II—L. A. Paul

Categorical Priority and Categorical Collapse

I explore some of the ways that assumptions about the nature of substance shape metaphysical debates about the structure of Reality. Assumptions about the priority of substance play a role in an argument for monism, are embedded in certain pluralist metaphysical treatments of laws of nature, and are central to discussions of substantivalism and relationalism. I will then argue that we should reject such assumptions and collapse the categorical distinction between substance and property.

A central project of contemporary metaphysics is to understand the nature of the world as a whole. The traditional way to approach this project is to develop an account of the metaphysically basic kinds, that is, of the *fundamental ontological categories* of the world. But in addition to giving an account of what the fundamental ontological categories are, we need to give an account of how they and their members ground the overall structure of the world.

This means that a fully developed fundamental ontology has a complex, interlocking structure. Part of the structure is determined by the nature and organization of the fundamental and derivative ontological categories, and part of the structure is determined by the way members of the categories are arranged and related in the world. Thus, an account of the metaphysical ground of Reality has three central elements: (i) an account of what the metaphysically basic categories and the relations between them are, (ii) an account of the way members of these basic categories are combined and arranged, and (iii) an account of the rules of ground, that is, an account of how the metaphysically basic categories, their members and their arrangements ground the rest of Reality. I will discuss the project of understanding the nature of the world as a whole primarily in terms of the way metaphysically basic categories and the members of these categories are arranged so as to provide the ground for

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all of Reality. Once we have the metaphysically prior ground, we have, as it were, the ontological initial conditions from which the rest of Reality, the metaphysically derivative remainder, is generated.

The fundamental ontological categories are the most basic kinds or natures of the world. (i)–(iii) give us two different sorts of fundamental ontological structure. The fundamental *categorical structure* of the world is given by the number and kinds of fundamental ontological categories, for example, the category of substance and the category of property, along with any categorical relations between them. The fundamental *entity structure* of the world is given by the way members of the fundamental ontological categories ground the most basic *complex entities* of the ontology, the objects or facts or states of affairs (or what not) of the ontology, and these entities can then function as the ground for other, metaphysically more derivative, entities. These metaphysically derivative entities are members of metaphysically derivative categories. Many accounts of fundamental entity structure defend *constituent* ontologies, that is, they implicitly or explicitly take the fundamental entity structure to involve internal constituent structure, such that complex entities are constructed from constituents of the categories. A constituent ontology might hold, for example, that objects are constructed from substances having properties, so the categories of *substance* and *property* are fundamental categories and the category of *object* is derivative. *Relational* ontologies, like that of Peter van Inwagen (2011), reject the notion that objects have internal constituent structure.[1] On the relational view, the only internal structure complex objects have is mereological structure.

The most widely accepted ontology takes the fundamental ontological categories to be those of substance and property.[2] A less fashionable view holds that the only fundamental category is that of substance. An even less fashionable view holds that the only fundamental category is that of property.[3]

[1] Van Inwagen (2011) describes the rejection of internal constituent structure as the rejection of ontological structure, full stop. I disagree: I think a relational ontology still involves a certain kind of ontological structure because of the way substances, when they are appropriately related to universals, are objects. It just isn't *constituent* structure.

[2] For example, Aristotle (1984), Armstrong (1997), Fine (1999), Koslicki (2008), Lowe (2006), Rea (2011), Sider (2006).

[3] Paul (2002, 2012a). As the final section will argue, the view that the only category is the property category is better described as the view that there is just one category that is neither substance nor property. It is simply a category of qualitative characters.

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The usual substance–property ontology is a constituent ontology where the complex entities are, or are constructed from, propertied and related substances. For example, Armstrong (1997) takes spatio-temporal regions to be thin particulars that instantiate immanent universals: the thin particulars are point-sized spatio-temporal regions, a contemporary version of traditional substrata. On this ontology, the fundamental ontological categories are the categories of substance and property, and the substances of the substance category are spatio-temporal entities such as spatio-temporal simples, points or regions, which are combined with immanent universals to build complex entities, which Armstrong calls 'thick particulars' or 'states of affairs'. Some might prefer to call these complex entities 'facts'. When facts are constructed from substances and properties, a fact ontology endorses at least three ontological categories, two fundamental and one derivative: the fundamental categories of substances and properties, and the derivative category of facts.

Any account of the metaphysical ground of Reality must meet two challenges. The first challenge is to fit the metaphysical ground of Reality with fundamental physics, which also describes the world at a very basic level. Here, one needs an account of how the physical categories of the fundamental physical theories fit with the fundamental ontological categories, how members of physical categories are related to members of the ontological categories, and the relations of ground involved.[4]

A second challenge is to provide an account of how the entity structure of the basic complex entities grounds the entity structure of metaphysically more derivative entities. If, say, we take the basic complex entities to be states of affairs, and we take the derivative entities to be states of affairs such as people sitting or chairs being arranged around a table, how *exactly* are the basic states of affairs grounding ordinary objects? How is an object such as a person sitting ontologically generated from arrangements of states of affairs?

A substance–attribute account modelled loosely on Armstrong's approach might take the fundamental ontological categories to be substance and universal, with states of affairs as the basic complex entities, and take the categories endorsed by fundamental physics to include a category for a substantival space and a category of micro-

[4] I discuss these issues in greater detail in Paul (2012a, 2012b).

