

Building as Fundamental Ontological Structure

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ABSTRACT

MICHAEL BERTRAND: Building as Fundamental Ontological Structure
(Under the direction of Thomas Hofweber)

What can be said about the structural principles governing the generation of less fundamental constituents of the world from more fundamental ones? In particular, do many building relations impose this structure or is there a single relation that does this work? The aim of this paper is to argue that, though initially plausible, building relational pluralism is unable to adequately account for comparative fundamentality, suggesting that it is not up to the task of building the world from non-fundamental constituents. In light of this, pluralism seems much less plausible than it appeared. In contrast, building relation monism appeared highly implausible. However, a building relational hierarchy featuring a single, most fundamental building relation is well suited to the job of building the world from fundamental constituents. As a result, we ought to turn from pluralism and devote our attention to articulating a monistic account of the building relational structure instead.

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1. Introduction

In recent years, there has been renewed interest in questions concerning the nature of the fundamental structure of the world. Thus, L.A. Paul asks, “what are the fundamental constituents of the world and how is the world built from these constituents” (Forthcoming b, 1)?¹ Meanwhile, Jonathan Schaffer advocates a neo-Aristotelean view of metaphysics according to which its aim is to uncover the substances, the “basic, ultimate, fundamental unit[s] of being,” on which all other things depend (2009, 351).

In order to answer questions concerning fundamental structure we must consider both the fundamental ontology and the fundamental ideology. The Fundamental ontology concerns what there is at the most fundamental level and how these constituents are related to what there is at non-fundamental levels. In contrast, the fundamental ideology concerns what expressions or descriptions we should take as primitive (Sider, 2012). While considerations of ontology and ideology are almost certainly intimately connected, my focus in this paper will be exclusively on fundamental ontology.

Like Paul (Forthcoming b), Cameron (2008) and others, I take the fundamental constituents of the world, the proper subject of fundamental ontology, to be that which is metaphysically prior where that which is metaphysically prior is understood as that in which everything else consists². So, I take it that fundamental ontology concerns those things from which all other existents are built (Paul Forthcoming b, 1). The province of fundamental

¹ Throughout, I will follow Paul and use constituent as a general term for existents in the world and so for inhabitants of ontological levels and building relational hierarchies. I do not mean to imply that constituents are related by material constitution.

² I take it that this is the traditional understanding of what it means to be a fundamental constituent. However, it is important to note that this understanding is distinct from the one employed by Schaffer (2010).

ontology properly extends beyond the constituents themselves to the structure in which these constituents are imbedded. This is the fundamental ontological (rather than ideological) structure of the world.

One piece of this fundamental ontological structure is categorical: to what categories do the fundamental constituents belong? In particular, do the fundamental constituents of the world fall naturally into the categories of object and property? The fundamental categorical structure captures the way in which fundamental constituents are related to each other.³ However unless we are Nihilists or Monists, and I will suppose that we are not, we are committed to looking for more than just categorical structure.⁴ In addition to the categorical structure, we require a structure that allows us to build up the world from its fundamental constituents and so allows us to generate the less fundamental constituents of the world from more fundamental ones. Thus, we require building relations in addition to the fundamental constituents and the category or categories to which they belong. These building relations impose a kind of fundamental structure that is distinct from the categorical structure.

It is an open question as to whether there are more pieces of fundamental ontological structure than categorical and building relational structure. For example, we may find that we must also countenance fundamental essential structure in order to capture relations of essential dependence or fundamental grounding relational structure in order to capture relations of metaphysical explanation. It is also an open question as to how these

³ This categorical structure has received some interesting attention from Paul (Forthcoming b), who argues that all of the constituents of the fundamental level belong to the property category.

⁴ 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.

structures relate to each other and so form a world. In particular, though it may turn out to be the case, these structures need not be related by building. It need not be the case that the relationships between structures be exhaustively captured in the building relational hierarchy. I do not intend to venture answers to these open questions in what follows.⁵

In this paper, I am interested exclusively in the fundamental structure imposed by the building relations.⁶ What can be said about the structural principles governing the generation of the less fundamental constituents of the world from the more fundamental ones? In particular, do many building relations impose this structure or is there a single building relation that does the work? Building relational structure brings with it comparative fundamentality and the idea of ontological levels. Thus, we described the building relational structure as that structure that allows us to build up the less fundamental from the more fundamental. An adequate account of the building relational structure must also account for the hierarchy of comparative fundamentality that comes along with it. This is the ordering of constituents as more or less fundamental. In addition to its importance in fundamental ontology, ontological levels and comparative fundamentality are essential to important debates in philosophy of mind, philosophy of science, and more traditional metaphysics.

In order to begin to understand building relational structure, I think we must first look to the ways in which what is less fundamental can be built from what is more

⁵ I think that there is a difficult question concerning whether the building relation(s) can be fundamental. This seems to me to be analogous to a similar question about the fundamentality of the grounding relation. See for example Bennett (Forthcoming). At any rate, I will remain silent on this problem for the purposes of this paper.

