons (2004, MS); Schaffer (2007, Forthcoming); Sider (2007); Trogdon (Forthcoming). Others seem to take monism less seriously than mereological essentialism, nihilism, and the rest, but this attitude is unjustified if monism is materially adequate. Furthermore, (existence) monism is simply a more extreme version of other doctrines taken seriously (by some): endurance and extended simples.

[5] Existence monism is the "exotic ontology". Priority monism isn't really an ontology at all (its distinctive claim concerns priority, not what exists), and it may not be as "distant from common sense and science" as existence monism (although see section 5).

[6] I count concrete points and regions as "objects", and so do not count anyone who accepts a plurality of them (applies natural features to them) as an existence (priority) monist.

[7] Lewis (1983, 1986, pp. 59–69). I defend a more general account in Sider (2008) and a forthcoming book (in the latter I compare this approach to Schaffer's).

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thus: *no natural features are had by any object other than the world-object*.

Schaffer (Forthcoming) thinks of priority (fundamentality, etc.), and therefore priority monism, a bit differently. For him, the fundamental locution for talking about priority is a predicate of objects, the predicate '*x* is prior to *y*'. Accordingly, he formulates priority monism as the claim that *the world-object is prior to every other object*. It should not be assumed that everything I say carries over to what Schaffer calls "priority monism".

2 Saving the Appearances

As we will see, there is a prima facie challenge to priority monism's material adequacy. Existence monism provides even fewer resources for reconstructing common sense and science than does priority monism, and so faces the challenge as well. Since this challenge will be our main focus, and is faced by each version of monism, I will speak simply of "monism".

I seem to observe an inflating balloon. I am no skeptic; I have no desire to wholly reject what I seem to see. But I am also a metaphysician; some theories I take seriously say that there really is no balloon. I resolve this tension by taking seriously only those metaphysical theories that allow that *it's as if there is a balloon*. (Understand 'it's as if there is a balloon' as being consistent with there really being a balloon.)

The fact that it's as if there is a balloon is surely not fundamental, but is rather grounded in other facts that are themselves fundamental. So any serious metaphysical theory must satisfy the following constraint of material adequacy: the theory's fundamental facts must be capable of grounding this and other "as-if facts".

At a very high level of abstraction, it's easy for a monist to satisfy this constraint. The monist can simply say: "As-if facts are grounded in the natural features of the world-object." But suppose we press the monist for more details. *How* do the world object's natural features ground as-if facts? We have been told only a *sketchy grounding story*; we should press the monist for a (more) *detailed grounding story*.[8]

[8] And the detailed story cannot appeal to natural features of the world-object like these: "being positively charged at location l_1 and negatively charged at location l_2". For what are these "locations"? They are either regions of space-time or objects located at such regions, but either

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Can the monist simply refuse to tell a detailed grounding story? This would place him on shaky ground. The point of detailed grounding stories is to convince fence-sitters that worrisome phenomena *can* be grounded. One reason for sketching functionalist accounts of the mind, for example, is to convince doubters that mentality has a place within an ultimately physical world. "The mind is grounded in the physical, somehow" won't reassure anyone who doubts that a grounding story for the mental *can* be told; in such a dialectical context, a more detailed story is needed.

Of course, it would be unfair to demand a more detailed story than one can tell oneself. And what opponent of monism can provide a fully detailed grounding of facts about inflating balloons? On my own view, the fundamental facts involve the natural features of time-slices of subatomic particles (or perhaps points of spacetime); but *I* certainly don't know exactly how those facts ground facts about balloons. If I myself can do no better than gesture toward "the natural features of time-slices of subatomic particles", then my grounding story is no less sketchy than the monist's.

Nevertheless, further reflection shows that the monist faces a special challenge. For by "piggybacking" on scientific explanations, pluralists (i.e., monism's opponents) can give a detailed grounding story in a way that monists cannot.

Imagine trying to give as detailed an explanation as you can, of how the fundamental facts ground the fact that it's as if the balloon inflated to a certain size. You will, surely, proceed in two stages, one informed by science, the other informed by your views about fundamental metaphysics. The first stage is essential, for what good source of details is there, apart from science? Almost by definition, your views in metaphysics will provide only very abstract information. So, in stage one you will appeal to science. You may appeal to the ideal gas law, the balloon's elasticity, the temperature and atmospheric pressure in your surroundings, and the amount of gas pumped into the balloon. Given a bit more time on Wikipedia, you may bring in the statistical-mechanical explanation of the ideal gas law, and even attempt to explain the balloon's elasticity in chemical or physical terms.

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way, the monist would be appealing to fundamental facts involving subworld objects (on the face of it, the holding of fundamental relations—*positively-charged-at*, *negatively-charged-at*—between the world-object and locations).

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At the end of stage one, you will have explained the size of the balloon in terms of certain "scientifically ultimate facts": whatever scientific facts you cited and did not further explain. But your task is to explain the size of the balloon in *fundamental* terms. This calls for metaphysics. So in stage two, you will show how the scientifically ultimate facts are grounded in the facts that you take to be fundamental.