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particles.[5] A super-substantivalist version might take the basic complex entities to be propertied and related point-sized regions of substantival space. Those that reject super-substantivalism might take the basic complex entities to be propertied and related material objects consisting of substances instantiating universals that occupy space-time. Basic complex entities could then be taken to mereologically compose microparticles. (Or, instead of microparticles, one might endorse a field ontology constructed from, for example, substantival fields and property instances.) The basic physical entities can in turn compose more complex, ordinary persisting objects.

All of these category-based accounts of the metaphysical ground of Reality make use of *categorical priority*. One kind of categorical priority is used to distinguish between the fundamental, or metaphysically prior, categories and any derivative categories. For example, when we take the categories of substance and property to be fundamental, and construct facts or states of affairs from substances and properties, we take the substance and property categories to be more fundamental than, and thus metaphysically prior to, the fact or states of affairs category.[6] If we construct objects from substances and properties, we take the category of object to be less fundamental than, and thus metaphysically posterior to, the categories of substance and property.

But there is a second, more subtle, way to distinguish between categories, even between categories that are ostensibly all fundamental: one can take the nature of a fundamental ontological category to be prior in some way to the natures of the other *fundamental* categories. The notion of priority here is not *vertical* priority, the sort of priority involved when members of a metaphysically posterior category are constructed from members of metaphysically prior categories. Members of the fundamental categories are not constructed from members of other categories. The sort of priority involved here is *horizontal*: it involves categories that are ostensibly at the same 'level' of Reality.

Horizontal categorical priority arises when something about the nature of the (members of) the horizontally prior category is taken

[5] Note that the fundamental physical categories can involve metaphysically complex entities. I don't think fundamental physical theory is best interpreted as endorsing a category of microparticles—or even of fields—but this is a topic for another paper. See Baker (2009).

[6] We can take categories to be classes, but we don't need to take classes to be entities in their own right. They just represent real divisions between natures (van Inwagen forthcoming).

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to establish a feature of the metaphysical ground that is implicitly or explicitly taken to be metaphysically prior to the other fundamental elements of the metaphysical ground of Reality. In particular, horizontal categorical priority is invoked when something about the nature of the members of the category determines or constrains the structure of the rest of the ground of Reality, such that (ontologically speaking) this determination or constraint must be in place before the rest of the fundamental ontological ground is added. When a fundamental category's nature is taken to be such that it defines or constrains the rest of the fundamental structure, we have horizontal categorical priority.

Horizontal categorical priority is most obvious in ontologies that endorse a category of substance. When the category of substance is given horizontal categorical priority, I'll describe it as *substantial categorical priority*. Substantial categorical priority consists in the way substances are thought to provide the initial metaphysical ground for whether, when, and where everything else exists. The idea seems to be that something about the nature of substance makes it specially suited to play a role where it determines the most ontologically basic nodes of the structure of Reality.

For example, D. C. Williams, discussing the Aristotelian distinction between matter and form, one of the bases for the contemporary distinction between substance and property, describes an Aristotelian notion of prime matter as that which 'engenders concreteness at the same time as it provides particularity, not because particularity is concreteness, but because by being the occasion for predicates, prime matter permits that concurrence of predicates which is concreteness' (Williams 1958b, p. 508). Particularity and concreteness determine constraints on the fundamental external structure, or the space, of Reality.

E. J. Lowe describes the asymmetry between substance and property, represented by figures such as Descartes, by describing how 'a substance is often conceived to be an object which does not depend for its existence upon anything else. [But] properties are often said to depend for their existence upon the objects which possess them' (Lowe 1999, p. 137).

Likewise, Theodore Sider describes a tempting claim (that he ultimately does not endorse): 'Now for the argument that tempts me. When I am sitting, am I sitting because I instantiate the property of sitting, or do I instantiate the property because I am sitting? Again, I

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want to answer: the latter. Particulars, not properties, wear the pants' (Sider 2006, pp. 389–90). Sider rejects this line of thought to the extent that it implies that properties do not play a fundamental role in fundamental Reality. But what he does endorse is the view that arrangements of substances, or thin particulars, determine the fundamental structure of spatio-temporal and mathematical Reality. It is in this way that a commitment to substantial categorical priority comes out: arrangements of substrata determine the fundamental external structure of the space and its ultimate individuation facts.

Substantial categorical priority is implicitly involved when haecceitistically individuated substances are used to ground the individuation and location features of the space of the world. When substances are used in this way, we can think of substantial categorical priority as constraining the fundamental external structure of the world.

Substantial categorical priority is also used to constrain the fundamental internal structure of entities, for example, when the substance is taken to be the vehicle or carrier for the properties of metaphysically derivative individuals or complex objects like particles, chairs or people. Substances are the nodes of the internal structure of metaphysically derivative individuals, by being the nodes for the qualities of the metaphysically derivative individuals of the space (haecceistic features of substances also play a role in internal structure, by giving individuals their distinctive thisness or essence).

The use of substantial categorical priority to establish internal structure comes out when properties are taken merely as *ways things are* or ways things can be. They merely endow the matter—once we have the matter—with its form. They are borne by the substance, and they can only be involved in material Reality if the substance instantiates them. The implicit idea here is that the substance is the primary entity or existent, which is then shaped or formed or modified by the properties. Ontologically speaking, we start with the substances, and then we mould them, qualitatively speaking, in different ways, giving the matter its form. Properties simply ornament the fundamental structural shape.