⁶ I distinguish fundamental building relational structure from non-fundamental structure of this kind because I think that it is likely that some building relations are reducible to or obtain in virtue of other, more fundamental ones. For example, it is sometimes argued that constitution ought to be analyzed in terms of composition. The building relational structure imposed by these relations would count as non-fundamental building relational structure. A multiplicity of non-fundamental building relational structure is acceptable to both the building relational monist and building relational pluralist as I describe them below.

fundamental. Many of these ways have been extensively studied and are helpfully, though briefly, characterized by Karen Bennett (2011). I have in mind here relations like the mereological notions of composition and constitution, as well as less understood notions like realization, micro-based determination, and emergence. These building relations seem to share a core notion, which Bennett articulates in three parts. First, building is directed in the sense that it is irreflexive and asymmetric. These logical properties suit them to impose structure on the constituents, both fundamental and nonfundamental, of the world. Second, the relata of building always differ from each other with regard to their fundamentality. Thus, building relations are relations of metaphysical priority (Bennett 2011, 14). In addition, there must be some sense, yet to be defined, in which the relata are connected by way of non-spatiotemporal overlap.

In spite of this shared core, there is a substantial amount of diversity among the building relations. For example, some building relations appear to unify by gathering together a multiplicity of constituents into a single whole while others seem instead to be determinative. In other words, building relations appear to differ significantly with regard to their logical profiles. While some, like composition, are many-one relations, others, like constitution and realization, are one-one. In addition, building relations would seem to differ radically with regard to their relata. While some building relations appear to operate only on objects (composition and constitution seem to be examples), others appear to relate only properties (or property instances or states of affairs). Examples include microbased determinism and realization.

These differences seem to indicate that building relations are capable of serving different building functions and so of imposing different pieces of the fundamental building relational structure. Those relations that take only properties as relata seem uniquely suited

to build the nonfundamental properties of the world up from their fundamental constituents while those relations that take only objects would seem to do a similar job with regard to objects. Building relations that unify construct in a way that determinative relations do not. Though some building relations may reduce to other, more fundamental ones, it seems implausible in light of their differences that every building relation can be reduced to one single most fundamental relation.

In light of the different roles that they play, it seems that many building relations are required in order to impose the fundamental building relational structure of the world. If we are to build the world up from its fundamental constituents, it seems plausible that we need many building relations to perform the many kinds of building that are required. In other words, it would seem that God must have in mind multiple building relations if he is to have what he requires for generating the non-fundamental constituents of the world from the fundamental ones.⁷ Call this view, on which there is no single most fundamental building relation that alone imposes fundamental building relational structure, building relation pluralism.⁸ Conversely, building relation monism is the view according to which there is a single most fundamental building relation responsible for imposing the fundamental building relational structure. Importantly, both monism and pluralism are compatible with the

⁷ Notable exceptions to this are views that begin with a one-category ontology. Paul (forthcoming a) discusses these. Thus, the outcome of Paul's discussion concerning the categorical structure has important implications for the building structure.

⁸ Though its endorsement is largely implicit, building relation pluralism dominates overwhelmingly in the literature. This is seen most clearly in the willingness of many to treat only parts of the building relational structure while ignoring others. This is done most commonly by restricting the domain under consideration. For example, Schaffer's (2009) discussion of the building relational hierarchy is restricted only to actually existing concrete objects while Kim's (1997; 1998, 80-87; 2003; 2005, 57-60) discussion of microbasing is restricted only to properties. This is so even though both Kim and Schaffer endorse the existence of both properties and objects. See Bennett (2011) for a more detailed discussion of this point.

existence of non-fundamental building relations and the non-fundamental structure that they impose.

The aim of this paper is to argue that, though it is initially very plausible, building relational pluralism is afflicted with serious problems that suggest that it is not up to the task of building up the non-fundamental constituents of the world. Though I will not argue that pluralism is false, I conclude in light of the problems I identify that pluralism seems much less plausible than it appeared. In contrast, building relation monism appeared highly implausible. However, I think that a building relational hierarchy featuring a single, most fundamental building relation is well suited to the job of building the world from fundamental constituents. This is because only building relation monism seems to adequately account for comparative fundamentality. Because building relation monism compares so favorably to pluralism, I suggest that we ought to turn away from pluralism and devote our attention to articulating a monistic account of the building relational structure instead.⁹ If I am right about this, then we need a single building relation that is capable of doing all of the assembly that we require in order to build the less fundamental from the more fundamental. This requirement places tight constraints on the correct account of the building relational hierarchy by ruling out many of those building relations that we are apt to appeal to. As a result, the building relational hierarchy looks much different than we might have thought.

I will begin by briefly presenting my preferred account of the building hierarchy, which has room only for a single building relation. Doing so will allow me to introduce the apparatus that I will make use of later in the paper. I will then canvas the possibility of an

⁹ Though I will argue that there must be a single, most fundamental building relation, I will not argue that this most fundamental building relation is absolutely fundamental. While I tentatively endorse this position as well, there are difficult problems with the thought that absolutely fundamental relations impose structure as is clear in the debate concerning whether the grounding relation is fundamental. In particular, it would seem to follow that relations of this kind must take themselves as relata. While I am hopeful that problems of this kind can be overcome, engagement with them falls outside the scope of this paper.

account that, unlike mine, accords with the intuitive presumption in favor of pluralism. I will argue that pluralistic accounts, unlike my preferred monistic one, are unable to adequately account for comparative fundamentality. This is because they admit of assignments of comparative fundamentality that are contradictory or counter-intuitive. This is a strong reason for preferring a monistic account of the building relational hierarchy.

