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**WEAK PRIORITY MONISM: A NEW THEORY
OF THE FUNDAMENTAL**

By Jamie Taylor

Submitted for the degree of Doctorate in Philosophy

Department of Philosophy

Abstract: In this PhD dissertation, I am defending a new version of Priority Monism, which I call Weak Priority Monism: that the Cosmos is fundamental and is *identical to the collective plurality of its proper parts*. This distinguishes it from the version of Priority Monism defended by Jonathan Schaffer, in that, unlike him, I accept the thesis composition as identity. I argue that Weak Priority Monism is preferable to Schaffer's monism as not only can all the arguments for his version of monism be also utilised by the weak priority monist, but they also have two decisive advantages over Schafferian Priority Monism (i.e. what I call Strong Priority Monism). Firstly, they are able to explain how the Cosmos can ground all its proper parts in 'weak' junky worlds; and secondly, they have a novel solution to the problem of heterogeneity which is superior to any solution available to Schaffer. In accepting composition as identity, however, Weak Priority Monism is a controversial view. It might be thought, for one, that composition as identity entails that the irreflexivity of grounding/dependence is violated: as if some things are identical to the mereological fusion they are grounded in, then it would seemingly be the case that those things grounded themselves. However, I will show that this is not necessarily the case, and that we can make sense of some plurality of things collectively grounding each of those things in the plurality, without it being the case that each of those things ground themselves. Indeed, as I shall argue, there is still a distinction between the fundamental and derivative, even if turns out that all the proper parts of the Cosmos taken collectively are fundamental. Weak Priority Monism then, as we shall see, is a promising new position on what is fundamental.

Title Page

Title: Weak Priority Monism: A New Theory of the Fundamental

Total no. of Volume(s): 1

Name: Jamie Nathan Taylor

Qualification submitted for: Doctorate in Philosophy

Department: Philosophy

Name of Institution: Durham University

Year submitted: 2018

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Acknowledgements

I would like to begin by thanking my two supervisors, Dr Matthew Tugby and Professor Robin Hendry, for the help they gave me in the course of my PhD. In particular, my regular meetings with Matt helped develop the version of Priority Monism I defend in this thesis, and this dissertation would not be what it is without his assistance. Robin's help is also very much appreciated on the parts of the thesis concerning emergence, and I am thankful for it.

I would like to thank the Northern Bridge Consortium of the Arts and Humanities Research Council (AHRC), for awarding me a studentship which helped fund my research for the first three years of my PhD. Without their financial support, it is very much doubtful I would have been able to do my PhD here at Durham. On that note, I should also thank Dr Alastair Wilson of the University of Birmingham; who was of great assistance in helping me develop my research proposal for my PhD and AHRC funding applications when I was at Birmingham as an MA student.

I'd like to thank to Giacomo Giannini for helping to proof read this thesis, as well as for invaluable feedback which has helped improve this dissertation. On that note, I would also like to thank Pedro Merluzzi, James Miller, and Alex Carruth, whose input has also helped to improve my PhD. I am also grateful to audiences in Durham, Padua and Vienna, where I have presented parts of my work which is within this dissertation. Again, to anyone who was at any of my presentations, I am grateful for your feedback.

I would also like to thank Tom Rossetter, Andrew Woodard, Tom Byrne, Nick Toseland, Anna Blackman, John Parry, Tom Bunce, Marcelo Costa, Les Grainger, Kirsty Jones, Alice Crush, Seunghoon Oh, Byoungjae Kim, as well as many others, for their friendship and moral support they gave me while I developed and wrote my PhD. And for their love and support, I would like to thank my uncle and aunt, Tony and Susan Colesby, my brother, Matthew, and my parents, Gary and Jacqueline Taylor. Without your backing, I would never have done a PhD, and cannot ever thank you enough for the unwavering support you have given me in the last four years. Thank you.

Introduction

What is fundamental? This is a question has been around in metaphysics since the Pre-Socratics, but there has been a resurgence of interest in fundamentality in the last thirty to forty years. David Lewis (1983; 1986, 59-61) thinks that the *naturalness* of properties comes in degrees and holds that there are an elite set of properties, which he refers to as the perfectly natural properties. These perfectly natural properties are the *fundamental* properties, as all other properties are less natural and are derivative upon them. Reality then is not ontologically flat for Lewis, but rather there is a hierarchy such that some things are more fundamental than other things. Similarly, Ted Sider (2011) has argued that the primary goal of metaphysics is uncovering reality's fundamental structure, claiming that “[m]etaphysics, at bottom, is about the fundamental structure of reality (2011, 1).”

This explosion of interest in fundamentality has coincided with the emergence of the notion of *metaphysical grounding*: a primitive, non-causal determination relation which underwrites metaphysical explanation, the same way that causal relations underwrite causal relations (Schaffer 2009a; 2016). Grounding is generally taken to be a strict partial order relation in that it has been held to be asymmetric, transitive and irreflexive, and ensures that there is a hierarchical structure to reality.¹ It is no coincidence then that interest in grounding has emerged at the same time as it has in fundamentality, for the two notions are connected. Indeed, Jonathan Schaffer has argued that “metaphysics ... is about what grounds what (2009, 379).” That the primary goal of metaphysics is not to work out what entities exist, but rather to find out how they are hierarchically

¹ Some philosophers are sceptical whether there is such a thing as ‘Big-G’ grounding and have complained that the notion is either unintelligible (Daly 2012) or is too coarse-grained to do any useful work (Wilson 2014; Koslicki 2015). There is simply not enough space to give ‘Big-G’ grounding a full defence in this dissertation, but I do argue in the first section of chapter one that we need ‘Big-G’ grounding to make sense of cross-categorical metaphysical explanation.

structured and what entities are ungrounded and ground all the *derivative*, grounded entities. To find out what the fundamental entities are then is to discern what entities are not grounded in any other entities. But what entities might these be?

