Abstract In recent years, a hierarchical view of reality has become extremely influential. In order to understand the world as a whole, on this view, we need to understand the nature of the fundamental constituents of the world. We also need to understand the relations that build the world up from these fundamental constituents. Building pluralism is the view that there are at least two equally fundamental relations that together build the world. It has been widely, though tacitly, assumed in a variety of important metaphysical debates. However, my primary aim in this paper is to argue that this has been a mistake. I will show that serious problems concerning the relationship between building and fundamentality afflict pluralism and are likely fatal to it. I claim that, for better or worse, our best hope is building singularism, the view that there is a single most fundamental building relation. I conclude by examining the advantage that singularist accounts enjoy over their pluralist rivals.

Keywords Ontological dependence · Fundamentality · Grounding · Metaphysical foundationalism
1 Introduction

In a range of recent work in metaphysics, a hierarchical view of reality is assumed. On this now familiar picture, the world is thought to have a rich ontological structure: bits of the world are stratified into levels of reality and ordered by relations of ontological dependence. Some of the world’s objects, properties, and relations are more fundamental than others, so that what is less fundamental depends for its existence on what is more fundamental. While this sort of comparative fundamentality might sound mysterious, there is no mystery on the hierarchical view. Rather, comparative fundamentality is plausibly nothing over and above the world’s pattern of ontological dependence so that what is more and less fundamental is fully determined by the dependence structure of the world.

According to the hierarchical view, understanding the world as a whole requires that we understand the world’s most fundamental constituents: we must understand what, if anything, is at the bottom of the hierarchy and so is absolutely fundamental. We must also understand the network of relations by which more fundamental constituents give rise to less fundamental ones. Following Bennett’s (2011a) picturesque usage, I’ll call these relations building relations for the role that they play in building the less fundamental from the more fundamental.

Given its widespread defense, I will assume the hierarchical view for the purposes of this paper in order to understand the way in which ontological structure is supposed to behave by its lights and, in particular, how the building relations that impose ontological structure fit in. It is not enough just to know what these relations are. We also need to understand how they are related to one another and especially how relations of ontological dependence are themselves related fundamentality-wise.

In what follows, I argue that the hierarchical view has a surprising and before-now unrecognized implication: it strongly supports what I will call building

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2 This Humean account of fundamentality is made especially clear in Bennett Unpublished. I take it, though, that this account is closely related to the traditional understanding of what it means to be fundamental, on which absolute fundamentality is understood in terms of independence. This view can also be found in e.g. Paul (2012), and Cameron (2008). However, it is importantly distinct from the account employed by Schaffer (2010a).

3 Building relations seem to share a common set of core features: they are relations of directed dependence whose relata always differ from each other with respect to fundamentality. There is a substantial amount of diversity beyond this core. Some building relations unify, for example, while others are determinative. (For more on this see Bennett 2011a).

4 It is worth emphasizing that the hierarchical view has its critics (see note 1 for examples). Also, though not my target here, it seems to me that my argument can be modified to impact priority monists like Schaffer (2009) as well. This is because, on Schaffer’s view, there is a priority hierarchy beginning at the cosmos, which is ultimately prior. Dependent, and so less fundamental, entities are produced by way of abstraction or un-building. As a result, the hierarchy posited by the monist is importantly similar to the one that the pluralist is committed to.
singularism and makes serious trouble for what I call building pluralism. Building singularism is the view that there is exactly one most fundamental building relation; building pluralism is the view that there are at least two. Pluralism has been widely, if unreflectively advocated in the literature on fundamental ontology while singularism has been largely ignored.\(^5\) On the face of it, after all, there are many familiar ways in which less fundamental entities are built from more fundamental ones: wholes are composed of their parts, statues are constituted by their material bases, and properties are realized or microbased in other properties (see Bennett 2011a for additional details and examples).

Despite its apparent plausibility, I argue that a pluralistic version of the hierarchical view (one in which more than one fundamental building relation orders the hierarchy) is afflicted with serious problems involving the relationship between ontological dependence and fundamentality. These problems strongly indicate that pluralism is not up to the task of building the non-fundamental constituents of the world. Though building singularism may initially seem implausible, it is immune from the problems that threaten pluralism.

Our best hope for developing the hierarchical view, and so understanding the world as a whole, lies in developing a singularist account. A pessimistic lesson might be drawn from this: that if singularism is its best hope, then the hierarchical view has a serious, perhaps fatal vice and its prospects are dim as a result. However, I think that this is much too quick. A more optimistic alternative deserves our consideration and, in Sects. 5 and 6, I will evaluate the prospects for a singularist version of the hierarchical view by presenting a first approximation of such a view in terms of grounding. I argue that singularism is more attractive than it seems and that grounding singularism provides an independent argument for the unity of grounding relations, and so for the theoretical usefulness of ground.

Before turning to the argument concerning building and fundamentality, it should be emphasized that the question of how building relations are related by fundamentality is an important subset of a larger question concerning the ways in which these building relations are related in general. Failure to account for the relationships between ways of building (relations fundamentality-wise being among them) prevents us from giving a good analysis of particular building relations and leaves open pressing questions about what is required for building to occur. As a result, the question of how building relations are related fundamentality-wise extends beyond fundamental metaphysics and should be of interest to anyone concerned with the analysis of particular building relations, like material composition and property realization.

\(^5\) Though its endorsement is largely implicit, building pluralism dominates overwhelmingly in the literature. This is seen most clearly in the willingness of many to treat only parts of the building structure while ignoring others. This is done most commonly by restricting the domain under consideration. For example, Schaffer’s (2009) discussion of the building hierarchy is restricted only to actually existing concrete objects while Kim’s (1997, 1998), 80–87; (2003, 2005), 57–60 discussions of microbasing are restricted only to properties. This is so even though both Kim and Schaffer endorse the existence of both properties and objects. See Bennett (2011a) for a more detailed discussion of this point.
An excellent example illustrating this can be found in the debate concerning physicalism in the philosophy of mind. While it appears that many of the properties we regularly encounter are non-physical, physicalism entails that all of these are constitutively determined by physical properties or states of affairs. This seems often to be the case even if physicalism is false. The relation of constitutive determination that holds between properties is often called realization or microbasing. Though the details of this relation (or these relations) have been highly controversial, it is enough for us to speak loosely and so to say only that a realized property is constitutively determined by its realizer so that there is a sense in which the occurrence of what is realized is nothing over and above the occurrence of its realizer.