I will begin, in section II, by introducing the assumption that the building relational structure is well-ordered. I will make crucial use of the well-ordering assumption in the arguments that follow. In section III, I will introduce what I take to be a natural account of comparative fundamentality in terms of rank and, assuming this account, will argue that there is one single hierarchy of comparative fundamentality. I conclude this section by presenting my preferred monistic characterization of the building relational hierarchy. I will then argue, in section IV, that either way of developing building relational pluralism leads to problematic assignments of comparative fundamentality. This is the case in virtue of very basic structural features shared by all pluralistic accounts. In section V, I will address the worry that building relational pluralism, as I have presented it, is too simple and, if made more sophisticated, can avoid problematic assignments. Finally, I will conclude in section VI that building relational pluralism ought to be set aside in favor of monism.

2. Some Formal Considerations

The informal discussion of the fundamental ontology that we have engaged in so far has made some assumptions about the building relational structure of the world and about the hierarchy of comparative fundamentality that accompanies it, the most contentions of which is that the building relational structure is well-ordered. Though I will not now defend this assumption, it is worth making explicit. This assumption comes in three parts. First, I am assuming that that the building relational hierarchy, which fixes relations of metaphysical

priority and comparative fundamentality, forms a strict partial ordering. This involves assuming that the building relations are irreflexive, asymmetric, and transitive. In virtue of their logical profile, these relations are strictly directed and so it is possible for them to generate the building relational hierarchy.

It also involves the assumption that the constituents of world, all of which serve as the relata of building relations, form ordered sets. This means that the constituents of the world can be described by a set, call this set \mathbf{W} for world, whose members include all the ordered pairs of constituents of the world. Each of these pairs is the potential relata of a building relation. Also required by the strict partial ordering is at least one binary building relation, R , that imposes an ordering on the set \mathbf{W} .¹⁰ We will say that R structures \mathbf{W} . This idea of a strict partial ordering on \mathbf{W} provides us with the formal framework that I will make use of below.

Finally, well-ordering involves the assumption that each nonempty subset of the set \mathbf{W} , ordered by the binary building relation(s) R , has an R -least element (Schroder 2003, 29). Because the ordered set \mathbf{W} is a subset of itself, it follows that the building relational structure must terminate in the sense that there must be a bottom, most fundamental, level in the hierarchy. The occupants of this level are independent such that there is nothing that is prior to them and they are prior to all other entities. Well-ordering thus involves the rejection of metaphysical infinitism.¹¹ Though I think that the assumptions involved in well-ordering are true, their soundness is still a matter of fierce debate. While I have no intention of entering

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.

¹¹ Advocates of infinitism include Morganti (2009) and Bohn (2009) while critics include Cameron (2008). Unfortunately, exploring the interesting debate between infinitists and foundationalists would take us outside the bounds of this paper.

this debate here, it is clear to me that its outcome will have a significant impact on the picture I have so far presented as well as the argument that I will give below.

3. A First Approximation

Having gotten the well-ordering assumption out in the open, I want to begin by presenting a characterization of the relationship between the building relational hierarchy and the hierarchy or hierarchies of comparative fundamentality. I will argue that, in light of an intuitive account of comparative fundamentality, which I will assume, it follows that there is a single hierarchy of comparative fundamentality. I will conclude by presenting a characterization of the building relational hierarchy structured by a single building relation. Not only is this my preferred model, but we can also go on to use the apparatus required for its articulation in order to present the difficulties that I claim afflict building relational hierarchies that are structured by multiple building relations.

As was made clear above, I understand the fundamental constituents of the world to be those constituents that are ultimately prior in the sense that the fundamental constituents are those in which everything else consists and from which everything else is constructed. Constituents that meet this description are absolutely fundamental and so reside at the lowest ontological level. In addition to this absolute notion of *fundamental*, the building relational hierarchy brings along with it at least one (and I will later argue exactly one) relation of comparative fundamentality: building relations allow us to construct what is less fundamental from what is more fundamental. Intuitively, A is more fundamental than B if and only if A is closer to those constituents that are absolutely fundamental than B is. If we move up the building relational hierarchies beginning at what is absolutely fundamental, we will reach what is more fundamental before reaching what is less fundamental. Thus, if the building relational hierarchy brings along with it multiple hierarchies of comparative

fundamentality then multiple orders of closeness are brought along as well.

This intuitive account of comparative fundamentality is imprecise as it stands and I will remedy this below. Even so, I think that it is significant that, unlike absolute fundamentality, we cannot give a straightforward definition of comparative fundamentality in terms of priority as I understand it: though there may well be other ways of defining priority and fundamentality, the multiplicity of priority chains on the view that I have assumed destroys the prospects for identifying comparative fundamentality with some portion of the priority orderings. While it seems true, for example, that the table is less fundamental than the carbon atoms that compose it and so is prior to it, it seems equally true that the table is less fundamental than *any* carbon atom, even those that do not serve as its proper parts. This is true even though no building relations obtain. Thus constituents can be related by comparative fundamentality even though they are unrelated by building. Constituents that are equally fundamental, for example, occupy the same ontological level and so, though they are related by comparative fundamentality, are not apt to be related to each other by building. While constituents at lower levels may build objects at higher levels, it need not be, and is likely not, the case that every constituent at some lower level serves to build a given constituent at some higher level.

This observation brings out an important feature that seems to be shared by all hierarchies of comparative fundamentality: though hierarchies of comparative fundamentality are determined by the priority orderings imposed by building relational hierarchies, they cut across these building relational hierarchies and so sometimes relate constituents that are members of different priority chains. Intuitively, closeness to what is absolutely fundamental need not be restricted to members of the same priority chain.