If you are a pluralist, stage two will be relatively straightforward.[9] For you will be free to say simply that the scientifically ultimate facts are themselves fundamental. In naturalness-theoretic terms: you can say simply that "scientifically ultimate features"—the features expressed by the core undefined expressions used to state the scientifically ultimate facts—are in fact natural features.[10] For example, if the scientifically ultimate facts consist of points of spacetime having certain field values, then you can say that those field values are natural features.

But if you are a monist you cannot say this; and as a result, stage two looks problematic. For by inspection, scientifically ultimate features are not features of the world-object; they are subworld features. (Indeed, the most powerful scientific explanations seem to appeal to features of very small entities.[11]) Biology posits features of organisms; chemistry, features of atoms and molecules; and physics, features of subatomic particles and points and regions of spacetime (and other spaces). This is not to assume an ultimate metaphysics of particles; perhaps we learn from physics that the world consists ultimately of fields distributed over spacetime. Nor is it to deny the holism that quantum mechanics suggests. The point is merely that the undefined expressions of even particle-less and holistic physical theories apply to subworld objects (such as points or subregions of spacetime).[12] If, for example, the scientifically ultimate facts consist

[9] Not that it's smooth sailing for *all* pluralists. Nihilists, for example, have a more difficult time than do other pluralists in grounding scientifically ultimate features of complex systems that resist decomposition into features of individual subatomic particles.

[10] Not that you would *have* to say this; my point is merely that this simple grounding story will be open to you.

[11] It's unsurprising that this strategy is so successful. Explanations are powerful when a small number of posits can explain a wide variety of phenomena. A small number of posited constraints on the behavior of small things generates, by combinatorial means, a large number of constraints on the behavior of large systems of small things. Thanks to Jason Turner here.

[12] Let me mention just two cases, to illustrate the inevitability of undefined expressions that apply to subworld entities. (There are of course many

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of points of spacetime having certain field values, you cannot tell the straight story that the pluralist can tell. You cannot say that the field values are natural features, for that would be to apply natural features to subworld objects, in violation of monism. You can of course always say: "scientifically ultimate features (such as field values) are grounded—somehow!—in the natural features of the world-object", but that would be to revert to a sketchy grounding story.

The prima facie challenge, then, to monism's material adequacy is this: only pluralists can give detailed (nonsketchy) grounding explanations, because only pluralists can piggyback on science to give detailed descriptions of the fundamental facts. A pluralist can say: "the fundamental facts consist of natural features F_1 ... distributed *thus*" (the inventory of natural features and the "thus" come from science); but the monist, apparently, can say only: "the natural

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others to consider, especially given the open questions about how to interpret the formalism of quantum mechanics.) First consider general relativity. Here one specifies the geometry of spacetime using such expressions as 'open set' and 'metric tensor', which apply to subworld regions and points, respectively; and one appeals to a further basic expression for the stress-energy tensor, which attributes values to points of spacetime. Second consider what might seem at first to be a monist-friendly theory: a Bohmian interpretation of quantum mechanics in which configuration space is *not* taken to be a mere abstract object whose points represent possibilities for three-space, but is rather taken to be a *sui generis* "concrete space". In fact, to make things as monist-friendly as possible, let our Bohmian interpretation do away with three-space: the picture is that reality consists of configuration space, on which the wave function is defined, plus a single "world-particle", whose motion through configuration space is guided by the wave function (Albert, 1996). We *still* have undefined expressions for subworld features, for on this interpretation, points of configuration space and the world particle are subworld entities. (It is important not to shift between thinking of configuration space as metaphysically ultimate—in which case its points are subworld objects—and thinking of it as merely abstract or representational—in which case its points represent possibilities for concrete three-space, whose points would then be subworld objects.) The subworld expressions are those which describe the location of the world-particle in configuration space, those which give the geometry of configuration space itself, and those which attribute values for the wave function to points of configuration space. Of course, in either case, the ultimate metaphysical story might yet be monistic: facts stateable using these undefined subworld expressions might hold in virtue of natural features of the world-object. The present point is merely that only the pluralist can say that these expressions themselves express natural features.

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features of the world-object are such as to—somehow!—ground the fact that (it's as if): there are features F_1 ... distributed *thus*".

If the challenge goes unanswered, the monist would be placed in an awkward position. He would be unable to say in any detail what the world is fundamentally like, and he would be unable to reassure a doubter that scientific or ordinary talk *can* be grounded in natural features of the world-object. For to do that, the monist would have to show *how* to ground such talk in the natural features of the world-object, but the only thing the monist could say about the natural features of the world-object ("they are such as to ground such and such a scientific theory") would presuppose that there is a way to ground scientific talk in them.