In order to make sense of physicalism, it must be the case that properties of micro-level entities can realize properties of macro-level ones: that realization can operate across levels and so is sometimes dimensioned rather than flat (Shoemaker 2007). This kind of cross-level realization, which I will call microbasing, is one in which a micro-level state of affairs realizes a macro-level property. The hardness of a diamond, for example, seems to be realized by properties and relations had by the carbon atoms that compose it (rather than another property of the diamond or properties of just any collection of carbon atoms). In order to be sufficient for the occurrence of the macro-property being microbased, the micro-level base always includes micro-entities that are parts of the object that instantiates the property and may even include the ways in which these entities are propertied and related to other micro-entities (Gillett 2002).

Microbasing has explicit mereological conditions and irreducibly involves states of affairs and the objects that constitute them. In order for two properties to be related by microbasing, the objects that instantiate them must stand in a part/whole relationship. As a result, a complete account of microbasing will involve an account of its relationship to composition: what it takes for a property to microbase another property is partly mereological. An account of microbasing ought to reflect this and so cannot be given if the relationship between microbasing and composition is ignored. How does the mereological order of parts and wholes relate to the order imposed by realization? Understanding the relationships at issue in this debate and many others involves understanding the ways in which what is more fundamental is related to what is less fundamental.

2 Building and fundamentality

It is a core feature of building relations that their relata differ in fundamentality. This is what allows building relations like composition and microbasing to generate what is less fundamental from what is more fundamental. So, an adequate account of the structure that building relations impose must also account for the hierarchy of comparative fundamentality that comes along with it. On the other hand, it is a
tenant of the hierarchical view I assume that the fundamentality structure of the world is nothing over and above the world’s pattern of ontological dependence.\(^6\)

In light of these two commitments I suggest that the most charitable way of understanding the hierarchical view entails that the connection between building and fundamentality is a circular one so that it will not due to give a reductive analysis of one in terms of the other. Instead, both building and fundamentality can be unpacked and illuminated in terms of the other.\(^7\) In this section, I will offer an account of absolute and then comparative fundamentality on behalf of the hierarchical view according to which the fundamentality structure of the world can be read off of its network of building relations. My aim here is to unpack and illuminate (but not to reduce) fundamentality in terms of building.

I will start with absolute (rather than comparative) fundamentality with the aim of understanding comparative fundamentality in terms of its absolute cousin. Something is absolutely fundamental, in the unrestricted sense at issue here, if it is absolutely independent and unbuilt. In other words, there is no building relation such that for some x, x builds the fundamental entity y. What is absolutely fundamental serves as the ontological foundation for the world: it is that which is ultimately prior and in which everything else consists.\(^8\)

It is possible, of course, to adopt a weaker, less-than-absolute version of independence. For example, we might concern ourselves with composition-independence where something is composition-independent just in case it is not built by way of composition. Relative notions of independence like this one are often interesting; we might be interested in mereological simples for example. However, it seems to me that the only independence of interest in fundamental ontology is the strongest one. Only this sense reflects the idea that what is

\(^6\) The hierarchical view I am concerned with here rejects the analysis of absolute fundamentality in terms of perfect naturalness, advocated by Sider (2012) and prefigured by David Lewis. Though I think that naturalness has a significant role to play in ontology, it seems to me that independence is far better suited to account for fundamentality. See Bennett’s forthcoming manuscript for detailed discussion.

\(^7\) As Shoemaker claims in another context, “it is perfectly possible for a ‘circular’ analysis to illuminate a network of internal relationships and have philosophically interesting consequences” (2003, 222).

\(^8\) It might be objected that this way of understanding absolute fundamentality will, on some accounts of them, render entire classes of entities necessarily derivative. If facts ontologically depend on their constituents or if properties ontologically depend on their bearers, for example, then no fact or property can be fundamental. Though it is perhaps surprising, I am willing to accept this implication because I am inclined to deny that there can be entities that are both ontologically fundamental and ontologically dependent. The reader need not agree. However, it is important to note that the fact that some things are necessarily derivative seems to fall out of the hierarchical view itself, which I have assumed here for the sake of argument. It does not result, for example, from the account of absolute fundamentality that I have offered or the ranking procedure that I will soon propose. A central tenant of the hierarchical view is the claim that the fundamentality structure of the world is nothing over and above the world’s pattern of ontological dependence. I fail to see how proponents of this view can count some ontologically dependent entities, like elite properties and facts, as fundamental while counting other ontologically dependent entities as derivative, all while restricting themselves to the resources provided by ontological dependence. There seems to be nothing special about the way in which elite properties and facts depend on other entities and it is impermissible, for example, for a proponent of the hierarchical view to make fundamentality ascriptions rest in part on ontological categories. The categorial structure of the world is distinct from its dependence structure. Thanks to an astute reviewer at Philosophical Studies for pressing this objection.
fundamental is that which is ultimately prior and in which everything else consists. So, only it plays a role in the way in which the non-fundamental is build from the fundamental.

Understanding absolute fundamentality in terms of absolute independence leads to a natural understanding of comparative fundamentality in terms of relative dependence and independence. The intuitive idea is that what is more fundamental is more independent than what is less fundamental. However, unlike absolute fundamentality, we cannot give a straightforward account of comparative fundamentality in terms of building.

Though what is built is less fundamental than the material from which it is built, entities need not be related by building in order to be related by comparative fundamentality. While it seems true, for example, that my desk is less fundamental than the carbon atoms that compose it, it seems equally true that my desk is less fundamental than any carbon atom, even those that do not serve as its proper parts. This brings out an important feature shared by hierarchies of comparative fundamentality: though they are determined by the priority orderings that building relations impose, hierarchies of comparative fundamentality cut across these orderings and so sometimes relate entities that are members of different building chains.

In order to make good on our promise to read fundamentality off of building, we need a way of understanding comparative fundamentality that cuts across different hierarchies of building and so allows us to combine the orderings imposed by the building relations into a hierarchy of comparative fundamentality. What follows is a model of comparative fundamentality that makes more precise our intuition that it is a matter of relative independence while also reflecting the aggregative nature of comparative fundamentality.