As a result of this feature, we need a way of combining different building relational

hierarchies into a given hierarchy of comparative fundamentality. This is required in order to define comparative fundamentality in terms of the building relational hierarchies and must be done whether the building relational hierarchies are structured by one relation or by many. At the bottom of any given hierarchy of comparative fundamentality will be those constituents that are absolutely fundamental. Making use of the assumption that the building hierarchy is well-ordered, I want to propose a very natural but more precise way of understanding closeness to what is absolutely fundamental, and so of understanding comparative fundamentality, in terms of the order theoretic notion of rank.

Recall our set \mathbf{W} , which has as its members all and only the ordered pairs of constituents of the world. For any member of \mathbf{W} , p , we can define the rank of p using the following recursive definition. Call p a minimal element of \mathbf{W} if and only if, for all members of \mathbf{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 the building relation, it is always as the left hand relatum and never as the right hand one.¹² 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 \mathbf{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. Now suppose that, for some ordinal number n , the elements that have been assigned ranks that are less than n have already been determined. We assign rank n to p just in case p is a minimal element of the set \mathbf{R} (for remainder), which has as its members all and only those members of \mathbf{W} whose rank has not yet been assigned. In other words, if p is minimal with regard to the ordered set of members of \mathbf{W} whose rank has not yet been settled by step n ,

¹² In cases where some p is never involved in a building relation, it is trivially true that that in every instance of a building relation in which it is involved, it is always as the left-hand relatum. As a result, these inert p 's are counted as absolutely fundamental.

then the rank of p is n . Using this procedure, we can assign ranks to every element of \mathbf{W} (Jech 2006, 25).

The rank of an element, defined by its location in the relevant building relational hierarchy, corresponds to its level of comparative fundamentality and so provides a much needed way of making sense of the philosophical term of art ‘levels of reality’ that plays such a central role in debates like those I described above. In addition, ranks can be assigned univocally to constituents of different building relational hierarchies and so can be used to define fundamentality, both absolute and comparative, in terms of this common feature. A constituent is absolutely fundamental, for example, if it has received a rank of 0 and so can be found at the bottom of a building relational hierarchy. A constituent that receives a rank of 25 is less fundamental than, and so is built (at least in part) from, constituents of rank 24 but is more fundamental than, and so serves to build, constituents of rank 26. All constituents receiving a rank of 25 are equally fundamental even though they participate in different building relational hierarchies. In other words, the rankings that constituents receive by way of the recursive definition, in terms of the building relational hierarchy, that I gave above are isomorphic to the ordering(s) of comparative fundamentality.

I have so far left it open as to whether there exist one or many hierarchies of comparative fundamentality. However, I think that the existence of multiple hierarchies is problematic given the natural characterization of comparative fundamentality in terms of rank. Assuming that this characterization is apt, I will argue that these difficulties provide strong reasons for rejecting pluralism about comparative fundamentality.

Pluralism of this kind comes in two variations. As I am using the label, all pluralists about fundamentality are committed to the claim that there are at least two hierarchies of

comparative fundamentality.¹³ Call the pluralist with only this commitment the simple fundamentality pluralist. In addition, some but not all fundamentality pluralists are committed to the claim there are at least two discrete sets of absolutely fundamental constituents. Call this kind of pluralist a complex fundamentality pluralist. Neither species of pluralism is successful, given the natural characterization of comparative fundamentality.

Consider first the simple pluralist account in which a multiplicity of comparative fundamentality hierarchies emerges from a single hierarchy of absolute fundamentality. On this view, there is a single cast of absolutely fundamental things. However, there are at least two ways in which things can differ with regard to their comparative fundamentality and so there are at least two dimensions of closeness along which constituents can differ. The problem with simple pluralism, given the natural account of comparative fundamentality, comes in making these notions of closeness more precise. It is difficult for me to understand what the simple pluralist means when she claims that there are multiple ways in which things can differ with regard to their comparative fundamentality.

This is because, on the account of comparative fundamentality that I have assumed, the closeness of a constituent to what is absolutely fundamental is a function of its rank, which is assigned as a result of a recursive procedure that works by selecting minimal elements. As a result, it would seem that the only effective way of making clear at least two accounts of closeness is to endorse at least two concepts of rank and so, as minimal element is responsible for the assignment of rank, two concepts of minimal element. This is the only

¹³ Another available pluralist position might feature multiple, discrete sets of absolutely fundamental constituents and only one hierarchy of comparative fundamentality. This position is not relevant to the debate at hand so I ignore it.

way to secure two hierarchies of comparative fundamentality that are genuinely distinct and not merely subsets of a single hierarchy.¹⁴

The problem for the simple pluralist is that both rank and minimal element are clearly defined order theoretic properties and so do not seem to admit of multiple interpretations: I fail to see how another definition of either term would be apt. Given that comparative fundamentality is best understood in terms of closeness to what is absolutely fundamental, where closeness ought to be understood in terms of rank, the prospects for multiple hierarchies of comparative fundamentality seem dim. Though it is not impossible for such a simple pluralist account to be developed, I think that it is unlikely to be successful.

More plausible is the complex variation of pluralism about fundamentality according to which there are at least two hierarchies of both absolute and comparative fundamentality. Strictly, this variation has been ruled out as a result of the definitions that we have given to our terms. This is because we have defined the absolutely fundamental constituents as those that are ultimately prior where that which is prior is understood as that in which everything else consists. In order to make room for the complex pluralist, we must engage in a subtly different project. As a result, the complex pluralist cannot make use of the definitions that I have given above. She owes us a definition either of priority or of absolute fundamentality such that the account admits of multiple hierarchies of absolute fundamentality. Though this position is similar to the one that the simple pluralist finds herself in, the prospects of providing these needed definitions is much more promising for the complex pluralist.