The challenge can be rephrased as follows. Any theory T of fundamental metaphysics generates a certain set $\mathcal{F}_T$ of fundamental possibilities for the world. Each $p \in \mathcal{F}_T$ specifies a way the world might be, in terms that T takes to be fundamental. For the monist, $\mathcal{F}_T$ is the statespace M—the set of the world-object's possible natural features; for pluralists, $\mathcal{F}_T$ consists of the various possible distributions of natural features over subworld objects. Now, if T is to be materially adequate, it must be capable of grounding the appearances. Let A be the set of possible descriptions of the world stated in the language of ordinary experience and science; and think of the material adequacy constraint as requiring the existence of a *grounding function*, g_T, mapping members of $\mathcal{F}_T$ to members of A, such that whenever $g_T(p) = a$, the realization of possibility p would ground its being as if a were true.[13] g_T allows the defender of T to describe the world in the language of $\mathcal{A}$. The grounding function may be regarded as the composition of two other functions, the *science function* and the *metaphysics function*. The science function, s, maps certain members of $\mathcal{A}$ to other members of $\mathcal{A}$, such that when $s(a_1) = a_2$, science has provided a_1 as a reduction of (or realization of) a_2. The metaphysics function m_T maps members of $\mathcal{F}_T$ to certain members of $\mathcal{A}$, such that when $m_T(p) = a$, a is a scientifically ultimate[14] description of the world, and the realization of p would ground its being as if a were true. Given m_T and s, we can define g_T: $g_T(p) = s(m_T(p))$. Here, then, is how to phrase this section's challenge in terms of this apparatus. If T is to be materially adequate, a grounding function g_T must exist;

[13] It should not be assumed that g_T's domain is all of $\mathcal{F}_T$ (perhaps some fundamental facts are $\mathcal{A}$-inexpressible), but its range should be all of $\mathcal{A}$: all appearances must be grounded.

[14] We might take a to be "scientifically ultimate" iff for no a' does $s(a') = a$.

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to *convince* us that T is materially adequate, its supporters must *convince* us that some g_T exists, presumably by (in part) constructing it. We'll spot the defender of T the *s* function (it comes from science); all that remains is to construct the m_T function, which specifies how the ultimate scientific story of the world is to be grounded in terms that T takes to be fundamental. Pluralists can construct m_T, since they can take the undefined expressions of science to express natural features. How can monists construct m_T?

3 The Monist's Resource: Statespace Structure

To ground the appearances of subworld objects, the monist cannot appeal to natural features of subworld objects. What *can* the monist appeal to? World-features, obviously: the features that the world-object has or might have had—the members ofthe statespace, M. But the monist can appeal to more than just the *members* of M (and the fact of which of its members is instantiated). The monist also has M's *structure*.

Let me approach this idea of the structure of a set of features by starting with some simple examples. Think about the set of (determinate) mass properties. That set has a structure, the structure of the set of positive real numbers. Its members can be arranged continuously in a line, starting with the property *having zero mass* at one end and continuing infinitely. Moreover, that is a *special* way to line them up; that's the intrinsic *structure* of the mass properties. (The use of real numbers to measure mass isn't a mere arbitrary choice.[15]) Anyone who doesn't know that that's the right way to line up the mass properties is missing some information about mass.

Second, think about the various properties of *location*. (Relative to a given reference object, say.) These properties can also be arranged, but not in a line; they can be arranged in a three-dimensional volume. The property of *being located at 1,5,7* (with distances measured in some chosen unit) is located in one unit in one dimension of this space, 5 units in another dimension, and 7 units in another dimension, from the property *being located at 0,0,0*. Again, this is intrinsic to the structure of this set of properties.

[15] Nor is its appropriateness due solely to the fact that there are continuum-many masses. The set of location properties to be considered below has the same cardinality but has a different structure (location is appropriately measured by triples of real numbers rather than single real numbers).

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One final example. Think of a two-particle system in which each particle can be located anywhere in three-dimensional space, and in which each particle can take on any mass value. The set of properties of the entire two-particle system is eight-dimensional; it's part of the structure of this set of properties that to specify one of its members, you give eight coordinates: three spatial coordinates for particle one, plus a coordinate for its mass; and similarly, four coordinates for particle two.

Thus, a set of properties—and more generally, any set of features—can have an (intrinsic, objective) structure. What the monist should say is that his statespace M has a certain structure. But this structure is vastly more complicated than the structure of any of the sets we've considered, and may well be largely unknown to us.

In what, generally, does the structure of a given set of features consist? That's a hard question, but one natural answer is that it consists in part of the set's members obeying certain formal constraints, as well as the holding of higher-order relations over its members.[16] For example, we might think of the structure of the set of determinate mass properties as emerging from: i) its satisfying the constraint that no object instantiates more than one of its members, and ii) the holding of higher-order relations such as the following over its members:

p_1 is *greater than* p_2
p_1 is the *sum of* p_2 and p_3

(The first relation would hold, for example, between *17g mass* and *1g mass*; the second relation would hold between *4g mass* and *3g mass* and *1g mass*.) The structure of M can be understood likewise, as emerging from formal constraints and a myriad of higher-order relations.