Many polycategorical ontologies, categories that admit multiple fundamental categories, implicitly invoke substantial categorical priority. In particular, the most popular sorts of polycategorical ontologies, Aristotelian and neo-Aristotelian ontologies with categories of substance and property, take substances to determine the

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external structure of the world space and the internal structure of metaphysically derivative individuals.

Below, I will explore some of the ways that substantial categorical priority shapes metaphysical debates about the structure of Reality.[7] Substantial categorical priority plays a role in an argument for monism, it is embedded in certain pluralist metaphysical treatments of laws of nature, and it is central to discussions of substantivalism and relationalism. I will then argue that substantial categorical priority should be eliminated by eliminating the category of substance altogether, in favour of a one-category ontology that collapses the distinction between substance and property.

I

Categorical Priority I: *Monism and Holism*. The pluralist about spatio-temporal composition takes the (material or concrete) world to be a whole that is composed from smaller spatio-temporal regions, where suitably small spatio-temporal regions are fundamental and the larger whole they compose is metaphysically derivative. The (priority) monist about spatio-temporal composition reverses this position, taking the spatio-temporal whole to be fundamental and the smaller parts to be derivative.[8]

If we combine pluralism with an Aristotelian-style ontology, we get a picture of material world-building that many find intuitive. In this picture, each small spatio-temporal part has its own range of intrinsic properties (this captures the content of these regions), and these propertied and related parts, when appropriately spatio-temporally arranged, compose larger propertied and related spatio-temporal regions, all the way up to the entire world, the largest propertied and related spatio-temporal whole. We build the spatio-temporal whole by putting together proper spatio-temporal parts, and we build the properties of the whole at the same time, as we put together properties of the proper spatio-temporal parts.

[7] I agree with Kit Fine that it is productive to distinguish between accounts of mere reality (or ordinary appearances) and accounts of Reality. I take the ontological project of interest here to be an account of Reality and its categorical structure, not an account of mere reality and our ordinary way of speaking about it.

[8] Jonathan Schaffer (2010) defends priority monism, but does not restrict his thesis to spatio-temporal monism. Elsewhere (Paul 2012a), I have argued against spatio-temporalism, but for simplicity I am setting aside those concerns here.

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But there is an empirical problem with this picture: standard interpretations of quantum mechanics support property holism, generated by the fact that the contents of extended spatio-temporal regions may exhibit *entanglement*, where the regions have intrinsic properties and relations that are not grounded by the intrinsic properties and relations of their proper spatio-temporal parts plus the spatio-temporal relations between these proper parts. This gives us *non-separability*, where some physical process of a region of spacetime is not supervenient on the intrinsic properties of its proper spatio-temporal parts plus their spatio-temporal arrangement (Healey 1991). 'In principle at least, the state of any region must be specified *directly*: no attempt to specify it in terms of any non-trivial decomposition into subregions will work' (Wallace and Timpson 2010). Jonathan Schaffer uses the existence of entangled systems to make the point that '[i]n general, duplicating the intrinsic properties of the particles, along with the spatiotemporal relations between the particles, does not suffice to duplicate … the intrinsic correlational properties of entangled wholes …' (Schaffer 2010, p. 53).

Do not be misled by the terminology. While the language might suggest that spatio-temporal parts must be literally 'entangled', strictly speaking the empirical claims about entanglement involve facts about *properties*, such that the properties of certain ('entangled') spatio-temporal regions do not supervene on properties of their spatio-temporal parts. So the fact that the world seems to contain spatio-temporal regions that have intrinsic properties and relations that are not grounded by the intrinsic properties and relations of their proper spatio-temporal parts (plus the spatio-temporal relations between these proper parts) lends support to a holistic thesis about properties. In particular, it lends support to the thesis that the fundamental heterogeneous properties of extended entangled regions are distributional (Parsons 2004), that is, that the fundamental heterogeneous properties of an extended entangled region, such as the region's being red at L_1 and green at L_2, are not composed or constructed from, or grounded by, intrinsic properties and parts of subregions of the region. An extended entangled region's property of being red at L_1 and green at L_2 is not grounded by some sort of composite of, say, L_1 being red and, in addition, L_2 being green. Instead, being red at L_1 and green at L_2 is fundamentally distributional, that is, it is simply, as a matter of brute fact, the property of *being red at L_1 and green at L_2*.

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If the properties of entangled regions are distributional, we have a way to make sense of property holism, and thus to provide a metaphysically clear way of understanding this feature of non-locality in physics. We might even argue, to the extent that we can determine the properties of subregions from the distributional properties of the entangled region, that the distributional properties of the region ground the properties of its subregions.

Now, this sort of non-locality does indeed create problems for traditional mereological pictures that assume that the properties of spatio-temporal regions are to be built up from intrinsic properties and relations of parts of those regions. A pluralist thesis about the supervenience of the properties of the whole on the properties and relations of the parts is threatened by non-separability. (See Paul 2012a for discussion, and §II below.) But is pluralism in general threatened? Or just this particular thesis? Schaffer (2010) argues that the possibility of entanglement in spatio-temporal regions supports the claim that the world as a whole is a basic entangled substantial system that exhibits the requisite internal relatedness. So Schaffer thinks the possibility of entanglement in spatio-temporal regions supports the claim that the world as a whole is a basic entangled system—a holistic substantial whole—and uses this supposition to support his arguments for monism against pluralism.