With the aim of constructing such a model, let’s begin by assuming that building is well-ordered (though see note 10). The well-ordering assumption involves the claim that building relations are relations of directed dependence. They are irreflexive, asymmetric, and transitive and so impose a strict partial ordering on the entities that are related by them.9 It follows from this that what is absolutely fundamental forms a unique, minimally complete set: it and no other set (including its subsets) contains all and only the material required to build the world. This corresponds to the powerful intuition that what is absolutely fundamental forms a kind of complete blueprint of reality.

Second, for the sake of simplicity let’s assume that the relata of building relations, all of the constituents of the world, are capable of forming ordered sets. These sets have as members pairs of entities or collections of entities that are potential relata of a building relation and also have at least one building relation that imposes an ordering on the pairs, much like the ‘greater than’ relation imposes an ordering on pairs of natural numbers.10

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9 For discussion of this assumption, see Dixon Forthcoming, Raven (2013), Litland (2013), and Jenkins (2011).

10 Reasons why the constituents of world might not form a set include the worry that the number of the constituents of world might exceed the cardinality of the ordinal numbers. In this case, we might replace ordered sets with ordered classes in our discussion.
Finally, for the sake of simplicity let’s assume that there are at least some absolutely fundamental entities. This means that there are some entities that are not built but are capable of building less fundamental entities and so serve as the base of building hierarchies. In other words, each nonempty subset of the set $W$ of all the entities in the world, ordered by one or more two-place building relations $R$ (or the $R$’s), has an R-lease element (Schroder 2003, 29). This amounts to the controversial assumption that metaphysical foundationalism is true.

It is important to note that, though each of these assumptions is well represented by proponents of the hierarchical view, each might reasonably be denied. Of the three assumptions that I have made, only the well-ordering assumption is critical. Those who wish to deny well-ordering cannot make use of the model I will suggest. However, the set membership assumption and metaphysical foundationalism are each assumed for simplicity and so can be denied in exchange for additional complexity in the model (See notes 10 and 12).

3 Building and comparative fundamentality

By making use of the well-ordering assumption, there is a convenient way of making more precise the natural suggestion that comparative fundamentality ought to be understood in terms of degrees of independence. I suggest that we model degrees of comparative fundamentality in terms of rank, where the rank of an entity is a formal property that it has in virtue of its position in an ordered set. The idea here is that ranks in suitably chosen ordered sets are structurally isomorphic to degrees of comparative fundamentality and so serve as useful and precise models of their structure. We are interested here in the ranks of members of the ordered sets of entities related by particular building relations like composition or microbasing.

We can define the rank of an element using a recursive procedure on our set $W$ (for world), which has as its members all the objects, properties, and relations (etc.) in the world. Something is a minimal element of $W$ if and only if, for all members of $W$ that are related by building to $p$, $p$ is prior to them in the sense that, when $p$ is involved in an instance of a building relation, it is always as the left hand relatum and never as the right hand one. In other words whenever $p$ is related by building, it is always (at least part of) that from which something else is built and is never built from something else. If $p$ is a minimal element of $W$, then assign it the rank of 0. Any $p$ with a rank of 0 is absolutely fundamental: it is not constructed and is among that from which all other things are built.

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11 Suppose that the well-ordering assumption is denied. Then building relations cannot form ordered sets and so their behavior seems not to be approximated by the model that I will propose. Suppose, however, that we instead reject the set membership assumption or metaphysical foundationalism. Rejecting either of these simplifying assumptions is not enough to suggest that my model fails to approximate the building hierarchy. We can abandon either (or both) of these assumptions in exchange for a more complex model in terms of ordered classes and, as I describe in footnote 11, idealized foundations.
Now, suppose that, for some ordinal number \( n \), the elements that have been assigned ranks that are less than \( n \) have already been determined.\(^\text{12}\) We assign rank \( n \) to \( p \) just in case \( p \) is a minimal element of the set \( R \) (for remainder), which has as its members all and only those members of \( W \) whose rank has not yet been assigned. In other words, if \( p \) is minimal with regard to the ordered set of members of \( W \) whose rank has not yet been settled by step \( n \), then the rank of \( p \) is \( n \). Using this recursive procedure, we can assign ranks to every element of \( W \) (Jech 2006, 25).\(^\text{13}\)

I have offered an account of \textit{un-relativized} comparative fundamentality. But much as it is possible to adopt a weaker sense of absolute fundamentality, it is possible to adopt a weaker sense of comparative fundamentality in which degrees of independence are relativized to different ways of building. Indeed, adopting a relativized notion of comparative fundamentality is a tempting (though I think flawed) strategy for resisting my argument against pluralism below. Though a relativized sense of comparative fundamentality may be useful, for example it may be useful to talk about various degrees of composition-independence, I don’t think that relativized senses are useful for fundamental ontology. In the remainder of this section, I’ll defend my model by showing that comparative fundamentality ought to impose a total ordering: any two entities are related by comparative fundamentality.

It is worth noting, in the meantime, that there is something unprincipled about adopting an unrestricted sense of absolute fundamentality and yet adopting a relativized sense of comparative fundamentality. After all, comparative fundamentality was defined in terms of absolute fundamentality. Because only the unrestricted sense of absolute fundamentality seems adequate for fundamental ontology, this is a strike against the relativized sense of comparative fundamentality. By employing one sense of independence for absolute fundamentality and another sense for comparative fundamentality, I think we would also ignore the important relationship between them had in virtue of a shared sense of independence. This is particularly worrying because it will always be possible to give an unrestricted sense of comparative fundamentality if there are defined restricted senses.

\(^{12}\) I am here assuming that there are no more degrees of comparative fundamentality than there are ordinal numbers. Perhaps this is controversial as well, but consider the alternative according to which chains of ontological dependence are continuous and dense. This would mean that between e.g. any whole and any collection of its parts, there are always more parts to be found so to speak between them. I see no reason to suspect that reality is dense in this way. Rather, this possibility seems to have the status of a skeptical hypothesis: it can’t be ruled out given our evidence but entails that we are vastly mistaken about the number of objects, including ordinary material objects like table legs and table tops, that there are in the world.