So: facts about the structure of M seem to be *in principle* available to monists. How might they characterize M's structure in detail? I do not know. To be sure, a certain cheap account is directly available: the monist might exactly mirror the pluralist's ontology at the level of world-properties. Imagine a pluralistic pixel-physics in which reality consists solely of a spacetime in which each point may or may not bear a fundamental property of *being on*. A monist could mimic this as follows: i) there is a set, P, containing continuum-many world-properties (these are to be surrogates for points of spacetime; think intuitively of there being, for each spacetime point, p, a member of P that is the property of *being such that* p

[16] See Mundy (1987).

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is on, although remember that these are to be properties of the world object); ii) the members of P bear "geometric" features that are exactly isomorphic to the geometric features that the pluralist ascribes to points of spacetime; iii) there are laws of nature governing the instantiation by the world-object of the members of P, which exactly mirror the pluralist's laws of nature governing the pattern of pixelation. This cheap strategy could be extended to mimic more elaborate physical theories: one could simply invoke a set of new world-properties for each new posited set of entities. A more distinctive—less cheap—monist strategy would try to characterize M's structure in a more alien way. It is this less cheap strategy of which I say: I do not know how the monist might pursue it. Still, monists will, I expect, opt for some non-cheap strategy. For modeling the monistic account of fundamental reality too closely on pluralism might forfeit any alleged advantages of monism over pluralism. Perhaps monists will say, simply, that M has some unknown alien structure, which we may never discover.

4 Microfictionalism

So the monist has the structure of M to work with, in addition to its members (and the fact of which one is instantiated). How does that help?

It helps because it allows the monist to "reverse-engineer" a world of subworld entities. It allows the monist to ground the fact that *it's as if there exist subworld entities with natural features* ϕ in the fact that natural features ϕ would give rise to the actual structure of M.

In slightly more detail: "microfictions" will be defined as fictional accounts of a world of subworld things and their natural features. The monist can use the structure of M to pick out one microfiction as being "apt". The apt microfiction is, roughly, the one that would give rise to a statespace whose structure matches the structure that M actually has, if statespace structure were generated combinatorially from the number and nature of natural subworld features. And finally, the monist can say that the world is *as if* the apt microfiction is true.

Now in still more detail (though at a few points the account will remain schematic). Let's begin with this definition:

Microfeature fiction: A fiction of the form: "there exist some natural subworld features f_1, f_2, ... These are all and only the

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natural features, and they fall into subgroups with structure as specified thus: Γ"

Γ specifies the structure of $f_1 \ldots$ in the sense of section 3 (recall how features fall into natural subgroups with distinctive structure: the mass properties, the location properties, and so on). Γ might specify the number of argument places various f_i's have. It might lay down further constraints on the f_i's (it might specify that a certain one is a transitive relation, for example). And it might specify the holding of higher-order structuring relations over the f_i's.

The next step is to construct, as a function of any given microfeature fiction F, two further fictions:

Micropluriverse fiction for *F*: A fiction, PW_F, of the possible worlds that would result if F were true: one world for each pattern of arrangement of $f_1 \ldots$ that meets the constraints in Γ

Microstatespace fiction for *F*: A fiction, M_F, of the structure of the statespace that would result if PW_F were true, constructed thus:

i) Add to PW_F a description of one[17] world-property P_w for each world w. P_w completely specifies the pattern of instantiation of $f_1 \ldots$ over w's objects.

ii) Then construct a description, M_F, of the structure of the resulting set of world-properties $\{P_{w_1} \ldots\}$. M_F will depend on the patterns of instantiation of $f_1 \ldots$ within the various worlds, plus the higher-order structure of $f_1 \ldots$ as specified in Γ.

The micropluriverse fiction PW_F of the space of possible worlds generated by F may be constructed combinatorially:[18] given the $f_1 \ldots$ and Γ specified by F, include a possible world for each choice

[17] Or more—instead of constructing a single world-property for each world, a monist might instead construct a family of world-properties, one for each natural subgroup of micro- properties and relations as specified by Γ. (One member of the family might specify the world's charge-distribution, another its mass distribution, and so on.) The resulting fictional statespace M_F would then have a little more structure. This will be useful if the monist's real statespace M has corresponding structure: members describing distinct facets of the world-object (its charge distribution, its mass distribution, and so on.) Thanks to Jonathan Schaffer.

[18] There is no deep commitment to combinatorialism about modality here, since only worlds obeying Γ are allowed. Given fixed $f_1 \ldots$, the monist is free to consider various degrees of combinatorialism—various choices for what goes into Γ—in search of an apt microfiction.

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of i) (fictional) particulars, and ii) a distribution of $f_1 \ldots$ over those particulars that obeys Γ. Micropluriverse fictions might look like the pluriverse sentences of [Sider (2002)]: they will specify how many possible worlds there are, how many objects are contained in each world, and how $f_1 \ldots$ are distributed over each world's objects.