But does entanglement really support the thesis that the spatio-temporal parts of a system are holistically related, and thus by extension support monism over pluralism? It does—*if* we adopt a categorical priority thesis such that the holistic nature of the properties of the entangled, extended spatio-temporal substance must mirror the nature of the internal structure of the extended spatio-temporal substance. If the holistic structure of the properties of the extended spatio-temporal region of the entangled particles reflects the structure of the substance of that region, then an empirical need for property holism for a region is evidence for the holism of the extended spatio-temporal substance.[9]

But why think that the distributional natures of properties of a substance must mirror the nature of the substance? That is, why endorse this sort of categorical priority? To support the mirroring thesis, we need substance to have categorical priority (or we need some

[9] I'm going to assume that there is empirical evidence in favour of property holism. This depends on which physical theories you accept, since there are interpretations of QM that avoid property holism (see Loewer 2004 for discussion), but I am leaving such issues aside.

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sort of property-based categorical priority). If substance has categorical priority, then the existence of distributional properties had by a substance is an argument for the holistic nature of the substance, providing support in turn for monism. But if the nature of the properties need not mirror the nature of the substance that has them, then the link is broken.

Here is another way to make the point.[10] Consider a substance–attribute view where distributional properties are fundamental properties or attributes of the substantial world-whole. Couldn't one be a pluralist about the substantial world-whole, and so hold that the whole that has these fundamental distributional properties is nevertheless composed of smaller, more fundamental, substances? Yes. Such a view would accommodate property holism and hence accommodate entanglement. It is a property holist thesis. But it is not a substance holist thesis.

The point is that, if there is empirical evidence for the possibility of fundamental distributional properties, this suggests properties are indeed fundamentally distributional. But unless one holds that the holistic nature of the properties of the world-whole is determined by the holistic nature of the substantial whole that has them (or vice versa), this carries no implications about monism as opposed to pluralism. If the nature of the substance that is the world-whole, whether mereologically derivative or mereologically fundamental, can diverge from the nature of the properties, then property holism is not evidence for substance holism.

For those of us who take the world to have a fundamentally qualitative character, properties stand on an equal footing with any other fundamental entities of the world. So if there are empirical reasons to defend fundamental distributional properties, then we can accept them as fundamental entities independently of whether we endorse a particular view about the relative priority of spatio-temporal parts and wholes.

[10] I'm indebted to Ross Cameron for this suggestion.

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II

Categorical Priority II: *Humeanism versus Strong Laws*. Implicitly taking spatio-temporal substances to be categorically prior is subtly bound up with the dominant reductive approaches to the metaphysics of fundamental laws of nature. (The substances don't have to be spatio-temporal, but it is usually assumed that they are.) Reductive accounts of the fundamental laws, that is, accounts that seek to reduce laws to other ontological entities such as universals or causal powers, often start with the presupposition that we have a space-time with a pattern of properties instantiated across it, where the laws are thought to link properties instantiated at a given time with properties instantiated at earlier and later times.[11]

The intuitive idea of 'lawfulness' is that laws determine the pattern of instantiation, that is, as the world evolves forward, the laws govern how properties of objects or states at one time determine properties of objects or states at later times. The world is thus composed of states at times that are related to states at other times via causation and other relations, where these relational connections are all governed and guided by the fundamental laws of nature.

This approach assumes spatio-temporal mereological pluralism: it assumes that the extended spatio-temporal region, that is, the manifold, is composed from a bunch of smaller, perhaps point-sized, regions. Temporally (and spatially) localized states or objects at suitably small regions or points are assumed to have local properties in the same way that the neo-Aristotelian or the fan of 'propertied and related spatio-temporal regions' assumes they do.

The two main reductive approaches to the metaphysics of laws usually implicitly accept spatio-temporal mereological pluralism, and then diverge on how to metaphysically accommodate lawfulness. So, for the purposes of this discussion, let's explicitly accept this sort of pluralism, that is, let's assume a picture where we have a propertied and related space-time composed of smaller spatio-temporal regions, and where these smaller regions either are or are occupied by propertied and related substances of some sort that compose a substantial propertied and related whole (the 'substantial manifold'). This account of the manifold will help us tease out a

[11] Other views that, while not necessarily reductive, seem to implicitly accept this sort of view include those of Maudlin (2007), who takes laws to be ontologically primitive entities, Carroll (2008), Roberts (2008) and Lange (2009).

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characterization of the role played by the metaphysical presupposition of substantial categorical priority.

The 'strong laws' approach captures lawfulness by taking the distribution of properties across the manifold to be determined by higher-order relations between universals. The reductive strong laws view is that laws are reducible to certain necessarily connected universals. Its main opponent, the Humean reductionist, an approach defended by David Lewis (1986) and embraced by many who dislike necessary connections and other substantive metaphysical embellishments, reduces the laws to qualitative patterns in the manifold: the laws *just are* the distribution of (the right) property instances. As Hall describes the view, 'facts about the laws reduce to facts about the distribution of perfectly natural properties and relations' (Hall MS, p. 6).