\(^{13}\) Suppose that metaphysical foundationalism is false so that metaphysical infinitism is true. Then there are in fact no minimal elements in \( W \) so that our recursive procedure fails to get off the ground. We need not reject the model I have proposed, however. We need only change the initial step so as to define an \textit{idealized} set of minimal elements by hand. Begin by arbitrarily (but strategically) choosing a collection of elements and assigning their ranks to 0. We might, for example, set the atoms and atomic properties like atomic weight or nuclear charge as fundamental. The model then proceeds as recommended, generating a structure of comparative fundamentality that approximates the actual one. Approximations of the comparative fundamentality ordering are better insofar as our arbitrarily chosen minimal elements are in fact more fundamental. For example, a choice of subatomic particles and their properties will yield better results than our choice of atoms and their properties. Though approximations can always be better, a perfect approximation is not possible because there is no absolutely fundamental level.
It is even more worrying that a relative sense of comparative fundamentality would threaten to make a mystery of the relationships between things that are built in different ways. For example, if we were to adopt one sense of comparative fundamentality relativized to composition and a second sense relativized to microbasing, we would have no way of making sense of the relationship between entities that are related either by microbasing or composition. The carbon atoms that compose a diamond do not compose the hardness of the diamond and they do not microbase it either. Yet, it is crucial to understand the relationship between these entities. As I argued above, to fail to do so is to fail to adequately account for microbasing: part of what is required for one property to microbase another is mereological. Relativized accounts of comparative fundamentality threaten to make building relations incommensurable fundamentality-wise and this would jeopardize the possibility of particular accounts of particular building relations.

In spite of this, it might seem to be the case that some things are building isolated in the sense that they are never related by a building relation. The number 7 and a peanut butter sandwich might be an example of two things that are isolated in this way and these entities might, as a result, seem incommensurable fundamentality-wise (cf. Bennett Unpublished). However, if comparative fundamentality is un-relativized and is understood in terms of degrees of independence, then this is not possible as long as there is, in principle, a fact of the matter about how each of these is built. The number 7 and the peanut butter sandwich need not be building related in order to have commensurable degrees of fundamentality modeled by ranks.

As a result, comparative fundamentality imposes a total order on entities in the world: any two entities will be comparable fundamentality-wise. It seems to me that this is as it should be. If comparative fundamentality is understood in terms of degrees of independence, it is hard to understand how two things could be incommensurable as long as an account of the way that they are built is, in principle, available.

In addition to its intuitive force, the total ordering imposed by comparative fundamentality brings along with it a theoretical payoff by making possible an account of ontological levels. Entities occupy the same ontological level if they are equally fundamental and so have the same degree of independence. Ontological levels are very useful in articulating views like physicalism, where mental and physical properties occupy different levels, and in articulating the distinction between micro and macro entities. However, it has proven difficult to account for ontological levels in a way that is free of their problematic characterization in terms of levels of explanation (cf. Oppenheim and Putnam 1958). By understanding ontological levels as levels of comparative fundamentality, we can make use of it independently of this problematic characterization.

4 What is the problem with pluralism?

My proposed model in place, we now have the resources to articulate the problem with pluralism about building relations, the view according to which there are at least two most fundamental building relations. In order to articulate the problem,
let’s consider the simplest form of pluralism in which there are exactly two most fundamental building relations. The problem for pluralism takes the form of a dilemma. Either the relata of these building relations overlap or they are entirely disjoint. I will argue that, if they overlap, then degrees of comparative fundamentality can be assigned twice and need not agree. The result is that the same entity may be located at different ontological levels and so, per impossible, be more fundamental than itself. If the relata are disjoint, I will argue that counterintuitive assignments can be given for *ontologically connected* entities. Because both ways of being a pluralist admit of problematic assignments of comparative fundamentality, it seems to me that the prospects for pluralism are not promising and so pluralism ought to be abandoned.

### 4.1 Overlapping building relations

Suppose that the relata of our two most fundamental building relations overlap. In this case, there are some constituents of the world that are built by both relations. The problem here is that there is nothing about pluralism that prevents an entity like this from being placed on two different ontological levels. Degrees of comparative fundamentality, modeled as we have in terms of the rank of a constituent, are a function of position in a particular building hierarchy. Because there are no resources available to prevent an entity from occupying one position in the hierarchy structured by the first building relation and another position in the hierarchy structured by the second, there are no resources available to prevent this entity from being assigned two different ranks and so two different degrees of comparative fundamentality. This assignment of comparative fundamentality is an impossible one, nothing is more fundamental than itself, and yet is allowed by pluralism.

In order to see this more clearly, consider a pluralist account in which both composition and constitution are most fundamental. Now, consider the part of the world that contains Statue and Clay. What is important about Statue and Clay, for our purposes, is that Clay features in two building hierarchies. In the first hierarchy, in which elements are related as parts and wholes by material composition, Clay is at the top of a long hierarchy of parts: it is composed of molecules, which are composed of atoms, which are composed of protons, neutrons and electrons, and so on. In the second hierarchy, in which elements are related by constitution, Clay would see to be located at the bottom of a very short hierarchy of constituents: Clay constitutes Statue and there is nothing that constitutes Clay.

Consider how the assignment of rank would go in this case. With regard to the hierarchy ordered by material composition, Clay is far from minimal. Though we have no way of knowing exactly what Clay’s rank is in this hierarchy, we can be sure that it is large. However, the rank that Clay is assigned with regard to the hierarchy ordered by constitution described about would seem to be very low. In virtue of its location at the bottom of this hierarchy, Clay should receive a rank of 0 and so be absolutely fundamental.
Recall that modeling comparative fundamentality in terms of rank was useful because it allowed us to make comparisons of fundamentality across hierarchies, making good on the intuition that a carbon atom in Antarctica is more fundamental than a table in North America. Because Clay receives two different ranks on the pluralist account, it occupies two different levels of reality: it is both more and less fundamental than itself. Though this is impossible, it is allowed by pluralism. In order to escape this problem, pluralist accounts must ensure that there are never cases in which two fundamental building relations disagree with regard to their ranking assignments and so with their assignments of comparative fundamentality. I don’t see how this can be done.\textsuperscript{14}

Of course, it is open to the pluralist to reject the ranking model of comparative fundamentality that I have suggested. However, in doing so she shoulders the burden of showing that comparative fundamentality has some feature, left out by the model, that allows it to avoid problematic assignments. I am, again, not sure what this feature would be. Worse, if she is to retain the Humean view according to which fundamentality is nothing over and above the pattern of building relations then the pluralist must confine herself to the thin resources provided by the world’s building structure when making her response.