¹⁴ This may indicate a further avenue for the objector, who might reject my assumed account and so wish to introduce a gap between rank assignments and assignments of comparative fundamentality. A positive account featuring such a gap would need to provide a function that takes ranking assignments as inputs and gives fundamentality assignments as outputs. It seems highly unlikely to me that a mapping function of this kind could be found that avoids problematic assignments of the kind that I discuss below. As a result, I'm skeptical of the efficacy of an objection along these lines.

As a result, it won't do to rule out the complex pluralist account in light of this additional burden alone. Let's assume for the sake of argument that the complex pluralist is able to provide an account that is compatible with the existence of multiple hierarchies of both absolute and comparative fundamentality. Such a picture might be one in which one hierarchy of comparative fundamentality contains only objects while a second contains only properties. At the bottom of the object hierarchy might be a pool of absolutely fundamental objects while, at the bottom of the property hierarchy, are only fundamental properties.

The problem that afflicts the complex pluralist is similar to the one that I will argue afflicts the building relation pluralists discussed below. I claim that the complex pluralist is forced to admit counterintuitive assignments of comparative fundamentality. The problem is the necessary absence of certain intuitively plausible assignments. Taking up the model in the paragraph above as an example, it is intuitively true that highly fundamental_{property} properties are more fundamental than very non-fundamental_{object} objects. For example, the property of having a particular charge is intuitively far more fundamental than the object *The United States Senate*. Yet the complex pluralist has no resources with which to compare these constituents: they belong to totally discrete hierarchies of comparative fundamentality. Of course, a suitably revolutionary theory might supplant our intuitions concerning charge and political bodies such that we might be inclined to agree that charges and political bodies are not comparable in terms of fundamentality. The problem is not that this assignment violates intuitions. It is that counterintuitive assignments like the one I mentioned follow from complex pluralism for the wrong kind of reason: these assignments follow as a matter of course from very general structural features had by any complex pluralist account rather than as a result of specific theoretical considerations. This provides a strong reason to reject complex pluralism.

Given what I have called the natural view of comparative fundamentality, where comparative fundamentality is understood in terms of closeness to what is absolutely fundamental, it seems to me to be highly implausible that there are multiple hierarchies of comparative fundamentality. Though I acknowledge that there may be room for such a position to be developed, I am skeptical of its prospects. As a result, in what follows I will make extensive use of the claim that there is one unique ordering of comparative fundamentality. In other words, the fundamentality hierarchy is a maximal chain meaning that any two constituents of the world stand in a relation of comparative fundamentality such that one is more, less, or equally fundamental with respect to the other.

In light of this, my preferred monistic characterization of the building relational hierarchy is easily described. On this view, there is a multiplicity of building relational hierarchies all structured by a single most fundamental building relation. In spite of the building relation that all of these hierarchies have in common, it is not the case that the building relational structure is maximal: it is not the case that any two constituents of the world can be compared or related by our single building relation. In order to define comparative fundamentality in terms of the building relational hierarchies, we make use of the recursive definition of rank, which assigns to every constituent a common rank property. The ordering imposed by rank reflects the distance of each element from what is absolutely fundamental and so is identical to the ordering imposed by comparative fundamentality.

4. What is the Problem with Pluralism?

In the previous section, I described what I take to be a natural way in which we can integrate the disparate building relational hierarchies into a single hierarchy of comparative fundamentality. By doing so, we are able to make good on our promise of using the fundamental building relational structure of the world to make sense of ontological levels of

comparative fundamentality. The problem for pluralists, I will argue, is that they are unable to account for comparative fundamentality assuming the natural account of it that I have proposed.

Consider, for the sake of argument, the simplest possible pluralist theory, which makes use of two building relations to structure the building relational hierarchy. I will simply call this the pluralist theory from now on. As a result of adding an additional building relation, the pluralist theory will involve two ordered sets instead of the single ordered set described by my preferred monistic account. In my monistic account, the base of the ordered set, the set from which the relata of the building relations are drawn, is \mathbf{W} whose members include all possible ordered pairs of constituents of the world. While \mathbf{W} may serve as the base in the pluralist account, it need not do so. Instead, each of the building relations in this account can structure a subset of \mathbf{W} as long as the union of these subsets is equivalent to \mathbf{W} . As a result, there are two ways in which the pluralist theory might be formulated corresponding to two kinds of bases that are available to the pluralist: both building relations might structure an overlapping subset of \mathbf{W} (the limiting case of which is \mathbf{W} itself) or each might structure a discrete subset of \mathbf{W} . I will argue that, no matter which base is chosen, the pluralist account is afflicted with serious problems that indicate that it is not up to the task of building the constituents of the world. Though I will not argue that pluralism is false, I conclude that, in light of the problems I identify, pluralism seems much less plausible than we would have thought. Pluralism seems now to come out unfavorably when compared with monism.

In order to see this, let's consider each of the ways that the pluralist theory might be formulated in turn, beginning with the theory in which both building relations structure \mathbf{W} . Like my preferred monistic account, this pluralist account will feature many different

building relational hierarchies. However unlike my preferred account, these building relational hierarchies will differ with regard to what building relation is structuring them. Because, as I argued above, there are many different building relational hierarchies and only one hierarchy of comparative fundamentality, the pluralist account must include a way of combining these hierarchies into a single hierarchy of comparative fundamentality. As in my preferred account, rank can be used to do this job. Rank is assigned by a recursive function that works by identifying the minimal unranked elements of each building relational hierarchy, regardless of the building relation doing the structuring, and assigns each of these elements the same rank number.