It might be that these entities are platonic universals, or states of affairs, or some class of tropes. However, in this PhD dissertation I will assume that the fundamental entities are ungrounded concrete objects. This class of concrete objects, I think, are good candidates for what philosophers have denoted as *substances*, as they are integrated objects which are not grounded in any proper part of them.² But what might such substances be? *Prima facie*, it might be thought that there are two possible answers to such a question. Firstly, it could be argued that they are mereological simples: objects which have no proper parts. That is, the fundamental substances might be those entities which physics will eventually uncover as being the smallest constituents of the world. These simples might either be point-sized or have extension but will regardless not have any objects as proper parts. To think that such objects are fundamental is to accept (atomistic)³ *Priority Pluralism*: that more than one (but not all)⁴ object is fundamental; thus pluralists hold all the derivative entities are grounded in the collection of mereological simples arranged certain ways. It also might be thought to be the intuitive view of what the *fundamentalia* are. Take away a grain of sand away from a heap, and the heap will gradually get smaller until it ceases to exist. If every proton which makes up my laptop were to be annihilated, then my laptop will also cease to exist. *Prima facie*, wholes seem to be grounded in their proper parts, and thus all objects ultimately seem to depend upon objects which have no substructure.

But there is another alternative to pluralism. Rather than supposing that some class of objects are fundamental, we instead might hold that only a single object is fundamental. This is the universal

² Either because they are mereological simples which lack proper parts (i.e. ‘atomistic’ priority pluralism) or because their proper parts are grounded in it/them (i.e. which priority monists think is the case). John Heil (2012, 18), for instance, holds that substances cannot have other substances as proper parts, a conception of substancehood which Jonathan Schaffer (2013, 83) also affirms.

³ One does not have to be an atomist to be a pluralist but, as I’ll argue, it is the most tenable version of pluralism.

⁴ I say not all, as (we’ll see that) to hold that all objects are fundamental is to be an *allist* (Saucedo MS).

mereological fusion which is composed out of all the objects there are in the world: the Cosmos. This answer to the question of what is fundamental has been called ‘*Priority Monism*’⁵ by Jonathan Schaffer (2010a). He claims it has been held by a number of past philosophers including Plato, Plotinus, Spinoza, Hegel, Bradley, and Alexander. Monism became unpopular in the 20th century, but it has recently been revived by Schaffer, who has put forward a wide range of arguments for the view. These include the (alleged) metaphysical possibility of gunk, emergence, that all sub-cosmic objects are internally related such that they are interdependent on the Cosmos (2010b), and that the Cosmos is the only object which evolves in accordance with the fundamental laws (2013). Schaffer thinks that there is a strong case to hold that it is not the smallest particles that microphysics may uncover which should be considered fundamental, but rather that it is the entire Cosmos itself which should be.

It seems then we have two potential answers to the question of what is fundamental. Either the fundamental entities are mereological simples or it is the mereological fusion of all concrete objects which is the one fundamental entity. But maybe there is another answer available? Raul Saucedo (MS)⁶ argues that there is, once one is willing to introduce plural logic into debates about fundamentality.⁷ Introducing plural logic allows one to hold that some objects can be fundamental *taken together* (i.e. collectively) even though *each* of them is (distributively) not fundamental. This idea that fundamentality may be non-distributive has also coincided with work by Shamik Dasgupta (2014),⁸ who suggests that there are possible cases of grounding which may be non-distributive: some things, *xx*, may ground some other things, *yy*, even though each *x* amongst the

⁵ It should be mentioned however, that there is a distinct version of monism which holds that the Cosmos is the only object which exists: Existence Monism. Existence Monism entails Priority Monism (i.e. as if the Cosmos is the only object which exists, it is not grounded in any other object (Schaffer 2010a, 66)), but the converse does not hold. I briefly discuss and reject Existence Monism in chapter two.

⁶ Despite Saucedo’s manuscript remaining unpublished (which is reportedly because he is working on a monograph which incorporates its contents) it is respected in the literature; being referenced by Litland (2016, 538, fn19) and Schaffer (2018) in his SEP article on Monism.

⁷ The idea that plural logic has a dramatic effect on the way we think about fundamentality is also endorsed by Einar Bohn (2012).

⁸ See also Litland (2016) and (2018), for accounts of grounding being irreducibly plural in at least one of its locutions.

xx is not a partial ground for either yy and/or for some y amongst the yy . Indeed, it may be that some xx *taken collectively* are a ground for each x amongst them, and that this is not a violation of grounding's irreflexivity as the xx collectively grounding some entity does not entail that each x is a partial ground for itself. Which is suggested by the fact that some things can be collectively some way without them being distributively that way.⁹ Saucedo thus thinks it is coherent to suppose that that every object in the world is collectively fundamental (with each individual object in the plurality being grounded in it): a position which he calls '*Collective Allism*'.

I think Saucedo and Dasgupta¹⁰ have done metaphysics a good service in introducing plural logic into debates about fundamentality and grounding. And I do agree with Saucedo that it is coherent to suppose that *some things* can be fundamental even if *each* thing in the plurality is not. Indeed, as we'll see in the seventh chapter, I agree with him that the collective plurality of all things is what is fundamental. My disagreement with him lies in the fact that I think such a plurality must be identical to some concrete object or particular, contrary to what he supposes. For him the collective plurality of all objects is just a plurality of those things and is not an entity. But if this is so, it looks as if the identity of such a plurality is determined by its members, and thus we should hold that such a plurality is grounded in those members. A *mere* plurality of this sort lacks the integration required to be fundamental, given that we only seem to be quantifying over the members of the plurality and nothing more. Pluralities are not some distinct ontological category separate from the things which make them up.