4.2 Discrete building relations

According to the first horn of the dilemma, pluralism admits of impossible assignments of comparative fundamentality. In the face of what appears to be an insurmountable problem, the second horn might seem considerably more promising. On this horn, our two most fundamental building relations relate wholly discrete parts of the world. For example, we might have one building relation that takes as its relata only objects and another that takes only properties. Because there are no entities that are related by both building relations, there are no entities that are given conflicting assignments of comparative fundamentality.

However discrete pluralism is no safe harbor either. Given what was argued above about interrelations between ways of building, like microbasing and composition, it might not even be possible to give an extensionally adequate but discrete pluralist account. Different ways of building are inextricably related so that what is required to microbase a property, for example, seems to be partly mereological. A complete understanding of microbasing requires an understanding of its relationship to composition.

\textsuperscript{14} Looking forward to Sect. 5, it might be worried that this strategy can be turned against the singularist as well. However, if singularism is true then there is a single most fundamental building relation, R, such that the ordering imposed by R is the only ordering that determines assignments of comparative fundamentality. In order to turn this strategy against the singularist, it must be shown that R itself provides contradictory assignments. However, because R is irreflexive and asymmetric by hypothesis, nothing can be R-related to itself and so no such assignments are possible. Importantly, it is not enough for non-fundamental building relations, like those that give rise to the problem for pluralism, to generate orderings in which the same entity appears and is ranked twice. See Sect. 6 for more discussion of this point.
Another problem emerges for discrete accounts. I’ll show that there is nothing to prevent those objects, properties, and relations etc. that are related exclusively by one building relation from involving or being ontologically connected to those constituents that are related exclusively by the other building relation. In these cases, I will argue that pluralism admits very counterintuitive assignments. All that is required, to support my case against it, is that these counterintuitive assignments be possible by pluralist lights. However, I think that it is very likely, particularly if property and object are fundamental categories, that there are many cases in which these problematic assignments are actually made by the pluralist account.

This is because many properties seem to be ontologically connected to objects. Consider, for example, the object *Photon* and the property *being disposed to emit a photon under conditions C*, or the object *Street sign* and the property *being a green street sign*. The problem here is that there is nothing about pluralism that prevents properties that involve objects, like *being disposed to emit a photon under conditions C*, from being classed as more fundamental than the objects that they involve. Intuitively, this is not the case: properties cannot be more fundamental than the objects that they involve. However, the problem is not that pluralist theories sometimes conflict with our intuitions. Intuitions are revisable in light of suitably compelling theoretical reasons. The problem is that counterintuitive assignments are admitted for the wrong reasons. They are a result of abstract structural features shared by all pluralist accounts and have nothing to do with these properties or objects at all. This should not be the case.

In order to make this rather abstract discussion more clear, let’s consider a case in which composition and microbasing are the most fundamental building relations and consider the part of the world that includes a diamond, a piece of glass, and the diamond’s power to scratch glass. Two things are important about this case. First, the property under consideration involves objects. Second, it seems that there are fewer properties in the hierarchy ordered by microbased determinism than there are objects in the hierarchy ordered by material composition.

To simplify, let’s begin our discussion on the atomic level and assume that there are no problems before then. Let’s also idealize away whatever impact on comparative fundamentality might be made by relationships between building relations. Now consider the hierarchy, ordered by material composition, whose highest ranked constituent is the diamond. Because diamonds have complex internal structures, it would seem that the hierarchy of parts and wholes from which the diamond is built is quite long. At the atomic level, the diamond is composed of carbon atoms, which are parts of highly regular short-range structures taking the form of diamond cubics (roughly cube shaped). Each of these cubics serves as a part of a larger cubic that, in turn, serves as a part of an even larger cubic. This chain of parts and wholes terminates with the diamond.

A similar observation can be made about the glass. As an amorphous solid rather than a crystalline one, the glass has less mereological structure than the diamond. However, it too would seem to be at the top of an extensive hierarchy of parts and wholes. For example, the soda glass found in familiar things like windowpanes and glass bottles is composed mostly of silicon dioxide, sodium carbonate, and aluminum oxide. Beginning again at the atomic level, this glass is composed of
silicon, oxygen, sodium, carbon, and aluminum. Some of these atoms are parts of compounds like carbonic acid that, along with some atomic constituents, are parts of larger compounds like silicon dioxide, sodium carbonate, and aluminum oxide. Because glass is an amorphous solid, it does not have the long-range crystalline structure of the diamond. However, it does have short and intermediate-range structure. Silicon dioxide, for example, behaves in a regular way as a result of its tetrahedral shape. These tetrahedra serve as parts of rings that, in term, generate intermediate-range networks of ring structures. This chain of parts and wholes terminates with the glass.

Let’s turn now to the hierarchy, ordered by microbased determination, whose highest ranked constituent is the power to scratch glass. Chemistry and physics give a detailed account of how the hardness of the diamond results from the properties and relations of individual carbon atoms. Individual carbon atoms have characteristic bonding and alignment properties that orient them in such a way as to form diamond cubics. As a result of having these bonding and alignment properties, “individual atoms have the characteristic power of causing other atoms to remain in a relatively constrained location even under high temperatures and forces” (Gillett 2002). Because it is difficult to change the relative positions of these atoms, the diamond is extremely hard and so has the power to scratch glass.

Thus, the power to scratch glass is microbased in the hardness of the diamond. The hardness property instantiated in the diamond is, in turn, microbased in the power of individual carbon atoms to constrain their neighbors. Finally, this power of individual carbon atoms is microbased in the bonding and alignment properties of individual atoms. It would seem that the building relation hierarchy that terminates in the power of the diamond to scratch glass is quite short. It is build by way of a chain containing only 4 members once we have agreed to ignore any structure below the atomic level.