The microstatespace fiction M_F, which describes the structure of the set of world-properties $\{P_{w_1} \ldots\}$, is to be constructed as a function of PW_F and F. This seems *in principle* possible (although this is a place where the account is schematic), because the structure of $\{P_{w_1} \ldots\}$ is presumably a function of what goes on in the possible worlds $w_1 \ldots$, together with the constraints Γ; and full information about those goings-on and Γ is contained in PW_F and F. Think first as a pluralist. From that point of view, statespace structure is presumably some function, μ, of a) the distribution of natural features over subworld particulars throughout the space of possible worlds, and b) the higher-order structure of various sets of natural subworld features. The monist rejects this point of view since he rejects natural subworld features. But he can nevertheless make use of μ, and apply it to the fictional counterparts of a) and b). The fictional counterpart of a) is the distribution of $f_1 \ldots$ over individuals throughout worlds as specified by PW_F; the fictional counterpart of b) is the fictional structure of $f_1 \ldots$ as specified by Γ. Of course, I have no idea what function μ is, and I doubt the monist has either. Still, it would seem that μ must exist, and so is in principle available to the monist.[19]

So: taking as input a fiction, F, of natural subworld features, the monist can generate, as output, a corresponding fiction, M_F, of the structure of statespace. The nature of the output fiction will depend on the nature of the input fiction. For instance, if F says that the only feature is a single monadic property, then M_F would have a lot less structure than it would if F describes a more complex set of features.

We can now introduce the idea of an *apt* microfeature fiction:

Apt microfeature fiction: a microfeature fiction, F, where the resulting microstatespace fiction M_F "accurately describes" the structure of the *real* statespace M

[19] The monist can view ordinary and scientific talk as resting on the existence of μ—as resting on there being a route to statespace structure from the structures of bits of the microworld. To the extent that it's indeterminate what μ is, such talk is correspondingly indeterminate.

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This definition is at present schematic: without a precise account of the nature of the "structure" of M, the monist cannot give a precise definition of what it is for M_F to "accurately describe" M's structure. The intuitive idea, though, is that M_F accurately describes M iff there is a one-to-one correspondence between M and the set of properties $\{P_{w_1} \ldots\}$ described by M_F that is "structure-preserving", in a sense that the monist might hope to fill in more fully.

Given the notion of an apt microfeature fiction, the monist can finally ground as-if talk:

Microworld fictions: For any $m \in M$, there is a *microworld fiction for m*, ϕ_m, which may be constructed as follows:

i) Find some apt microfeature fiction, F

ii) Find a one-one map v between M and the fictional possible worlds described in PW_F as follows:

(a) Let η be a structure-preserving isomorphism between M and $\{P_{w_1} \ldots\}$ (such a η exists because M_F accurately describes M's structure)

(b) For any $m \in M$, let $v(m) = w$, where $\eta(m) = P_w$

iii) Let ϕ_m be the ramsey sentence of world $v(m)$: a complete description of $v(m)$ of the form: "there exist objects x_1 ..., and there exist natural features q_1 ..., distributed thus-and-so over x_1 ...".[20] This ramsey sentence may be read off of PW_F's description of $v(m)$.

Actual microworld fiction: a microworld fiction, $\phi_@$, for $m_@$ (i.e., for the member of M that is instantiated by the world-object)[21]

Microfictional truth: ψ is *microfictionally true* iff ψ is entailed by some actual microworld fiction $\phi_@$

The microworld fiction for a monistic world-property, m, is a description of a possible world that has m, but which is phrased in subworld terms, as if that world consisted of natural subworld features distributed over subworld objects. Thus, the actual microworld fiction is a description of the actual world, phrased in subworld terms; and the microfictional truths are those statements that are entailed by such a description of the actual world.

[20] In an infinitary language perhaps. One might also include some information from Γ in ϕ_m, specifying the structures of various subsets of $\{f_1 \ldots\}$ whose members are instantiated in $v(m)$.

[21] If the monist thinks of multiple members of M as being actually instantiated, then define an actual microworld fiction as a microworld fiction for each actually instantiated member of M; see note 17.

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Imagine you are a monist. Fundamental reality for you consists of a structured statespace, M (a set of world-properties), one[22] of which, $m_@$, is in fact instantiated by the world-object. (If you are a mere priority monist you also believe in the existence of subworld objects, with no natural features.) But you have many nonmonist friends, who do not share your beliefs. For them, fundamental reality consists in the instantiation of natural features by subworld individuals. How will you speak to them about the actual world? First, look out over your statespace, M. It has a certain structure. Think now of that structure *as if it were generated by natural subworld features*, as if it were the structure of a set of properties of entire possible worlds containing individuals with natural subworld features. (These are worlds as described by a micropluriverse fiction based on an apt microfeature fiction.) Among these imagined possible worlds, find the one that instantiates $m_@$, and construct a description, $\phi_@$, of this world. Return now, to your nonmonist friends. You can speak to them of the actual world as being *as if* it contained subworld objects with natural features as described by $\phi_@$.