As in my monistic account, the pluralist account can then claim that the rank of an element corresponds to the ontological level that it occupies and so determines its comparative fundamentality. This move from rank to comparative fundamentality is where the problem with pluralism lies. The problem here is that, because rank is being determined by two different relations operating in tandem, contradictory or counterintuitive results can be reached.

Overlapping Building Relations

Consider the two possible ways in which the two building relations, call them B1 and B2, might structure **W**. It may be that there are constituents of **W** that are comparable with each other both by B1 and by B2. In this case, there are two building relational hierarchies in which these constituents are related to each other by building. Or it might be the case that there are no constituents that are related by both B1 and B2 such that each relation structures a discrete part of **W**. No matter how B1 and B2 behave, I think that they will produce problematic ranking assignments.

Take the case in which B1 and B2 overlap. In this case, there are some constituents of the world, call an arbitrary constituent of this kind p , such that p is related by both B1 and B2. The problem here is that there is nothing about this pluralistic hierarchy that prevents p from being placed on two different levels. Recall that the rank of a constituent is a function of its position in a particular building relational hierarchy. Because there are no resources available to prevent p from occupying one position in the building relational hierarchy structured by B1 and a second position in the building relational hierarchy structured by B2, there are no resources available to prevent p from being assigned two different ranks.

This is highly problematic because we have supposed that the rank of an element like p corresponds to its ontological level and so determines its place in the hierarchy of comparative fundamentality. If p is assigned two different ranks, then p occupies two different levels of reality and so occupies two places in the hierarchy of comparative fundamentality. Yet, this is impossible. If p can be located on two different levels of reality and so occupies two places in the fundamentality hierarchy, it can be said that p is less fundamental than p and also that p is more fundamental than p . But nothing can be more or less fundamental than itself just as nothing can occupy another level than itself.

In order to see this more clearly, consider an example in which B1 is replaced by composition and B2 is replaced by constitution. Now consider the part of \mathbf{W} that contains a statue, David, and the lump of clay that it is made from, called Lump (to use a familiar example). What is important about David and Lump, for our purposes, is that Lump features in two building relational hierarchies. In the first hierarchy, in which elements are related as parts and wholes by material composition, Lump is at the top of a long hierarchy of parts: he is composed of molecules, which are composed of atoms, which are composed of quarks and leptons and so on. In the second hierarchy, in which elements are related by

constitution, Lump would seem to be located at the bottom of a short hierarchy of constituents: Lump constitutes David but there would seem to be nothing that constitutes Lump.

Consider how the assignment of rank would go in this case. With regard to the hierarchy ordered by material composition, Lump is far from minimal. Though I have no way of knowing exactly what Lump's rank is in this hierarchy, we can be assured that it is large. However, the rank that Lump is assigned with regard to the hierarchy ordered by constitution described above would seem to be very low. In virtue of his location at the bottom of this hierarchy, Lump should receive a rank of 0 and so be absolutely fundamental. Thus, Lump occupies two different levels of reality on this pluralist picture: He is both more and less fundamental than himself. So, the pluralist account produces contradictory results. It might, of course, be objected that constitution is not likely to be one of the building relations that structures the fundamental building relational hierarchy.¹⁵ While I think that this is likely true, this is not enough to blunt my argument. In order to show that the pluralist account we have considered does not admit of contradictory results, it must be shown that there are no 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.

Discrete Building Relations

It might be thought that a more promising pluralist account can be formed by incorporating two building relations, B1 and B2, that structure discrete subsets of \mathbf{W} rather than allowing B1 and B2 to overlap. On such an account, there would be no member of \mathbf{W} , p , that would be related by both B1 and B2. For example, we might have one building

¹⁵ See Paul (2006), for example, who argues that constitution should be analyzed in terms of composition.

relation that takes as its relata only objects and one building relation that takes as its relata only properties. This discrete pluralist account escapes the argument that I gave above because it is never the case that both relations relate the same constituents and so it is never the case that the same constituents are assigned two different ranks. In addition, this discrete account seems better to capture the intuition behind pluralism.

Even so, another problem emerges for discrete accounts. This is because there is nothing to prevent those constituents that are related exclusively by B1 from involving those constituents that are related exclusively by B2. Although all that I need is for this to be possible, I think that it is also very likely, particularly if property and object are fundamental categories, that some of those constituents that are B1-related to each other will involve constituents that are B2-related. 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 are no structural features that prevent properties that involve objects, like *being disposed to emit a photon under conditions C*, from being classed as more fundamental than the objects, like *Photon*, that they involve. After all, the features of the discrete pluralist account that allow it to avoid contradiction also prevent the ranking assignments of B1-structured hierarchies to constrain the assignments of B2-structured hierarchies and vice versa. However, this seems to violate our intuitions concerning what is more fundamental than what. Intuitively, *being disposed to emit a photon under conditions C* cannot be more fundamental than *photons* themselves. Photons seem prior to the property of *being disposed to emit a photon under conditions C* such that we would expect god to build photons before building the properties that involve photons. Because ranking assignments determine

comparative fundamentality, this opens the door to counterintuitive assignments of comparative fundamentality.