An important objection to the Humean reductionist is that Humean laws are insufficiently explanatory: there is no entity that links the instantiation of one part of the property pattern to another. How, then, can we say that the pattern counts as a *law*? The Humean reduction seems to leave us without anything that has the requisite governance or guidance needed for lawfulness, that is, for control over the pattern of property instantiation as the world evolves. Put another way: the objection to the Humean reductionist is that facts about the laws could not be reduced merely to facts about the distribution of perfectly natural properties and relations, for we need something stronger to explain generalizations involving counterfactuals, causation, and other cross-time relations that explain by capturing facts about how properties and relations instantiated at later times depend on the properties and relations instantiated at earlier times. 'The [Humean] reductionist should recognize that much of our ordinary conception of law of nature, and indeed, much of our scientifically informed conception, has a distinctly anti-reductionist cast to it. So he should be forthright that he is advocating an at least modestly revisionist account of laws of nature' (Hall MS, p. 25).

But as Hall, and also Loewer (2004), points out, while the intuitions of guiding and governance that support the explanatory role of laws and their support for counterfactuals and causation are strong and natural, they are also incredibly vague. 'Guiding' and 'governance' are basically just metaphors that describe some primitive ability to direct or control the evolution of the world that we feel is

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needed to explain the way the earlier property instances lawfully generate later property instantiations. We don't have a deeper account of just what such lawfulness would amount to, at least not without explicitly making commitments to things like necessary connections between universals that allow us to explain, for example, that the underlying reason for the fact that all *F*s are *G*s is because there is a necessary connection between being *F* and being *G*.

Moreover, the Humean can argue that both the problematic notion of 'governance' that underlies intuitions about laws, and the problem of explaining how properties are distributed though an evolving region, arise from the implicit substantial categorical bias involved in taking relations between the substantial regions that instantiate the properties to be metaphysically prior. How? In a nutshell, by assuming that facts about the substances (that is, the individuals, whether they are spatio-temporal regions, substrata, or something else, that instantiate the properties) constrain facts about the nature of the properties they instantiate. The assumption, in particular, is that facts about the construction and internal character of the substantial manifold determine facts about the construction and the internal character of the properties of the manifold.

Recall: the pluralist assumption is that we build the substantial manifold by composing it from smaller propertied and related substances, and we build the properties of the manifold at the same time, in effect composing properties of an extended region from the arrangement of the properties and relations of its substantial parts. The substantial categorical priority thesis here, as we saw in §1, is the assumption that the composition operation performed on the substances leads to a parallel composition operation on the properties. The assumption is that properties of the extended substantial manifold are constructed from combining the properties and relations of these smaller substances, and in this way the internal structure of the extended substantial whole is reflected in the internal structure of its properties.

The idea seems to be that when we create the manifold by fusing together smaller substances, the overall qualitative structure of the manifold is somehow generated by relations between localized instantiations of properties of these smaller substances, creating the overall properties of the manifold. The idea behind the pluralist metaphysic is that when we fuse together smaller propertied and related regions (or substances occupying those regions), we also create

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a property pattern. Arranging the smaller spatio-temporal regions or substances strings together a bunch of local property instantiations, giving us the overall qualitative structure of the manifold. Don't think that one has to be a substantivalist about space-time to hold this view: if the manifold is taken to be constructed from spatio-temporal relations and arrangements of localized substantial individuals, adding in substantial categorical priority to the relationalist space still leads to the overall qualitative structure of the world being generated by relations between localized instantiations of properties of these arrangements of individuals.

If properties are distributed in virtue of when or where they are attached to local substances, this creates the need for an explanation of what the underlying causal or counterfactual connections are between the parts that are strung together to give the overall pattern of the mosaic, that is, we need an explanation of what makes it the case that when we have an individual that is *F* at L_1, we then have an individual that is *G* at L_2. (Armstrong's answer is that we need a necessary connection between *F* and *G*.)

But if we reject the substantial categorical priority of the pluralist, we can reject the implicit assumption that the arrangements of the individuals of the whole region determine its overall qualitative structure, which then frees us to accept a fundamental, non-local distributional property of the manifold. For example, instead of taking the property of the manifold *R* that *all Fs are Gs* to be grounded by the fact that when a subregion of *R* instantiates *F*, a subregion of *R* instantiates *G*, we take the property of *all Fs are Gs* to be a primitive, fundamental distributional property of *R*. Or, in a context where we want to explain the evolution of the world over time, we may say that the lawful causal regularity that *if F then G* is just the distributional property of being *F* at t_1 and *G* at t_2 and *F* at t_3 and *F* and *G* at t_4, …, etc. The regularity that *if F then G* is not, then, grounded by a collection of local facts such that at subregion t_1 we have an instance of *F*, and at subregion t_2 we have an instance of *G*, and at subregion t_3 we have an instance of *F*, and so on.

And if we don't have a jumble of local facts that somehow needs to be threaded into a pattern in virtue of being 'governed' by a law, the dispute over how to make sense of the notions of guidance and governance from point to point in the manifold dissolves. What makes it the case that we have a particular linking of properties and relations instantiated across a region is simply the existence of the

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fundamental distributional property that, in effect, *is* the pattern. Properties and relations instantiated at later times depend on the properties and relations instantiated at earlier times in virtue of being a more fundamental distributional property that is, in a sense, just that property spread out across the manifold. If this is the case, then the non-local distributional property is what 'guides' the local causal pattern of instantiations across subregions of the whole by being more fundamental than the local causal pattern.