But I think matters change if we suppose that this plurality is *identical to an object*. That is, by supposing that Composition as Identity (CAI) is true: that if some things, yy , compose some object, x , then yy (taken collectively) are identical to x . If (CAI) is true, then it turns out that the collective plurality of all objects is identical to an integrated whole: the Cosmos.¹¹ If composition is identity,

⁹ For instance, if some people 'surround' a building, it does not follow that *each* person surrounds the building.

¹⁰ And Bohn (2012) as well, obviously.

¹¹ In chapter seven, I argue that the Cosmos is an integrated whole on the grounds that it is nomically integrated (i.e. it evolves in accordance with the fundamental laws) (Schaffer 2013).

it turns out that collective allism and priority monism will both be true. Now Schaffer (2010a, 35) has argued that in debating what objects are fundamental, we should take it as a presupposition that (CAI) is false. For otherwise “[i]f the one is literally the many, then monism and pluralism would no longer be opposing views – indeed both “sides” would turn out to be right.” Now, this might have been true if we formulated debates about fundamentality in the framework of singular logic, but it is not true once we do so in the framework of plural logic. For even though it would follow (from the transitivity of identity) from the Cosmos being fundamental that all its proper parts are fundamental, it would only follow that they are *collectively* fundamental and not that each of them is distributively fundamental. If composition is a relation of identity, it can still be the case that *each* of the proper parts are grounded in and less fundamental than the Cosmos even though those parts collectively are identical to the Cosmos. Again, it does not follow that some plurality of things having some property *collectively* that each of those things has that property distributively; thus, even if a whole is identical to some things collectively, it does not follow that each of those things is as fundamental as the whole is.¹²

By introducing not just plural logic, but also (CAI) into debates about fundamentality, I hold that we can distinguish two distinct versions of priority monism:

Strong Priority Monism (SPM): The Cosmos is fundamental and *only* one thing

Weak Priority Monism (WPM): The Cosmos is fundamental and is *identical to the collective plurality of all its proper parts*

The goal of this is to defend (WPM). But why believe that (WPM) is true? Firstly, I’ll argue that any argument in favour of (SPM) can also be utilised as an argument in favour of (WPM). I’ll argue

¹² As we’ll see, Einar Bohn (2012) argues that there can be collective *fundamental* properties, which do not supervene on the intrinsic properties and spatiotemporal relations of the individual objects which collectively instantiate them. Similarly, I’ll argue that (CAI) entails only that a whole is as fundamental as its proper parts collectively, and not that each part is as fundamental as the whole.

that the arguments from gunk, emergence,¹³ nomic integration and so on can all be utilised in favour of (WPM).¹⁴ But, I'll argue that (SPM) is subject to metaphysical problems which can be solved by the weak priority monist. Secondly, I argue (in chapter five) that (SPM) is subject to the problem of weak junk: where some x is weak junky iff every proper part of x is a proper part of *another* proper part of x (which is *at least twice* the size of the original proper part).¹⁵ Weak junk is similar to ordinary mereological junk (Bohn 2009a),¹⁶ in that any world which is weak junky will have infinitely ascending chains of parthood; but is unlike it in that it does not necessarily preclude there being a universal mereological fusion. Indeed, I'll argue that monists should suppose that weak junk is possible as it can be used to explain away the possibility of junk (which is incompatible with priority monism).¹⁷ That junk only appears metaphysically possible because we are instead conceiving of weak junky worlds.¹⁸ But, weak junk is still problematic for (SPM) as it entails that there are infinitely ascending grounding chains which never terminate at the Cosmos.¹⁹ And if this is so, it does not seem as if any derivative entity will be grounded in the Cosmos: to take Schaffer's (2010a, 62) charming phrase, "being would be infinitely deferred, never achieved."

I argue however (in chapter seven) that (WPM) can avoid the problem of weak junk, because in supposing that the Cosmos is identical to the collective plurality of all its proper parts, the weak

¹³ At this stage, the reader might be sceptical about this claim. For one, it has been argued that (CAI) is incompatible with emergent properties (McDaniel 2008), so one might think that a weak priority monist will need to deny that emergent properties are metaphysically possible. In chapter six however I show that (CAI) is not incompatible with emergent properties providing one is willing to acknowledge the possibility of fundamental collective properties (Bohn 2012), and in chapter eight I show that the argument from emergence for monism is still sound even if one accepts such properties and thinks that (CAI) is true. This is because there would still be an 'asymmetry of supervenience' between the Cosmos and each of its proper parts *distributively*. Weak priority monists then, I'll conclude, can utilise the argument from emergence for monism.

¹⁴ I'll only argue in detail for the arguments from gunk and emergence (in chapters three and four respectively), though I'll look at the argument from nomic integration briefly in chapter seven; I'll only argue for the modest thesis that the Cosmos being nomically integrated shows that it is an integrated whole, and won't argue in detail that it is the *only* entity which evolves in accordance with the fundamental laws. I will not consider the arguments from internal relations, supersubstantialism (Schaffer 2009b) nor truthmaking (Schaffer 2010c) in any depth at all in this dissertation (though I do not see any reason why they cannot be utilised by proponents of (WPM)).

¹⁵ I add this clarification in the brackets to rule out dense parthood chains as being classed as weak junky (see footnote 14, chapter five).