Insofar as they can actually carry out the construction just sketched, monists are justified in speaking of a given property m in M as being "the property of being as if ϕ_m". They are, moreover, justified in speaking of the actual world as being as if $\phi_@$. They are, moreover, justified in saying "it as if ψ", where ψ is any microfictional truth. And they can piggyback on science to give detailed grounding explanations: whenever the scientist says ψ, the monist can say instead: "ψ is microfictionally true." In this way they can answer the challenge of section 2. In the terminology of the end of that section, they can define the "metaphysics function", m_T, where $T =$ monism, as follows: for any $p \in \mathcal{F}_T$—i.e., for any $m \in M$—we have: $m_T(m) = \phi_m$.

There is no guarantee that there will be a unique actual microworld fiction. A benign multiplicity might result from indeterminacy at various points in this section's constructions. There might, for example, be slightly different, equally acceptable, functions μ for generating M_F as a function of PW_F and F. But nothing seems to rule out a more drastic multiplicity. Utterly different microfeature fictions F_1 and F_2 might give rise to microstatespace fictions M_{F_1} and M_{F_2}, each of which accurately describes M's structure. Both F_1 and F_2 would count as apt, and yet the microfictional truths according to F_1 might differ drastically from the microfictional truths according to F_2. Massive indeterminacy (or worse) in the notion of

[22] Or more; see note 17.

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microfictional truth would then result. The monist should, I think, embrace this possibility.[23] If the structure of M does not single out a single way of talking about subworld entities and their natural features, then there would simply be no single correct way to talk in those terms.[24]

The approach of this section has a limitation, albeit one that the monist can live with. Since microfictional truths must be entailed by an actual microworld fiction, and microworld fictions take the form of ramsey sentences, only sentences capable of being entailed by ramsey sentences will be microfictionally true. Ordinary sentences like 'Ted is a philosopher' will not count as microfictionally true, since the relevant sort of ramsey sentences do not contain ordinary names or predicates like 'Ted' and 'philosopher'; they contain only quantifiers for objects and features. Ordinary sentences must, therefore, be ramsified before the account of this section can be applied. 'Ted is a philosopher' must be replaced with a ramsey sentence of the following form: "some object, t, plays such and such a role vis a vis everything else, and some property, p, plays such and such a role vis a vis everything else, and t has p."[25] Only such a replacement sentence is capable of being microfictionally true.

The account I have suggested, on behalf of monism, has been schematic in several ways. As we saw last section, actual monists know few details about M's structure. They would need to know more before providing a precise characterization of what it would take for a microstatespace fiction M_F to "accurately describe" M's "real structure". They would also need to fill in details about how to generate M_F from the micropluriverse fiction PW_F. And, finally, they would need to know how to "ramsify" ordinary sentences. Thus, in order to implement my strategy and actually *give* a fully precise definition of microfictional truth for ordinary sentences, monists would need to possess more information than they in fact have. Still, the account is useful to them. They can look forward to a day when implementation would be feasible. And, perhaps more importantly, they can regard the in-principle availability of an implementation as

[23] Embracing its *actuality*—if backed up with argument—would in fact improve the monist's dialectical position; it would supply a response to the final argument of section 7.

[24] Relatedly, the monist ought to allow the possibility that no microfeature fiction is perfectly apt, and introduce a notion of "near-microfictional truth" corresponding to nearly-apt microfeature fictions.

[25] It might also be useful to include information about the structures of sets of properties; see note 20.

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underwriting their use, here and now, of ordinary talk about subworld objects and natural subworld features. The account demonstrates that, within a monistic world, there exist facts that can ground its being as if such talk is true. Pluralists feel free to speak of tables and chairs without knowing, exactly, how facts about them are grounded in what's fundamental; monists can feel free to do the same.

Not that the monist has achieved *full* parity with the pluralist. The pluralist can still give more specific information about the fundamental facts (by piggybacking on a scientific story) than the monist can; absent any particular account of M's structure, the monist can say only that the structure of M is such that the scientific story is microfictionally true. Still, the monist has made progress. First, he has a recipe for turning any account of M's structure that he might one day produce into a detailed grounding story. Second (and more vaguely), he has shown that a monistic world is capable of grounding more complex discourse than it may first have appeared. Speaking for myself, before thinking along the present lines, I doubted whether there was enough structure in a monistic world to support the complexity that we experience.

5 Existence and Priority Monism Revisited

The fictionalism of section 4 applies only at the level of the sentence, not at the level of the predicate. That is, it defines the expression 'ψ is microfictionally true', not the expression 'object o microfictionally satisfies open sentence $\psi(x)$'. It lets us say that it is microfictionally true that there is a donkey; it does not let us say, of any particular thing, that *it* is microfictionally a donkey.

Existence monists would clearly have no use for a notion of microfictional satisfaction, since they do not believe in the existence of subworld objects. But what about priority monists, who do believe in subworld objects? Could they use section 4's methods to develop an account of microfictional satisfaction?