Note that the possibility that properties of the substantial manifold are fundamentally distributional is entirely independent of the facts about entanglement discussed in §1. The properties of the manifold could determine the properties of the individuals or subregions of the manifold even if there is no entanglement and there is no phenomenon of non-separability.

Another way to dissolve the debate is to adopt a bundle-theoretic conception of the world-whole, eliminating substances as the organizing principle from the start. (This, then, involves rejecting the categorical priority of substances by replacing it with the categorical priority of properties, rather than simply taking substances and properties to be categorical equals.) Take the world bundle to be a fusion of (initially) unlocated qualitative universals with spatio-temporal relations. The fusing or bundling together of the universals with the spatio-temporal relations generates a world-whole where the universals F and G are instantiated across the world-region by fusing with spatio-temporal locations defined relationally. This fusion grounds the distributional property of being F at L_1 and G at L_2 and F at L_3 and F and G at L_4, …, etc., which in turn grounds the qualitative links of instantiation across the world-region.

In each case, whether the distributional property is taken as a metaphysically fundamental constituent of the world, or whether it is grounded by fusing together other non-local properties with location properties, we have a candidate for the law that *all Fs are Gs* that avoids any special need to explain how it 'governs' the fact that when we have F at L_1 we have G at L_2. The distributional property guides the pattern of instantiation across locations by being more fundamental than that pattern, and supports counterfactual and causal inferences across times by being the more fundamental thing that simply exists at the different locations. By rejecting the implicit assumption that arranging and generating located substances ontologically determines the pattern of property instantiation, we show

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how insisting that lawfulness must be understood in terms of special connections between localized instances is confused. In essence, without substantial categorical priority, one can defend a new sort of Humeanism over the strong laws theorist—one that endorses fundamental distributional properties of the entire manifold rather than localized instances of properties scattered across subregions of the manifold.[12]

Now, my case for the Humean was made assuming pluralism about spatio-temporal mereology. If we assume pluralism but reject substantial categorical priority, we can defend a distributional Humean version of the laws. But a Humean monist could subvert my arguments. Such a monist could defend substantial categorical priority, taking the fundamental nature of the categorically prior substance (the world-whole) to provide the grounds for the lawful evolution of Reality (and thus to provide the explanation of the lawfulness of the evolution). A monist like Schaffer (2013), who takes the fundamental world-whole to be an intrinsically evolving object, might also argue that we do not need necessary connections to explain the pattern of instantiation, since we already have substantial categorical priority to do the needed work. What explains the pattern of instantiation is the intrinsic evolution of the more fundamental substance, the spatio-temporally extended whole-world, whose nature supports distributional, evolving properties. The internal dynamic substantial character of the world-whole gives us the sense of temporal evolution we get from examining the extent and variation of the world (and presumbly the temporal arrow as well), and thus gives us the ontological ground for our lawlike statements or descriptions of the pattern of instantiation. Here, we have an explicit recognition of the role of substantial categorical priority, and an explicit reason for a monist of a Humean persuasion to endorse it.

III

Categorical Priority III: *Relationalism versus Substantivalism*. A way to characterize spatio-temporal substantivalism is as the view that the spatio-temporal manifold is composed of primitively indi-

[12] Space does not permit me to address the full range of objections to the Humean. In particular, more needs to be said about what distinguishes accidental regularities from laws.

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viduated substantival points.[13] In this version of substantivalism, space-time is a substance that is, in some important sense, ontologically independent of the objects and other entities that occupy it.[14] (This should remind you of Lowe's characterization, quoted above, of substance as something which does not depend on anything else for its existence.) Spatio-temporal relationalists, on the other hand, deny that there is any such independent spatio-temporal entity.

There are complex, interrelated ontological issues in play in the debate between substantivalists and relationalists that need to be carefully separated. In particular, the notion of independence is obscure. It runs together questions about what grounds what, which concern the nature of the fundamental constituents of the space, with the question of how spatio-temporal locations and relations are to be individuated.

I take it that one useful way to distinguish between substantivalism and relationalism is to distinguish between the constituents that are the ground for the rest of the space (Dasgupta 2011). On a standard way of understanding the substantivalist view, the derivative features of the space, including spatio-temporal relations between material objects, are grounded by substantival points. The arrangement of the points provides the space with its overall spatio-temporal structure. Relationalists, on the other hand, deny that space-time is fundamentally pointy. Instead, the space of the world is grounded by relations between material objects.

So the debate is over the ontological character of the space itself: is it grounded by points? Do substantival points provide the structure of the space? Or, as on the relational view, is the space grounded by a network of distance relations and relational properties of existing physical objects, such that there are no substantival points, and the relations and relational properties define what the space is? This is a dispute about whether space is fundamentally substantival-point-like or fundamentally relation-like.

But there is a second question here about independence and ground. The substantivalist usually takes substantival points to be ontologically fundamental, independently existing individuals that are primitively individuated by non-qualitative thisnesses or haec-

[13] I'm assuming a fairly standard version of manifold substantivalism here. Other versions, for instance a monist substantivalism, are certainly possible. One might also be a metric field substantivalist.