This substantial difference in length between the building hierarchy terminating in the diamond’s power to scratch glass and the building hierarchy terminating in the glass produces a troubling result. To see this, consider how the assignment of comparative fundamentality would go in this case. Treating the atomic constituents as minimal in the way that we have stipulated, the property of being disposed to scratch glass is assigned a rank of 3 as a result of its position in the hierarchy ordered by microbased determinism. Because of this, the scratch property would seem to be very fundamental. However, the piece of glass is far from minimal with regard to the hierarchy ordered by material composition. Above, I described 5 layers of constituents populating the building chain that terminates in the glass. While this is likely to be a conservative estimate, it is sufficient for us to assign glass a rank of at least 4.

Because the property of being disposed to scratch glass has a rank of 3 and glass has a rank of at least 4, the property of being disposed to scratch glass is more fundamental than glass itself. This assignment is counterintuitive. It is natural to think that glass is at least as fundamental as the power to scratch glass. Yet,
assignments like this seem unavoidable given the structure of the pluralist account.\textsuperscript{15}

Though it appeared highly plausible at the outset, pluralism about building has unpalatable consequences. Any form of pluralism admits the possibility of problematic assignments in virtue of the common structure shared by all pluralist accounts. Thus, the plausibility of pluralist accounts in general is severely damaged. While singularist accounts appeared to be implausible at the outset, they do not admit of these counterintuitive assignments. In light of the problems afflicting pluralism, it seems that pluralist accounts of the fundamental building hierarchy ought to be laid aside in favor of singularist accounts.

5 A plausible singularism?

Though singularism does not fall prey to the problems afflicting pluralism, it remains to be seen that it is capable of doing the job that pluralism cannot. I will use this section to describe a first approximation of a plausible singularist account of the building relations. Though it is only a first approximation, I think that it is sufficient to illustrate the potential had by singularism as well as some of the advantages over pluralism that singularism enjoys.

According to singularism, there is exactly one most fundamental building relation, which I will, for now, call R. At the core of a plausible singularist account is a characterization of R and a description of the way in which R is related to less fundamental building relations. Though we ought not expect an analysis of R to be forthcoming, we can characterize the features of R taking a suggestion from Bennett (2011a): that R’s features are just those that make up the core notion of building. R is a relation of directed dependence whose relata differ in comparative fundamentality. Rather than thinking that these properties characterize a class or a family of different relations, it is natural for the singularist to claim that they characterize the most fundamental building relation. Non-fundamental building relations share core features in virtue of their relationship to R.

Much more difficult, I think, is accounting for the relationship that R has to the non-fundamental building relations. Although the singularist has several options here, perhaps the most attractive is the view that R is a highly abstract determinable. If this is the case, then less fundamental building relations are determinates of R in the same way that \textit{being square} and \textit{being circular} are determinates of \textit{being shaped}. I find this view attractive because it preserves the distinctive features of non-fundamental building relations while tightly relating them to R. Though \textit{being square} and \textit{being circular} are intimately related to \textit{being shaped}, each has importantly different properties. Non-fundamental building relations are not

\textsuperscript{15} Importantly, the pluralist cannot avoid this issue by offering a re-description of the case that refers to the power to scratch glass in a way that avoids mention of glass. Though such a re-description might be necessarily coextensive with the one that I have given, the relationships at issue here are hyperintentional. As a result, any such re-description, even a necessarily coextensive one, refers to a relationship that is distinct from that of the original case. I owe this point to a helpful reviewer from Philosophical Studies.
reducible to R on this view and, because R is not identical to a disjunction of its determinates, R is distinct from them. Finally, the familiar ways in which building relations differ seem to provide well-defined dimensions of determination along which non-fundamental building relations are differentiated. For example, some building relations are determinative while others unify.

It is often assumed that determinables are always less fundamental than their determinants. Gideon Rosen, for example, argues for the Determinate-Determinable Link: that the having of a determinable property is always grounded in the having of a determinate one (2010). If this is the case, then the particular singularist view that I have proposed is a non-starter. Notice, though, that this would not pose a significant threat to singularism more generally: a wide variety of alternative formulations remain available.

However, it seems to me that it is not the case that determinables are always more fundamental than their determinates, though they may sometimes be. A case against this claim, briefly outlined, can be made on three different fronts. One kind of consideration against this claim comes from our best scientific theories. It is plausible that the sciences are especially well suited to provide information about the way things are built and so about what is more fundamental than what. However, lower level physical phenomena and fundamental physical laws often involve determinable properties rather than their determinates (Wilson 2010). A second kind of consideration comes from naturalness. Determinable properties perform many of the theoretical roles set aside for perfectly natural properties, while these roles cannot be played by their determinates (Hawthorne 2006). So, naturalness might be applied in the first instance to determinables rather than determinates (Denby 2001, 300). While fundamentality does not consist in perfect naturalness, there is an intuitive connection between them so that perfectly natural properties are plausibly more fundamental than comparatively unnatural ones. For this reason, determinables are sometimes more fundamental than determinates.

Finally, determinable properties seem sometimes to be explanatorily prior to their determinates. Determinables can explain systematic connections among properties, like why some properties exclude or include others, while fundamental determinate properties cannot (Denby 2001). In addition, I argue elsewhere that the having of a determinable property can directly explain the having of a determinate property by way of a metaphysical explanation by constraint [Omitted for Blind Review]. These explanatory considerations suggest an asymmetry of dependence.

In light of these considerations, there is a strong case to be made according to which some determinables are more fundamental than their determinates. Like mass and energy, I think that R is one of these. R is unlike many determinables, which appear to be badly gerrymandered, in that it is characterized by a unified core of properties. In addition, R’s properties are distinct from the properties of its determinates and so R seems to be a genuine property above and beyond them.

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16 However, other roles characteristic of natural properties are better performed by determinables so that the argument from naturalness is inconclusive on its own (Hawthorne 2006).
Given this brief characterization, it seems to me that there is already a primitive relation in our ontology that is capable of playing the role that I have outlined for R. I have in mind here the grounding relation understood in the Schafferian way, as a relation of metaphysical priority that can hold between entities of any ontological category (cf. Schaffer 2009).17 If so, the singularist need not posit a novel primitive, instead she can make use of a familiar one that already enjoys independent support. Understood in this way, grounding is, in fact, sometimes taken to be equivalent to building. The grounding relation has the core properties that we have attributed to R and is naturally (though again controversially) assumed to be well ordered. In addition, both grounding and building seem to underwrite the same kind of constitutive metaphysical explanation.