In fact the answer is *no*, at least given the formulation of priority monism that I have been working with.[26] That formulation, recall, is: *no natural features are had by any object other than the world-object*. If no subworld object has any natural features at all, then every two such objects, trivially, have the *same* natural features—both intrinsic

[26] Let me reiterate that my conclusions are based on my formulation of priority monism in naturalness-theoretic terms, and may not hold under Schaffer's formulation.

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and relational. That is, every two subworld objects are "fundamentally alike". But fundamentally alike things must share *all* features, since every feature of a thing is determined by its natural features, both intrinsic and relational. Thus, any putative relation of microphysical satisfaction would be vacuous: every two subworld entities would microfictionally satisfy exactly the same open sentences.

Let me lay out this argument more carefully. Its core premise is:[27]

Supervenience on the natural Every feature supervenes globally on the set of natural features

To cash this premise out, we need a precise definition of global supervenience. For definiteness' sake, take all "features" to be quantities, and take an n-place quantity, q, to be an n-place function from objects to members of some value-range.[28] (We lose no generality in so doing, since properties can be construed as one-place relations, and n-place relations construed as n-place quantities with value-range {0,1}.) Here, then, is the definition:[29]

> Feature q *globally supervenes* on set of features $B =_{\text{df}}$ for any possible worlds w and w', and any function f that maps the objects in w one-to-one onto the objects in w', if f preserves all the features in B then f preserves q

where

> function f *preserves* n-place feature $q =_{\text{df}}$ for every $x_1 \ldots x_n$ in f's range, $q(x_1 \ldots x_n) = q(f(x_1) \ldots f(x_n))$

Now for the argument. Consider any possible world, w, and any two subworld entities at w, o_1 and o_2. Let f be a function that maps o_1 to o_2 and o_2 to o_1, but which otherwise maps each object (including the world-object) at w to itself. Given priority monism, f preserves all natural features: the only natural features are those of the

[27] By 'features' I have in mind here *qualitative* features; expressions that can be defined only by naming particular objects do not express features on this usage.

[28] The nature of the value-range will depend on the quantity in question; it could be a set of real or complex numbers, or even a set with minimal structure, such as {0, 1}.

[29] Slight rewording required if objects are transworld rather than worldbound. Note: in this section I am discussing what's *really* true according to priority monism, not what's fictionally true; so the possible worlds, features, and objects I am discussing are "real" possible worlds (however one thinks about such things), real features, and real objects, not the fictional worlds, features, and objects of section 4.

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world-object, and *f* maps it to itself. So, given supervenience on the natural, *f* must preserve *all* features. Thus, if there were a putative feature of *fictionally satisfying* '*x* is a donkey', then if o_1 had it, o_2 would have it as well. Conclusion: any putative feature of fictionally satisfying a given open sentence would be vacuous; for each open sentence, either every object would fictionally satisfy it or every object would fail to fictionally satisfy it.[30]

The vacuity of any notion of fictional satisfaction may seem incompatible with the fact that fictional truth is *not* vacuous. Even though one cannot define a notion of fictional satisfaction such that some objects would satisfy '*x* is a donkey' and others would not, (a suitable ramsification of) the following is nevertheless microfictionally true: 'There exist an *x* and a *y* such that *x* is a donkey and *y* is not a donkey'.[31] But in fact, there is no tension here. *In the fiction*, it's not true that all objects are alike; nevertheless, all objects really are alike (assuming priority monism).

Here is what's going on, at an intuitive level. The idea behind introducing a notion of fictional satisfaction, as opposed to a notion of fictional truth, would be to enable saying, of a *particular* subworld object *o*, that it's as if *it* is a donkey (say). Given supervenience on the natural, something at the fundamental level must attach this as-if description to *o*. But since all subworld objects are, fundamentally speaking, exactly alike, anything that would attach this as-if description to *o* would also attach it to every other subworld entity.

[30] The argument leaves open that there be a nontrivial *nonqualitative* relation of satisfaction ("features" are qualitative; see note 27). It might be thought that we should never have expected satisfaction to be qualitative: in a mirror-symmetric possible world in which George W. Bush and I are exactly alike, both intrinsically and extrinsically, only Bush satisfies '*x* = Bush'. The thought is correct if whether an object "satisfies" a formula in a possible world *w* depends on the semantic conventions that *actually* govern the formula. But on another understanding of 'satisfaction'—the understanding that is relevant here—whether an object satisfies a formula in *w* depends on the semantic conventions governing the formula *in w*. Satisfaction, in this latter sense, is surely qualitative; in order for Bush to satisfy, in this latter sense, '*x* = Bush' in the mirror world, speakers *in the mirror world* using '*x* = Bush' must pick out Bush (and not me) by their word 'Bush', which they surely cannot do given the symmetry between me and Bush. Thanks to Louis deRosset.

[31] For that matter, a suitable ramsification of the following would also be fictionally true: 'There exist an *x* and a *y* such that *x* satisfies "*z* is a donkey" and *y* does not satisfy "*z* is a donkey"'.