[14] See Earman and Norton (1987, p. 521), Sklar (1974, p. 161).

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ceities. But what about the relationalist? Must relations be grounded somehow, for example, by differences between fundamental material objects, as many relationalists would have it? If relations must be grounded by something ontologically more fundamental, then while the substantivalist can hold that substantival points are ontologically fundamental, primitively individuated constituents of the world, and thus that the space is part of the ontological bedrock, relationalists must hold that the space is ontologically derivative, grounded by differences between fundamental material objects.

The question of how to understand the ontological status of relations takes the dispute between substantivalists and relationalists to be focused on the ground of the identity facts of the space, rather than on whether the spatio-temporally fundamental constituents of the space are pointy or relational. The dispute is over individuation: is the individuation of objects and locations grounded by primitive, i.e. haecceitistic, non-qualitative thisnesses of substantival points?[15] In other words, are substantival points haecceitistically individuated entities that ground the overall cardinality and location facts of the space? Or is the individuation of objects ontologically prior to the individuation of locations of the space, as on a relationalist picture that takes the space to be composed of spatio-temporally fundamental relations that are grounded by ontologically prior differences between material objects?

The issues about the nature of the constituents and the issues involving individuation need to be evaluated separately. They are related, but they involve different ontological commitments. One ontological commitment involves the type of spatio-temporally fundamental constituents of the space, namely, points or relations. The other ontological commitment involves the way the constituents of the space are individuated.

There is substantial categorical priority involved with the way the substantivalist handles both of the ontological commitments. If space is substantival, the distribution of the substantival points alone determines the structure and nature of the space. Distributing the points determines the relations of the space and thus its overall structure, which then prepares it for the material objects. So the priority is over relations as well as objects, relations in the first instance and objects in the second. (Compare this to the relationalist picture that

[15] For the standard understanding of haecceitism as primitive thisness, see Adams (1979).

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adds relational structure to material objects to create the space of the world as a whole.) The second aspect of substantial categorical priority is also present, for as I noted above, on many interpretations of substantivalism, primitive differences between the substantival points determine the different locations of the space. In fact, it is just these aspects of the substantial categorical priority of the substantival points that made it attractive to many traditional substantivalists. Relationalists, on the other hand, often reject both features of substantial categorical priority, instead taking a space to be constructed from objects and relations without any substantival points, and holding that locations are determined by a combination of the individuating objects and the qualitative character of the relations, such as *two feet from*, *three feet from*, etc., that obtain between them.

The traditional substantivalist–relationalist dispute is often characterized as a dispute between Newtonians and Leibnizians. A Leibnizian argument on behalf of the relationalist is that a space that is shifted some distance to the right, but in all other respects is indiscernible from the original, should still be the same space. This argument is reflected in the contemporary literature on the ontology of space-time by Earman and Norton (1987), who argue that substantivalists must reject 'Leibniz equivalence', according to which diffeomorphic models of space-time represent the same physical system. The idea is that mere symmetry transformations should not generate ontologically distinct spaces, and so substantivalism is incompatible with the most popular contemporary treatments of space-time.

But the substantivalist who rejects the second element of substantial categorical priority, the commitment to the internal structure that uses primitive individuating differences between point-sized substances as the ground for differences between locations and located objects, can accept Leibniz equivalence. As Baker puts it,

> [M]ost specialists [in contemporary philosophy of physics] are split between two views. Relationalism: There are no spacetime points; spatiotemporal properties are nothing more than (actual and possible) relations between physical objects. (Sophisticated) substantivalism: Spacetime points exist, but there are no primitive facts about their identity across worlds; physical states related by spacetime symmetry transformations describe the same possible world. (Baker forthcoming)

Under a sort of sophisticated substantivalism we can call 'supersophisticated substantivalism', we can keep a version of the first on-

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tological commitment of substantial categorical priority, that space-time is structured by arrangements of fundamental substantival points and contains everything else, but reject the second, that is, reject the thesis that substantival points are primitively individuated locations in the space. Rejecting primitive individuation, on this interpretation, entails rejecting primitive thisnesses and hence primitive transworld identity, so diffeomorphic models can represent the very same space-time after all.[16] Being clear about the different ways one can invoke substantial categorical priority can help the substantivalist respond to the Leibnizian challenge.

IV

Categorical Collapse: Structuralism and Collapsing the Distinction Between Objects and Properties. Recognizing and separating out the ways that substantial categorical priority affects the content of metaphysical views paves the way for new versions of structuralism. One such view could involve states of affairs constructed from substances (thin particulars) and properties, but where the substances are not haecceistically individuated. The view is a natural companion to super-sophisticated substantivalism: it is a structuralist ontology based on rejecting primitive haecceitism, but retaining the idea that substances are part of the fundamental ontology. The idea would be that what defines the fundamental nature of the world is the purely qualitative structure of the world, where 'qualitative' here means something like 'does not involve any particular individual' but does *not* exclude substances like thin particulars, as long as such substances are not assigned haecceitistic 'non-qualitative' characters.