It might be objected that grounding is importantly different from R because grounding, but not R, is hyperintentional. In other words, if two facts, F1 and F2 occur in all the same possible worlds and F1 grounds a new fact F3, it doesn’t follow that F2 grounds F3. Bennett (2011a), for example, takes the hyperintentionality of grounding to be a serious barrier to the kind of view I have described. However, this objection is mistaken: R seems to be hyperintentional for the same reason that grounding is. If necessary existents like numbers, sets, or transcendent properties are to be built, R must be hyperintentional. Suppose for the sake of argument that the hardness of the diamond and its disposition to scratch glass are both transcendent properties and so both exist necessarily. Though it remains true that the hardness of the diamond microbases its disposition to scratch glass, it is not the case that other necessary existents, like the fact that 1 + 1 = 2, also build this disposition. This is so even though every necessary existent occurs in all the same possible worlds.

Grounding singularism is perhaps the most plausible version of singularism because it has the virtue of employing a familiar fundamental relation rather than proposing a novel one. In addition to benefiting from the work that has already been done in grounding theory, grounding Singularism has resources to employ on behalf of the grounding theorist.

In particular, grounding singularism offers the grounding theorist resources for defending against the challenge, recently leveled by Jessica Wilson (2014), that there is no work for a distinctive relation of large-G Grounding over and above that which is done by specific relations of ontological dependence, and small-g grounding relations like composition and constitution. If large-G Grounding singularism is true, then the large-G Grounding relation does have work to do: it is required to adequately fix the fundamentality structure of the world and so in particular is required to settle degrees of fundamentality and directions of priority.18

In Sect. 3, I argued that degrees of comparative fundamentality cannot be adequately fixed by a pluralistic view: the view according to which at least two small-g grounding relations impose the fundamentality structure of the world. This

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17 In contrast, it is sometimes argued that grounding ought to be restricted to facts. See for example Fine (2012), Audi (2012), and Raven (2012).

18 Wilson attributes this response to Benj Hellie, though the considerations that I offer are different from those that Willson attributes to Benj Hellie.
shows that small-g grounding relations are insufficient for the job: they would allow for counterintuitive or incoherent assignments. Although pluralistic views backed by small-g grounding relations can support relative senses of comparative fundamentality, restricting our attention to these relative senses impoverishes our understanding of the ontological structure of the world. If the job of fixing the fundamental ontological structure of the world can be done at all, then it must be done by a single most fundamental building relation. Because large-G Grounding is a good candidate for this relation, this is good reason to suspect that large-G Grounding has important work to do by which it earns its keep.

In response to a similar line of argument, Wilson (2014) objects to reductive accounts of absolute fundamentality like the one I have offered here. She suggests that absolute fundamentality shouldn’t be understood negatively, in terms of ontological independence or un-Groundedness, because it shouldn’t be understood in independent terms at all. Rather, absolute fundamentality is attractively understood as an ontological primitive. In addition to its intuitive appeal, Wilson claims that primitivism about absolute fundamentality has the virtue of allowing for Grounding relationships among absolutely fundamental entities, something that the reductive theory of fundamentality I have considered rules out by definition. By remaining neutral in this respect, Wilson’s primitivism avoids a theoretical commitment that the independence view of fundamentality does not.

However assuming that Grounding singularism can be adequately developed, it seems to me that the dialectic between Wilson and the grounding theorist is much less straightforward than Wilson suggests. Wilson’s claim is that the best package of views is primitivism about fundamentality and eliminativism about Grounding. By contrast, the singularist offers primitivism about Grounding together with an analysis of fundamentality and the small g-grounding relations. On both views, primitive relations permeate the ontological structure of the world. While Wilson eliminates Grounding and leaves small-g grounding relations untouched, the singularist preserves Grounding in order to analyze small-g grounding relations and fundamentality in terms of it. Neither side has a clear parsimony advantage. It is also unclear which view offers the better set of explanation because it is unclear whether it is explanatorily better to admit brute relations of absolute and comparative fundamentality or brute Grounding relations. I doubt that we can adjudicate this dispute without developing a mature Grounding singularism and comparing its theoretical virtues against Wilson’s fully articulated view. As a result, it is at best unclear whether Wilson’s argument against large-G Grounding ought to convince.

It is further unclear that the pattern of instantiation of Grounding relations really are brute after all. Schaffer, for example, has claimed that there is an explanatory gap between entities and their grounds that ought to be bridged with laws of metaphysics. Just as natural laws govern the temporal evolution of the world over time, laws of metaphysics might be thought of as governing the constitutive evolution of the world across levels of fundamentality (See Schaffer Unpublished, Wilsch 2015). This is compatible with singularism provided that the laws do not ‘build’ the Grounding relations.

In what follows, I will suppress the capital G in grounding when context allows it with the understanding that I intend to refer to Grounding rather than particular small-g grounding relations.
6 The benefits of singularism over pluralism

I have offered only a first approximation of just one kind of singularist view. Even so, I think this is enough to illustrate the advantage that singularism has over pluralism. Because singularism has it that every entity is related by a single most fundamental building relation, it is easy to see that there is no possibility of the counterintuitive assignments that afflict pluralist accounts. Pluralism was threatened by the possibility of overlapping assignments of comparative fundamentality or double rankings. But, because the ordering imposed by grounding (or more generally by R) is the only one involved in determining relative fundamentality, there is no possibility of overlap or double rankings on singularism. In addition, a successful account of the grounding hierarchy ought to reflect the connection between objects and the properties that involve them such that object-involving properties are partially grounded in the objects that they involve. This ensures that grounding singularism avoids the counterintuitive assignments of comparative fundamentality that I have argued afflict pluralism.

Finally, grounding singularism is well equipped (unlike pluralism) to help us understand the relationships between ways of being built and so is poised to play an essential role in a suitably complete fundamental ontology. Complete accounts of particular building relations often involve their relationships with other building relations: microbasing, for example, seems to have a mereological component. Grounding singularism can capture this fact because microbasing and composition are both ways of being grounded and so can be accounted for in the same building hierarchy.

The deep connection between microbasing and composition might be reflected in the grounding structure as follows. It is plausible that properties are partially grounded in states of affairs that include proper parts of the objects that they involve as well as properties had by these proper parts. So, the hardness property of the diamond is plausibly grounded in the power to constrain neighbors had by diamond cubics and it is these diamond cubics that ground the diamond.