Of course, our fundamentality intuitions are open to revision as a result of suitably revolutionary theoretical considerations. The problem is not that pluralist theories sometimes conflict with our intuitions. The problem is that these counterintuitive assignments are admitted for the wrong reasons. Rather than resulting from theoretical conditions, they occur merely as a result of abstract structural features shared by all accounts of a certain general kind. This ought not be the case.

In order to see this, consider a case in which B1 is replaced by material composition and B2 is replaced by micro-base determinism. Now consider the part of \mathbf{W} that includes a diamond, a sample of glass, the property of being disposed to scratch glass had by the diamond and the property of being disposed to be scratched by diamond, had by the glass. Two things are important about this case. First, the properties at issue make reference to objects. Second, it seems that there are fewer properties in the hierarchy ordered by micro-based determinism than there are objects in the hierarchy ordered by material composition.

We must first assume that there are no problematic assignments until the atomic level, on which I have chosen to begin our discussion for the sake of simplicity. Because the problem I identify is caused by disagreements in the number of properties and objects, assume that up until the atomic level there are no mismatches and so that the portions of the building relational hierarchies under consideration that extend below the atomic level are equal in length. Alternatively, imagine a world very much like ours with the exception that in this world, atoms and their properties are absolutely fundamental.

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 piece of glass. As an amorphous, rather than a crystalline, solid, the glass has less structure than the diamond. However, it too would seem to be at the top of an extensive hierarchy of parts and wholes. Soda glass, found in familiar things like windowpanes and glass bottles, is composed mostly of silicon dioxide, sodium carbonate, and aluminium oxide. Beginning again at the atomic level, the glass is composed of silicon, oxygen, sodium, carbon, and aluminum. Some of these atoms are parts of compounds like carbonic acid, composed of carbon and oxygen that, along 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 turn, generate intermediate-range networks of ring structures. This chain of parts and wholes terminates with the glass.

Having discussed the building relational hierarchies ordered by material composition and noted their extensive length, let's turn now to hierarchies ordered by microbased determination. Look now at the building relational chain at the top of which is the property of being disposed to scratch glass. The sciences have given us 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 position 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 relational hierarchy that terminates at the power of the diamond to scratch is quite short. We can build the power to scratch glass by way of a chain containing only 4 members once we have agreed to ignore any structure below the atomic level.

This difference in length between the building relational hierarchy terminating in the diamond’s power to scratch glass and the building relational hierarchy terminating in the glass produces a troubling result. To see this, consider how the assignment of rank 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. As a result, this 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 relational chain terminating in glass. While this is likely to be a conservative estimate, it is sufficient for us to assign glass a rank of at least 4 given that we are treating atomic constituents as minimal. Because the property of being

disposed to scratch glass has a rank of 3 and glass has a rank of 4, the property of being disposed to scratch glass is more fundamental than glass itself.

A similar account can be given for the power to be scratched by diamond, which is had by the glass. In the same way that the power to scratch glass comes out more fundamental than glass, the disposition to be scratched by diamond is more fundamental than the diamond. As in the diamond case, the disposition to be scratched by diamond is microbased in the hardness of the glass. Hardness is, in turn, microbased in the power of individual atoms to rather loosely constrain the relative positions of their neighbors. This power is reflected in the short and intermediate-range ring structures. Finally, this power, had by individual atoms, to constrain neighboring atoms is microbased in the bonding and alignment properties of these atoms.

As in the case of the disposition to scratch glass and the glass, the building relational hierarchy terminating in the disposition to be scratched by diamond receives a rank assignment of 3. Though I don't know how many levels of building relational structure feature in the building relational hierarchy terminating in the diamond, it is certain that the number is far higher than 4 and so the assignment of rank given to the diamond will be significantly greater than 3. The disposition to be scratched by diamond is significantly more fundamental than the diamond itself. Using the building relational hierarchy to assign rankings of comparative fundamentality in the way that we have described admits of counterintuitive results. In addition, it doesn't seem to me that these results depend on any particular facts about our choice of building relation. I think that it is possible to show that counterintuitive results can arise given any two building relations whose hierarchies exhibit the general features that I described above.

Though it appeared highly plausible at the outset, I have shown that building relational pluralism has unpalatable consequences. No matter how the pluralist chooses to use the building relational hierarchies to assign rankings of comparative fundamentality, problematic assignments are admitted. I have argued that these assignments follow in virtue of the common structure shared by all pluralist accounts and are independent of the theoretical features of any particular pluralist account. Thus, the plausibility of pluralist accounts in general is severely damaged. While monistic accounts appeared to be implausible at the outset, the ease with which they use building relational hierarchies to assign rankings of comparative fundamentality ought to bolster them. In light of the problems afflicting pluralism, it seems that pluralist accounts of the fundamental building relational hierarchy ought to be laid aside in favor of monistic accounts.

5. An Important Objection

In the previous section, I argued that building relation pluralism is highly problematic in any of its formulations. However, it might be objected that in doing so I have saddled the pluralist with an implausible commitment by requiring her to consult building relational hierarchies separately when assigning rank. It might be thought that a much more plausible pluralist account is available that allows consultation between each of the building relational hierarchies when assigning rankings of comparative fundamentality. This consultation might be thought to come by way of the extensive relations that obtain between building relational hierarchies and their members in such a way as to impose constraints on assignments in order to exclude problematic assignments of the kind above.