This approach retains categorical structure by allowing for entities from different kinds of fundamental categories to be constituents of basic states of affairs, and thus retains the feature of substantial categorical priority that is employed to provide the sort of external structure we find in the space of the super-sophisticated

[16] Strictly speaking, a sophisticated substantivalist could respond to the Leibnizian challenge merely by going counterpart-theoretic with respect to different possible spaces at different worlds. (I'm indebted to Jonathan Schaffer for this point.) However, as a matter of practice, many sophisticated substantivalists reject haecceitistic thisnesses, since their dislike of haecceitism tends to motivate rejection of primitive identity within a world as well as across possible worlds, so many are, in effect, what I'm calling 'super-sophisticated substantivalists'.

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substantivalist. It rejects the second feature of substantial categorical priority, the feature that assigns non-qualitative individuating features to substances that are the nodes of the structural space.

A related structuralist approach would be to focus on higher-level 'general' facts that are constructed from purely qualitative properties. This view is defended by Dasgupta (2009, 2011), who argues that the fundamental ontology does not include individuals. Rather, it includes purely qualitative general facts that are constructed in part from purely qualitative properties. He takes these purely qualitative general facts to give us the fundamental structure of the world in, again, much the same way as our super-sophisticated substantivalist takes the world to have an overall structure that is not grounded by haecceitistic differences.

But I think we can go even farther. Once we have rejected haecceitism, the neo-Aristotelian distinction between the categories of form and matter no longer has a distinctive role in the fundamental ontology. And so we should simply dispense with it. In other words, we should not just reject the feature of substantial categorical priority that assigns non-qualitative thisnesses to substances. We should reject the substance category itself, for once we reject haecceities, substances aren't doing any work that can't be outsourced.[17] In particular, if we need 'points' of some sort for the external structure of Reality, these points could be fusions of qualitative properties, rather than substances.

So I say we dispense with the category of substance, and with it, substantial categorical priority. I reject the notion that we need more than one ontological category to provide the ontological structure that substantial categorical priority was traditionally invoked to support. In effect, the idea is that the categorical difference between substance and property should be collapsed at the fundamental level, since we can use purely qualitative entities—perhaps relations and fusions of *n*-adic properties—to build the fundamental external and internal structure of Reality.

As Greaves (2011) and Dorato (2008) suggest, collapsing the categorical distinction between substance and property makes the debate between substantivalist and relationalist theories of space-time much less interesting. The traditional debate between substantival-

[17] Sider (2006) and Benovsky (2010) both point out that some versions of substrate–attribute theories and bundle theories can be thought of as mere terminological variants.

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ism and relationalism that involved the nature of the grounding constituents as substantival-point-like or relation-like becomes irrelevant. Moreover, once primitive individuation is rejected, the debate over individuation collapses as well.

For the sort of ontology I want to defend, we simply need some qualitative entities that can provide the fundamental structure, such as relations; that is, we need entities with distinctive qualitative natures such as spatio-temporal relational characters, as well as other sorts of distinctive qualitative natures that can serve as structural 'nodes' and can be arranged into the appropriate patterns.[18] To generate external structure, some of the qualitative entities may endow fusions they belong to with concreteness or location in virtue of including properties of location, and some may endow their fusions with other features. Internal structure comes from qualitative fusion. (For more on this, see Paul 2002, 2006, 2012a.) Collapsing the categorical distinction between substance and property fits with Dasgupta's project, at least in spirit. It is also friendly to yet another one-category approach being developed by Jason Turner (forthcoming), who argues for a fact ontology, where the space of the world is structured by relations between primitive facts. It can also fit with Jessica Wilson's nice arguments for fundamental determinables (2012).

Categorical collapse may also complement an even more radical sort of structuralism, the ontic structuralism of Ladyman (1998) and French and Ladyman (2003): this view is partly motivated by interpretations of indiscernibility in quantum mechanics that suggest that the fundamental nature of the world is purely qualitative. One standard claim of ontic structuralism, intended as a way to capture the purely qualitative character of Reality, is that 'there are no objects'. It is unclear, however, exactly what this claim amounts to. If it means that all that exists are relations, some worry whether having 'relations all the way down' would create a vicious regress. But if it can mean that we collapse the difference between object, property and substance, then collections or fusions of purely qualitative entities can perfectly well serve as non-relational nodes for a relational struc-

[18] Now, some might want to embrace a one-category view but retain primitive individuation. Perhaps they want to reject super-sophisticated substantivalism along with a similarly super-sophisticated relationalism (super-sophisticated relationalism would not primitively individuate relations, just as in the traditional version, and would dispense with building relations from primitively individuated objects). Fine. But we still don't have to classify these non-qualitative entities as *objects* or *substances*. What matters is that they are *non-qualitative*.

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ture that fits the empirical constraints of the ontic structuralist.

Thus collapsing the categorical distinction between substance and property is the next step for a 'super-sophisticated' structuralism, one which connects with ontic structuralism but avoids the metaphysical pseudo-problem with 'relations all the way down'. Collapsing the distinction also eliminates the question of whether relations must be ontologically derivative, grounded by differences between more fundamental objects, reducing it to the question of whether the fundamental ontological constituents of the world are purely qualitative, and allowing for primitively irreflexive relations of 'weak discernibility' that can serve as the ground for distinctions between entities like fermions.

So I suggest we leave Aristotle behind. We should collapse the distinction between substance and property and free ourselves from outmoded Aristotelian constraints in order to pursue an ontology that is simpler and fits better with contemporary physics (Baker 2009; Healey 2007). It's the modern way to go.[19]

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