¹⁶ Some things being junky iff every part of them is a proper part (Bohn 2009a, 28).

¹⁷ At least if we suppose that monism should be a necessarily true metaphysical thesis, as Schaffer (2010a, 56) does.

¹⁸ The possibility of junk then, it might be said, is an *illusion* (Williams 2006).

¹⁹ This is also pointed out by Aaron Cotnoir (2013b, 70) and Jonathan Tallant (2013, 435).

priority monist can hold that the Cosmos *immediately* grounds each of them distributively. They can suppose that this is so because as well as being concrete object, the Cosmos is the (collective) universal plurality and that this plurality grounds each of those things in it distributively. Everything in the plurality (taken collectively) is ontologically on par with one another irrespective of what mereological level *each of them* are at. One does not need to pass through proper subpluralities of the universal plurality to see how each derivative entity gets its being; what proper subpluralities of the universal plurality I am a member of are irrelevant in terms of how I get my being from the plurality of all objects. In being able to help themselves then to immediate grounding relations between the Cosmos and its proper parts, the weak priority monist has an explanation of how the Cosmos can ground its parts in weak junky worlds.

Thirdly, I argue (in chapter nine) that (WPM) has a novel solution to the problem of heterogeneity for monism, which is unavailable to the strong priority monist. I'll argue that the best solution to the problem of heterogeneity for monism available to (SPM) is to postulate distributional properties; that what accounts for qualitative variation in the Cosmos is that the Cosmos instantiates a property which guarantees it has a certain qualitative distribution, and is not reducible to any non-distributional property (Parsons 2000, 2004).²⁰ However, I'll argue that distributional properties are not able to help the priority monist overcome Ted Sider's (2007) objections that monists are unable to explain the size of the statespace and cannot give a plausible account of what it is to be an intrinsic property. By contrast, in explaining the world's heterogeneity by holding that it (i.e. the world) is identical to the collective plurality of its proper parts, I argue that the weak priority monist can explain the statespace's size and can utilise Kelly Trogdon's (2009) *in-virtue-of account* of intrinsic properties.²¹ I therefore think that the weak priority monist has a much

²⁰ An example of such a property might be the property of 'being polka-dotted': its instantiation guarantees that the object which possesses it has a certain qualitative distribution (i.e. being polka-dotted).

²¹ Trogdon (2009) argues that a monist who avails themselves to distributional properties should accept what he calls the *intra-virtue account* of intrinsic properties. However, in chapter nine I argue that not only is the intra-virtue account inferior to the in-virtue of account, but that a monist cannot utilise it if they rely on distributional properties to solve the problem of heterogeneity.

more plausible solution to the problem of heterogeneity than is available to the strong priority monist.

Given these two decisive advantages, I hold that weak priority monism is a more plausible position than strong priority monism; monists should hold that the Cosmos is the collective plurality of its proper parts as well as being a concrete object. Collective fundamentality then has some interesting applications in debates about fundamentality, and much of the purpose of this dissertation is to show that not only is it a coherent notion, but there are some strong reasons to think that some things can be collectively yet not distributively fundamental. And as we will also see, it is because of this that one can still see there is a distinction between the fundamental and derivative entities even if composition is identity. Resultantly, a distinct version of Priority Monism from Schaffer's can be defended, and it is the primary task of this dissertation to show that this new version of monism ((WPM)) is a compelling view and is the best version of monism.

The structure of this dissertation will be as follows:

In **Chapter One**, I'm going to investigate why one should presume that there are any fundamental entities at all. I will begin by arguing that there is a primitive, non-causal relation of determination which philosophers call metaphysical grounding: an asymmetric, transitive and irreflexive relation which hierarchically structures reality. I then argue that this relation must be well-founded: all non-fundamental entities are grounded in some fundamental entities (Dixon 2016b, 446).²² This is because I hold that grounding is a super-internal relation, which entails that grounded entities are pieces of an 'ontological free lunch'. Hence, if grounding were not well-founded, there would be infinite vicious grounding regresses, because pieces of ontological free lunch must derive their existence and being from entities which are not a free lunch. This allows metaphysical

²² This formulation is not precisely how Dixon formulates the thesis grounding is well-founded though (see footnote one in chapter one).

foundationalists (i.e. who believe grounding is necessarily well-founded) to respond to objections levelled against it by Ricki Bliss (2013) and Matteo Morganti (2015).

In **Chapter Two**, I make clear that I am assuming that the fundamental entities are concrete objects. I then formulate the Fundamental Mereology Question (FMQ): What concrete objects *xx* are fundamental? Following this I formulate a pluralized version of Schaffer's (2010a, 38-39) Tiling Constraint, which (unlike Schaffer's singularized version) is able to accommodate that some things can be non-distributively fundamental. Any plausible answer to the (FMQ) must be able to meet the constraints imposed by the Tiling Constraint, and I argue that only three²³ positions can do so: Priority Pluralism, Priority Monism and Collective Allism. I also argue however that there may be two distinct versions of priority monism if we also think that (CAI) is compatible with there being a distinction between the derivative and the fundamental. It is in this chapter then I first make a distinction between strong and weak priority monism, as well as the more general distinction between collective and distributive fundamentality.

In **Chapter Three**, I defend the argument from gunk for monism. Some object is gunky iff every part of it has a proper part, and I argue that if gunk is metaphysically possible pluralism is false as there would be possible worlds where there are no mereological simples to serve as the pluralist's *fundamentalia*.²⁴ I hold that we should think that gunk is possible because it is conceivable and respond to two objections to its possibility: (i) Hudson's (2001) objection from the Doctrine of Arbitrary Undetached Parts (DAUP) and space-time being necessarily pointy, and (ii) that gunk seeming possible is an illusion generated by co-located extended simples (Williams 2006).