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I stated priority monism in a particularly strong way, as ruling out *all* subworld natural features. This could be weakened in various ways. One could allow, for example, natural relations of identity and parthood, which would relate subworld entities as well as the world-object.[32] But even this would not allow for an interesting notion of fictional satisfaction. Though it would no longer be true that every two subworld things are exactly alike, it would still be true that any two "mereologically similar" things are exactly alike; and this would preclude any interesting notion of fictional satisfaction. Let f be any one-one function from world w's objects onto themselves, such that $f(x)$ is part of $f(y)$ iff x is part of y. f will preserve all fundamental features, given the new version of priority monism, and so, given supervenience on the natural, must preserve all features. So, for any putative notion of fictional satisfaction, if I have the feature of fictionally satisfying 'x is a person', so must f(me). But f(me) could be any mereologically isomorphic object—a mereologically isomorphic asteroid on the other side of the universe, say.[33]

Even priority monists, then, will define only fictional truth, not fictional satisfaction. This means that the priority monist's subworld objects are, in a strong sense, superfluous: they play no role in the monist's reconstruction of ordinary and scientific talk about the world. This is unsurprising, since they have no fundamental features. But then: why believe in them? They seem to be playing no theoretical role.[34]

6 The Objection from Intrinsic Properties

The fictionalism of section 4 allows the monist to answer an objection that I put forward previously (Sider, 2007): that the monist has no

[32] Under the original formulation, there are no "positive" facts at all involving the subworld entities: speaking at the fundamental level, all one can say of a subworld thing o is that "o is not F" for various natural world-object features F.

[33] If atomism is true—if there is no "gunk"—then any two objects o_1 and o_2 containing the same number of atoms can be paired by such a function f. Construct f by first letting it map each atom of o_1 to a unique atom of o_2; then let it map all other atoms to themselves; and finally, map every nonatomic b to the fusion of $\{f(x) : x \text{ is an atom that is part of } b\}$.

[34] For that matter, the world object isn't playing much of a theoretical role either. Why not eliminate it too, and replace the statespace—a set of properties, one of which is instantiated—with a space of propositions, one of which is true?

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way to account for the ordinary correctness of the distinction between intrinsic and extrinsic properties. The reply goes as follows. When some micropluriverse fiction PW_F says that two fictional possible objects (perhaps from distinct fictional possible worlds) have the same fictional natural properties and whose fictional parts[35] stand in the same fictional natural relations, let PW_F also say that those objects are "fictional duplicates"; and let PW_F then say that any fictional property, whether natural or no (that is, whether one of f_1 ... or no) is intrinsic iff it never differs between fictional duplicates according to PW_F.[36] Thus updated, the monist's micropluriverse fictions speak of intrinsicality. As a result, the microworld fictions will speak of intrinsicality as well, and so the fictionalist may speak of it being *as if* there is a distinction between intrinsic and extrinsic properties.[37]

7 Concluding Pluralistic Remarks

To secure material adequacy, our monist has embraced a distinctive conception of fundamental reality: reality consists of a rich array of facts about the features that the world-object might have instantiated. There are two striking points of contrast between this conception and the pluralist's; each favors pluralism.

First, since only one[38] of these features, $m_@$, is actually instantiated, most of the monist's fundamental facts involve uninstantiated natural features. (It would be hopeless to try to get by with only $m_@$. Fundamental reality would consist solely of the fact that the world-object instantiates $m_@$. How could the monist ground everything else on such a meager basis? He might just as well say: "let there be light".) Since these uninstantiated features are natural—fundamental—facts about them could not derive from facts about $m_@$. Facts about this portion of the statespace are in no way rooted in what actually occurs; the nonactualistic commitment is deep and irreducible. The pluralist, on the other hand, is free to reject fundamental uninstantiated features.[39]

[35] The monist should probably hard-wire a predicate 'part of' and constraints on its application into the definition of a micropluriverse fiction.

[36] Here I follow Lewis (1986, pp. 61–62).

[37] Trogdon (Forthcoming) gives an alternate reply.

[38] Or a small number; see note 17.

[39] Michael Tooley (1987) argues on independent grounds for postulating certain uninstantiated natural features, namely, those that would "round out" our laws of nature by providing for high-energy physical states that

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Second, the structure of the monist's statespace cries out for an explanation that only a pluralist can give.[40] The monist's statespace must have an immense, complicated structure, enough to select an apt microfeature fiction. To do so, this structure must be as if it were generated from a much simpler basis, as if it were generated combinatorially from subworld natural features (a small number of them, if physics is complete)—as if it were generated by a simpler, *pluralistic*, underlying reality. Is this just a coincidence? We are generally suspicious of such coincidences. Rather than believing merely in sensory impressions that display striking patterns of uniformity, we deem it reasonable to believe a simpler hypothesis: that the uniformity is no accident, that it is explained by the existence of an external world.[41]

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have never and will never be realized. But this limited commitment to the nonactual is nothing like what the monist requires.

[40] In effect this was the main argument of Sider (2007).

[41] Compare Russell (1912, chapter 2).

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