This kind of pluralist view is undeniably attractive and, if it can be made to work, would avoid the problems that ground my objections. However, there are good reasons for thinking that its prospects, also, are dim. The problem is in finding avenues by which this

correspondence between building relational hierarchies might occur. On the simple view that I described above, the level of reality that a constituent occupies is a function of its rank, which, in turn, is determined by the position(s) it occupies with respect to the building relational hierarchy or hierarchies in which it appears. Thus, there seem to be three places where consultation between hierarchies might get in the picture: at the assignment of levels of comparative fundamentality by rank, at the assignment of rank by recursive procedure, or at the assignment of position in the relevant building relational hierarchy. None of these is hospitable to consultation between building relational hierarchies.

Because problematic assignments enter in at the assignment of levels of comparative fundamentality, it is plausible to think that consultation ought to occur at this step. Consultation would thus be an operation on the ranks of elements and so would involve a rejection of my claim that the ordering imposed by the hierarchy of ranks is identical to that imposed by comparative fundamentality. Instead, different functions might be proposed in order to translate ranking assignments into unproblematic assignments of comparative fundamentality. For example, we might (implausibly) contend that the ranks assigned constituents in building relational hierarchies ordered by composition are identical to the comparative fundamentality of these constituents while comparative fundamentality is identical to the rank plus 1 of all constituents ordered by microbased determination. The problem with such a view is that the modifications it is capable of making are too coarse. It is difficult to see how the choice of a different function mapping ranks to comparative fundamentality is going to resolve the problematic assignments I have identified without causing new problems. This is because this strategy is forced to make changes to large numbers of assignments and not just to individual problem cases. Although such a strategy may be pursued, it doesn't look promising.

Locating the solution at the assignment of rank looks no more promising. Presumably, this would involve altering the definition of rank such that rank assignment proceeds in a way other than the recursive procedure I defined above. Rather than searching for minimal elements, such a procedure would need to weigh the complicated interrelationships between the hierarchies in question in order to assign rank in such a way as to avoid problematic assignments of comparative fundamentality.

As in the intervention on assignments of comparative fundamentality, it seems unlikely that such a procedure could be defined: this strategy is very coarse grained and so is unlikely to resolve problematic assignments without producing new ones. Even if such a definition can be given, rank is an order theoretic property of constituents of partially ordered sets and does not appear to admit of multiple definitions. As a result, a procedure of this kind would not be a new strategy for the assignment of rank. Instead, it would be an altogether new account of the connection between building relational hierarchies and comparative fundamentality. This amounts to a rejection of the natural account of comparative fundamentality that I have assumed. Though I see no reason for thinking that a new account is unavailable to the pluralist who wishes to deny this assumption, the burden is on her to articulate this account and demonstrate its superiority to the account that I have advocated.

Finally, it might be thought that consultation ought to occur at the building level and so play a role in determining the positions a constituent takes in the building relational hierarchy (or hierarchies) in which it occurs. On this view, what builds what is not a local matter concerning a single building relation and its relata. Instead, it is a complex matter involving the relationships that obtain between constituents located in different building relational hierarchies, for example objects and their properties, or even between whole

building relational hierarchies, like property hierarchies and object hierarchies. It would seem that, to say that the table is built from the table leg, it is not enough to know that the table leg is part of the table. We must also know about the relationships that obtain between the table, its parts, and the properties that inhere in them or between the hierarchies that contains the table and table leg and other hierarchies like those concerning the construction of the table's properties.

The problem with this strategy is that the account of building that it requires seems to be at odds with how building works. In order to know that the table is built from its parts, I need not take into account the relationship between the table and any other constituents of the world or so the pervasive mereological story goes. In addition, building seems only to be a relationship between constituents and has little to do with higher order relationships that obtain between larger building relational structures. After all, building relational hierarchies as I have defined them, are results of the ordering imposed by the instantiation of building relations taking constituents of the world as relata. It will not do to have these hierarchies determine the relations of building that they, in turn, depend on. It would seem that this strategy, though it may resolve problematic assignments of comparative fundamentality, involves commitment to an implausible account of building. Though the pluralist might accept this implication by revising our understanding of building and building relational hierarchies, it comes at the high price of revising our accounts of many well-understood building relations.

Though it might be thought that a more sophisticated account of building relational pluralism can resolve the problems that I have raised by allowing for consultation between different building relational hierarchies or their constituents, I have argued that any way of developing this account is problematic. My simple account of building relational pluralism

has three parts, each of which might be amended or intervened upon in order to allow for consultation. Yet, intervention on any of these parts is problematic.

6. Conclusion

Though it appeared highly plausible at the outset, I have argued that building relational pluralism has unpalatable consequences. Given the plausible account of comparative fundamentality that I have assumed, it follows that there is a single hierarchy of comparative fundamentality. It would seem that no matter how the pluralist chooses to use the building relational hierarchies to assign rankings of comparative fundamentality, problematic assignments are admitted. I have argued that these assignments follow in virtue of the common structure shared by all pluralist accounts and are independent of the theoretical features of any particular pluralist account. Thus, the plausibility of pluralist accounts in general is severely damaged. Though it might be objected that a more complicated pluralist account capable of avoiding these problems might be given, I have argued that any way of developing such an account will be afflicted with further problems. A more sophisticated account is not impossible but its prospects for development do not seem promising.

While monistic accounts appeared to be implausible at the outset, the ease with which they use building relational hierarchies to assign rankings of comparative fundamentality ought to bolster them. In light of the problems afflicting pluralism, it seems that pluralist accounts of the fundamental building relational hierarchy ought to be laid aside in favor of monistic accounts. As a result, it seems to me that future development of the project of fundamental ontology ought to proceed along monistic lines when articulating the fundamental building relational structure of the world.

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