²³ To be precise, there are actually four answers to the (FMQ) which are compatible with the (pluralized) Tiling Constraint: Priority monism, Collective Allism, *Individualist* Priority Pluralism and *Collective* priority pluralism. Individualist Pluralism stating that many, but not all, objects are *each* fundamental entities and Collective Pluralism stating that many, but not all, objects are *collectively* fundamental. The distinction however will not be that important given my arguments against pluralism will generally apply against either version of it.

²⁴ I'm presuming of course here that one's answer to the (FMQ) must be necessary (which I make clear in chapter two).

In **Chapter Four**, I defend the argument from emergence for monism. Some property F is emergent iff it is an intrinsic property instantiated by a composite object and which does not supervene on the intrinsic properties and spatiotemporal relations of the object's proper parts. If emergent properties are metaphysically possible, however, then pluralism would be false, as there would be possible worlds where fixing the properties and relations of the mereological simples would not account for all that existed in the world. I argue that we should think that emergent properties are possible because not only are they conceivable, but that quantum entanglement suggests that there are emergent properties in the actual world. I then consider and reject three pluralist strategies which try to account for emergent properties in a pluralist framework: Priority Pluralism [A V E], Relational Holism (Teller 1986) and Plural Collective Instantiation (Bohn 2012).

In **Chapter Five**, I consider the problem posed to Priority Monism by the apparent possibility of mereological junk: some things being junky iff every part of them is a proper part (Bohn 2009a, 28). Junk is incompatible with monism as any junky world would lack a universal object, but I argue that the seeming possibility of junk is an illusion (Williams 2006) being generated by weak junky worlds. However, weak junk still poses a problem for (SPM). It entails that there are infinitely ascending grounding chains which never terminate at the Cosmos. I argue that in order to overcome this problem, a monist needs to be able to assert that the Cosmos immediately grounds all its proper parts, but I argue that this is not possible for a strong priority monist. I conclude that if a monist wants to solve the problem of weak junk they need to be a weak priority monist; which involves accepting both (CAI) and Collective Allism.

In **Chapter Six**, I present a defence of Composition as Identity (CAI) and argue that it is not incompatible with (irreflexive) metaphysical grounding. I begin by showing that (CAI) does not violate the Indiscernibility of Identicals (II) nor plural logic,²⁵ providing we hold that counting

²⁵ To be precise, I argue it does not entail the principle Ted Sider calls 'Collapse' (2007, 57), which then causes trouble with plural logic.

things is something we do *relative* to a concept or sortal. I then show that (CAI) being committed to mereological essentialism (i.e. that objects are essentially their parts) is not problematic, providing one is willing to be a perdurantist and accept counterpart theory. I also argue that (CAI) is not incompatible with emergent properties if one is willing to accept there can be fundamental collective properties (Bohn 2012). I finish the chapter by arguing that (CAI) does not entail the irreflexivity of grounding is violated, nor is (CAI) undermined by the fact that some of its metaphysical benefits can be had at a cheaper price by proponents of grounding.

In **Chapter Seven**, I argue that (unlike strong priority monists) collective allists can solve the problem of weak junk as they have an explanation of how objects in weak junky worlds are grounded in the fundamental entities: namely, that as all objects are collectively fundamental (and thus are *collectively* all on ontological par in the plurality), it is intuitive to suppose there is a relation of immediate ground between them collectively and each of them distributively. However, I argue that such a plurality needs to be collectively *identical* to a concrete object, otherwise it would not be integrated enough to be fundamental. This is to accept (CAI), but in so doing collective allism becomes a version of Priority Monism: namely, Weak Priority Monism. The weak priority monist then inherits (given the transitivity of identity) the collective allist explanation of how each individual object is immediately grounded in the universal plurality/the Cosmos, and thus has a solution to the problem of weak junk. Before bringing the chapter to a close, I argue that (WPM) does not have any problem with Classical Mereology and also that it should be counted as being a genuine version of monism as opposed to some hybrid view which shares features of both monism and Collective Allism.

In **Chapter Eight**, I consider some objections to (WPM). After dealing with a couple of preliminary objections concerning whether (WPM) has some problems with certain assumptions about grounding, I then consider the objection that (WPM) undercuts the argument from emergence for monism; as to accommodate emergent properties one would need to accept there

are fundamental properties had collectively by the plurality of its parts, and thus there would not be an ‘asymmetry of supervenience’ between it and its proper parts. I argue that the argument from emergence however is not undercut by this though, as there is still an asymmetry of supervenience between the Cosmos and all its proper parts *distributively*, and this is all the argument from emergence needs to succeed. Finally, given it is important for (WPM) that the Cosmos is nomically integrated,²⁶ I consider a recent objection to the Cosmos being necessarily nomically integrated: the possibility of island universes (Baron & Tallant 2016). I respond to this objection by arguing that even if (weak)²⁷ island universes are metaphysically possible, this would not actually undermine the Cosmos being nomically integrated.

In **Chapter Nine**, I argue that (WPM) has another strong advantage over (SPM) in that it has a novel solution to the problem of heterogeneity for monism not available to (SPM): namely, that weak priority monists can explain the world is heterogeneous because the Cosmos is identical to the collective plurality of its proper parts. After considering several solutions to the problem available to (SPM), I hold that the only solution available to them which might rival (WPM)’s is to hold that the Cosmos instantiates a distributional property (Parsons 2000; 2004). However, I argue that this solution is ultimately untenable as it cannot deal with Ted Sider’s (2007) objections that a monist cannot explain the size of the statespace nor have a plausible account of intrinsic properties. By contrast, I argue that the (WPM)’s solution can do so, and thus (WPM) has a solution to the problem of heterogeneity better than any available to (SPM).