It is more difficult to account for the relationship between different building relations that take the same relata. However, grounding singularism gives significant resources here too. For example, we might account for the relationship between composition and constitution, both of which relate Statue and Clay by suggesting that the constitution relation obtaining between Clay and Statue is grounded, at least in part, in the composition relations they stand in. In general, instances of constitution are grounded in, and so are less fundamental than, instances of composition.

21 I continue to use Grounding singularism as a sample singularist account. However, the advantages of singularism more generally are not dependent on the success of Grounding singularism. I suspect that other forms of singularism will have similar advantages over pluralism.

22 For a strategy in this spirit see Paul (2010).

23 Though I think that this is generally true, it might not be universally true. It is at least epistemically possible, for example, for Statue to be constituted by Simple, a mereologically simple object. That being said, I am not sure whether such a case describes a genuine metaphysical possibility. For one thing, such a
This promises an explanation for puzzling asymmetries in the properties had by Statue and Clay. For example, we can now explain why Clay’s unique parts and essential properties seem more fundamental than Statue’s (see Paul 2010 for discussion of this question). It may also suggest that the constitution relation is less fundamental than the composition relation. In the same way that both relations are determinates of the grounding relation, constitution might be a determinate of the composition relation. Much more work needs to be done in order to articulate the details of these grounding relationships, but success here would be a significant victory, constituting a solution to what Paul (2010) calls the structural puzzle for material constitution.

In spite of its promise, grounding singularism is not without its problems. So far, we have taken ourselves to be describing the way in which nonfundamental things get into the world. On the hierarchical view that I have assumed, all nonfundamental things are ultimately built from fundamental things such that the fundamental level serves as a sort of complete blueprint of the world. Nonfundamental entities exist because they are built from fundamental ones. But how, on the singularist picture, do determinate building relations (e.g. composition and constitution) get into the world?

I have suggested that these building relations are related to grounding by way of determination and so it would seem that determination is a way in which what is less fundamental can be built from what is more fundamental. However, this leads to a dilemma. If determination is a building relation, then the grounding singularist must claim that it is also a determinate of the grounding relation so that determination is a determinate of grounding. On the other hand, if determination is not a building relation then there are other ways, besides building or small-g grounding, in which some entities can be less fundamental than others. This threatens the account of fundamentality I offered and in turn the arguments against pluralism that made use of it.

I will not fully resolve this dilemma on behalf of the singularist. However, I will suggest a way the singularist might go between its horns. Although grounding and its determinates are related by determination, it is not the case that determination is a building relation. Instead, I suggest that we get determinate building relations in the same way that we get determinate masses. In the case of determinate masses, fundamental laws of nature supplement the mass determinable with determinate

Footnote 23 continued

Fundamental ontological structure: an argument against…

Footnote 23 continued

Fundamental ontological structure: an argument against…

case would introduce an additional puzzle about mereological constitution. Presumably, Statue need not be mereologically simple and so can have parts itself e.g. a hand, a head, a left side, or a right side (if Statue must be simple, then Statue and Simple share a part, though not a proper one). However, these parts are based in precisely the same object as Statue itself: Simple. How can this be? More generally, how is it that Statue is mereologically complex given that its material base is mereological simple? For another thing, it might be thought that the unlovely exception introduced by cases of simple constitution to an otherwise exception-less generalization is itself grounds for doubting that such cases are metaphysically possible: it provides a defeasible reason for thinking that we’ve overlooked some feature that renders these cases metaphysically impossible. Thanks to a helpful reviewer at Philosophical Studies for pressing this worry.

24 Paul (2006), for example, gives an argument along these lines.
initial and boundary conditions. This results in particular determinate masses.\textsuperscript{25} In the same way, the singularist might claim that metaphysical laws governing or describing the way in which the grounding relation is instantiated might be supplemented by determinate fundamental conditions and boundary conditions in order to get determinate building relations.\textsuperscript{26}

More needs to be said to flesh out the analogy. However, it does not seem to be the case that determination is a distinct way in which entities can depend on other entities. Instead, I think that we should be reductionists about the determination relation that stands between the grounding relation and its determinates. Being a determinate of the grounding relation just is being grounded in the grounding relation together with determinate initial and boundary conditions. In this way, determination is just a particular kind of grounding and is not distinct from it in the way that the building relations are distinct. We need not admit a way, in addition to grounding and its determinates, in which entities can be more or less fundamental.\textsuperscript{27}

7 Conclusion

Though it appeared highly plausible at the outset, I have argued that pluralism about building has unpalatable consequences. Pluralism in any form admits the possibility of problematic assignments in virtue of the common structure shared by all pluralist accounts. In addition, pluralistic accounts seem unable to satisfactorily account for the relationships that hold between different ways of building. I have argued that failing to account for these relationships prevents us from giving a good analysis of particular building relations by leaving open pressing questions about what is required in order for building to occur. Thus, the plausibility of pluralist accounts in general is severely damaged.

While singularist accounts might have appeared implausible at the outset, it seems that, in light of the problems that afflict them, pluralist accounts of the fundamental building hierarchy ought to be laid aside in favor of singularist accounts. As a result, future development of the project of fundamental ontology ought to proceed along singularist (rather than pluralist) lines when articulating the fundamental building structure of the world. I have presented a model singularist account that is sufficient to demonstrate the advantage over pluralism that singularism enjoys and which, I hope, points in the direction of some interesting avenues of research.

\textsuperscript{25} See especially Wilson (2014).

\textsuperscript{26} For more on metaphysical laws see Schaffer Unpublished and Wilsch (2015).

\textsuperscript{27} Accepting the strategy that I have offered does commit the singularist to cases in which grounding takes itself as one of its relata. This has struck many as a problematic commitment. However, problems of iterated ground like this one are not special problems for the singularist: they are problems for most views of grounding and afflict the singularist because of her appeal to it. Though resolving this issue is an important task, I don’t think that being subject to it counts against singularism. For discussion, see Bennett (2011b), Bliss (2013, 2014), and deRosset (2013).
References


Dixon, T. S. (Forthcoming). What is the well-foundedness of grounding. Mind