Following this chapter, I’ll bring the dissertation to a close and conclude that Weak Priority Monism is a plausible new position on what is fundamental; it has the strengths of Strong Priority Monism and Collective Allism, while not having their decisive weaknesses. That Weak Priority Monism is not only a coherent, but attractive answer to the (FMQ), shows the value of taking both

²⁶ Because it being nomically integrated is what shows that the Cosmos is an integrated whole, and not the mere plurality a universal plurality would be if (CAI) were false.

²⁷ I say weak here, as strong island universes would show that monism cannot be necessarily true. However, I argue in the chapter that strong island universes are not metaphysically possible.

collective fundamentality and Composition as Identity seriously in debates about fundamentality. This PhD dissertation then is an important contribution to the growing literature on grounding and fundamentality.

Chapter One: Metaphysical Foundationalism and grounding

In this dissertation, I am going to argue for a version of priority monism; which I call ‘Weak Priority Monism’ (WPM). But before I do so, it’s necessary that I explore why one would want to be either a monist or priority pluralist to begin with. That is, I need to assess whether we should think that there even are any fundamental entities, and whether they must exist as a matter of metaphysical necessity. In the course of this chapter, I plan on doing exactly that and defend the thesis that there are fundamental entities which ground the non-fundamental (i.e. derivative) entities. I’m going to argue then that metaphysical foundationalism is true: the thesis that (i) reality is hierarchically structured (by grounding relations) and (ii) the structure of reality is well-founded (the derivative entities are grounded in fundamental entities) (Bliss MS, 1). If metaphysical foundationalism is necessarily true, then there must necessarily be some entities which are fundamental and are not grounded in any other entities.

I’m going to begin the chapter by arguing that reality is hierarchically structured by relations of metaphysical *ground*: a non-causal determinative relation which underwrites metaphysical explanation, in the same way it is said that causal relations underwrite causal explanation (Schaffer 2016). After offering brief explication and justification of this notion, I will then argue that this relation must be well-founded: all non-fundamental entities are grounded in some fundamental entities (Dixon 2016b, 440).¹ I argue that this is so because grounding is a super-internal relation: a relation, Rxy , is super-internal iff “necessarily, if x exists then y exists in virtue of the existence of x and Rxy obtains in virtue of the existence of x (Cameron 2014, 95).” It is because grounding is super-internal that derivative entities are piece of an *ontological free lunch* and ‘nothing over

¹ This definition for grounding’s well-foundedness has been offered T.S. Dixon (2016b), but in the original formulation he denotes the relata as being facts rather than entities which can belong to a number of ontological categories. I’ve also formulated grounding as being plural in both locutions, whereas Dixon (as well as most grounding theorists) only formulate grounding as being plural in one locution (i.e. the grounds). I’ve done this as there might well be cases where some entities are *collectively* grounded in some entities even though they are not *distributively* grounded by them (see Dasgupta (2014) and Litland (2016; 2018) for potential, albeit controversial, examples of this). It should be noted that in plural logic a plurality can be satisfied by a single thing, so this definition is obviously compatible with one entity being fundamental or being grounded in the fundamental.

and above' the entities which ground them. However, I'm going to argue that if this is so, there must be *something* that the free lunch is nothing over and above; there must be some entities which are fundamental and thus 'an addition of being' for there to be entities which are 'no addition'. Hence of pain of a vicious grounding regress (on which there would be no source for the being of any entity), there must necessarily be some fundamental entities. Metaphysical foundationalism is therefore necessarily true.

1.1. Grounding

1.1.1. *Grounding and Full/Partial Ground*

Suppose someone asked you for an explanation of why the Labour government collapsed on the 28th March 1979. It might be the explanation they were asking for was that of a *causal* explanation for why the government fell. The explanation you might offer might then involve the fact the Liberals had decided to end their confidence and supply arrangement with Labour the previous year, that the SNP decided to table a no confidence motion in the government, and that the Leader of the Opposition (Margaret Thatcher) decided to table her own no confidence motion in response to the SNP's. Facts of these sort could give someone a good explanation of how it was that the Labour government fell.

But it might be that the person asking the question is after a different sort of explanation. That is, what they might be after is a *metaphysical* explanation for why the government fell. In which case, the explanation you might then offer would involve explaining that the government must have the confidence of the majority of MPs in the House of Commons. What explains the fact the Labour government fell then is that it no longer had the *confidence* of the majority of MPs in the Commons, and without such a property the government cannot continue in office. But an explanation of this sort does not appear to involve causation. Rather, the relation which underwrites this sort of explanation is constitutive and non-causal, and where the constituent(s) of

the explanans is ontologically prior to the constituent(s) of the explanandum. Many contemporary metaphysicians maintain that this relation is that of the *metaphysical grounding*.²

Other putative examples of include the relationship between a disjunction and its disjuncts. For instance, suppose the disjunctive fact ‘I was born in Redditch or I was born in Worcester’ is true *because* ‘I was born in Redditch’. In this case, we maintain that the disjunctive fact holds *in-virtue-of* one of the facts corresponding to a disjunct, while each fact corresponding to a disjunct does not obtain *in-virtue-of* the disjunctive fact. Another example is that of the relationship between universals and the particulars which instantiate them. Genghis Khan, for instance, does not exactly seem to have been a benign individual if historians are to be believed; so, presuming one is fairly permissive about what universals there are, it seems plausible that Khan instantiated the universal ‘being cruel’. Assuming one is a Platonist, one will hold that Genghis Khan’s cruelty is grounded in him instantiating the universal ‘being cruel’ and not vice versa. Consider also the following cases:

Singleton: Socrates’ singleton obtains *in-virtue-of* Socrates

Physicalism: My mental state *M* obtains *in-virtue-of* the physical state *S* of my brain

Categoricism: The sphere’s disposition of being able to roll is grounded in its being spherical

Integrated Whole: A person’s finger is grounded in the person³

While one may dispute any of the above examples,⁴ what they share in common is that there is an asymmetric non-causal relation in which an entity obtains in virtue of another entity. Even if one

² One famous proponent of grounding, Kit Fine (2012, 38-40), would likely dispute this as this being a case of *metaphysical* grounding, and instead hold that it is a case of *normative grounding*. Most grounding theorists however would probably dispute this and hold that cases of metaphysical and normative grounding just involve one relation of grounding.

³ The example is initially Aristotle’s (1984, 1634), though is referenced by Schaffer (2009, 374; 2010a, 47) when he argues there are plausible cases where we judge the whole to ground its proper parts rather than vice versa. Schaffer calls wholes of this sort *integrated wholes*, as they display a genuine unity that mere aggregates (i.e. heaps of sand) do not.

⁴ For instance, Paul Audi (2012a, 103) thinks that grounding does not hold between either objects or substances; non-physicalists and identity physicalists will dispute whether mental states are grounded in physical states; dispositional monists (i.e. Bird 2007) reject that any dispositional properties are grounded in categorial properties.

is sceptical of a particular example of grounding, one may well accept other examples of it such that one affirms that there is such a relation.

Some philosophers however are sceptical of whether there is such a thing as ‘grounding’ and have complained that the notion is either unintelligible (Daly 2012) or is too coarse-grained to do any useful work (Wilson 2014; Koslicki 2015). Jessica Wilson, for instance, has argued that there is no “Big-G” grounding relation which subsumes the particular cases of grounding, as there is no theoretical work it could do apart from the “small-g” grounding relations such as composition, set membership, the determinable-determinate relation and so on. It is these small-g relations which do the explanatory work in each of their respective areas of metaphysical inquiry, and there is nothing that grounding can do alone which *illuminates* what is going on here in these debates. I do not agree and in fact think it is because grounding is more coarse-grained than these small-g relations that it can do the explanatory work we postulate it to do.⁵ In particular, I think grounding is useful because it can support *cross-categorical* metaphysical explanation. To see this, consider the following example.

As we have seen, it is plausible to suppose that Socrates’ singleton obtains in-virtue-of Socrates and not vice versa. Even though it is necessary that if Socrates’ singleton exists then so does Socrates, it is not plausible that Socrates depends upon his singleton for his existence. Rather, it seems the other way round; the singleton depends upon Socrates for its existence (Fine 1995). Now suppose that wholes are ontologically dependent upon their parts, and hence that Socrates’ existence and nature depends upon some arrangement of his parts. Thus, the fact that Socrates’ singleton depends upon and is explained by Socrates is underwritten by the set membership

⁵ One argument that people are often attracted by in favour of “Big-G” grounding is that it is needed to fix the relation of priority between the more fundamental and the less fundamental entities in some ontological category. Wilson (2014) however rejects that we need any Big-G grounding relation for this and that some primitive specification of fundamentality is all that is required; specifying what is fundamental (as well as possibly other assumptions about the small-g grounding relations in question) will fix what entities are less fundamental as well. While this strategy might work when restricted within a single ontological category in fixing the relation of priority (i.e. what we might call *flat* cases of grounding), as we will see in a moment, I do not think it can explain away cross-categorical (i.e. *dimensional*) cases of grounding.

relation, and the fact that Socrates depends upon and is explained by his parts is underwritten by the parthood relation. But what relation then underwrites the relationship between Socrates' parts and Socrates' singleton? Socrates' singleton it seems depends upon and is explained by Socrates' parts, as without those parts being arranged in a "Socrates-wise" way there would be no singleton Socrates. But it is neither the case that Socrates' parts are members of the set which contains him, nor are they proper parts of the set. For Socrates' parts to explain why his singleton exists seems to require there to be some relation which underwrites the metaphysical explanation and is transitive. Otherwise, why should we assume that Socrates' parts can explain his singleton if there is no transitive *relation* between them? The fact that there is metaphysical explanation which cuts across different ontological categories suggests that there is a relation which can cut across them. And this relation must be grounding.⁶

As such then, we need to be aware that just as something may only provide a partial or full explanation (whether either causally or metaphysically) for some other entity, there is a distinction between something being a *partial* or *full* ground for another entity. A full ground is a ground which is sufficient by itself to ground some entity, whereas a partial ground is *not necessarily* sufficient. Let us say that for some Φ to partially ground some Δ is for it to be the case that:

⁶ I do not think then that Wilson's idea that specifying what is fundamental fixes the ontological priority will work, as what we need is a relation which is both genuinely explanatory and (crucially) is transitive. We need, it seems, some kind of explanatory and transitive dependence relation which subsumes both parthood and set membership. Otherwise there is no reason to assume that Socrates' singleton is explained by his parts, even though his singleton is dependent upon Socrates and Socrates upon his parts. Specifying that mereological simples are fundamental (and perhaps certain facts about the small-g relations in question) won't serve to explain why some entities in some ontological category *explain* some others in a different category where there is no small-g grounding relation which *directly* relates them. It doesn't necessarily follow that Socrates' parts being more fundamental than Socrates, and Socrates being more fundamental than his singleton, that Socrates' singleton can be *explained* by his parts. Furthermore, how can Socrates' parts be more fundamental than his singleton unless we assume there is some transitive relation which holds between them *which is not a small-g relation*? That they are connected in such a way surely requires postulating a transitive Big-G relation, given the transitivity of relative fundamentality. So, I don't even think even that Wilson can explain the transitivity of relative fundamentality here, let alone the transitivity of metaphysical explanation.

Partial Grounding: Φ partially grounds Δ =df for some Γ , (i) Δ is fully grounded by Γ and (ii) Φ are among Γ ⁷

Every full ground then is a partial ground, but the converse does not hold. Consider the conjunction ‘the ball is red and the ball is round’. The ball being red is a partial ground for the conjunction but is not a full ground for it as it is not sufficient for it to be the case. Rather, the conjunction’s full ground are the two conjuncts, ‘the ball is red’ and ‘the ball is round’.⁸ If we are to then explain why some entity exists and has the intrinsic nature it has in virtue of some others, only specifying a partial and not its full grounds will fail to give us a complete explanation of the grounded entity. Every grounded entity must be fully grounded.⁹

1.1.2. Grounding as a Strict Partial Order relation

Given the explanatory role of grounding, it is often taken to be a relation of strict partial order; that grounding induces an ontological hierarchy on the world from the more fundamental entities to the less fundamental ones. It is generally assumed that grounding exhibits the following structural features (where q stands for some arbitrary entity and the other variables stand for distinct pluralities of entities):

Irreflexivity: It is not the case that Γ ground themselves

Asymmetry: If Γ ground Δ , then it is not the case that Δ ground Γ

Transitivity: If Γ ground Δ , and Δ ground Φ , then Γ ground Φ

Non-monotonicity: If Γ ground Δ , it is not necessarily the case that $\Gamma + q$ ground Δ

⁷This definition is pretty much lifted from T.S. Dixon (2016a, 376), except Dixon regiments grounding as being plural in one locution (i.e. the grounds) and singular in the other (i.e. what is grounded). By contrast, I regiment grounding as being irreducibly plural on both sides (see footnote one).

⁸ Following Dixon (2016a, 376), we can then define a *proper partial ground* (PPG), where for some Φ to properly partially ground some Δ is for it to simply be the case that: Φ partially grounds Δ , but it is not the case that Φ fully grounds Δ . When partial ground is invoked in the literature, it is generally (PPG) what is being invoked.

⁹ As such, when I refer to some entities grounding some others I should be taken as stating that they are full grounds (as opposed to only partially) unless otherwise specified.

The requirement that grounding is asymmetric however actually follows from the requirements that grounding is irreflexive and transitive; if the latter two requirements hold, grounding must be asymmetric.¹⁰ What connects these three principles is the conception that grounding is a *generative* relation. We hold that grounded entity obtains in virtue of its grounds and not vice versa. That no entity bootstraps itself into being. And that if some grounded entity is grounded in some other grounded entity, then what the grounds the latter will also be a ground of the former. It is because grounding has these features that we can say some entity or entities are ontologically prior to some others, and that potentially all grounded entities are ultimately grounded in some fundamental ones. Non-monotonicity, meanwhile, is assumed given the explanatory nature of grounding. If Socrates' singleton is fully grounded in Socrates, it does not seem plausible that is also grounded in Aristotle. Aristotle's existence and intrinsic nature are not relevant to whether Socrates' singleton exists; it plays no explanatory role explaining that there is a set which only contains Socrates as its member. Any ground must underwrite some metaphysical explanation of why what it grounds obtains and has the intrinsic nature it has.¹¹

There have been challenges though to the principles that grounding be irreflexive, asymmetric and transitive. Carrie Jenkins (2011), for instance, has questioned whether grounding is always irreflexive. Suppose we are token-identity theorists, and we hold that my mental state M is identical to the physical state S of my brain. Yet we still might hold that the mental state is explained by and obtains in virtue of the brain state, while the converse does not hold. In which case given $M = S$, we would have a violation of grounding's irreflexivity. The asymmetry of grounding has been

¹⁰ Proof: Suppose that x grounds y , and y grounds x ; then given the transitivity of grounding x will ground x . This however violates the irreflexivity of grounding, so either grounding cannot be transitive or irreflexive if we accept it can be symmetric.

¹¹ One may be tempted to think that if some entities fully ground some others, then no other entity or entities fully ground these grounded entities. That is, they might accept Paul Audi's (2012b, 699) principle of *minimality*: If Γ fully ground Δ , it is not the case that there is some Φ such that (i) $\Gamma \subset \Phi$, and (ii) Φ ground Δ . But minimality is false. Consider the following case (adapted from Dixon (2016a, 385-386)): the conjunctive fact 'the ball is red and the ball is scarlet' is fully grounded in both of these facts: 'the ball is red' and 'the ball is scarlet'. However, the conjunctive fact also seems to be fully grounded in the 'the ball is scarlet' alone, as the 'ball is red' is grounded in that fact (presuming determinables are grounded in their determinates). But in that case the conjunctive fact is both fully grounded in 'the ball is scarlet' alone yet also in both facts, which is a violation of minimality. As will become clear, the rejection of minimality is crucial if my preferred version of Priority Monism (Weak Priority Monism (WPM)) is at all plausible.

challenged by Ricki Bliss (2014; 2018), Gonzalo Rodriguez-Pereya (2015), Elizabeth Barnes (2018) and Naomi Thompson (2016). Bliss, for example, argues that one might hold that the north and south pole of a magnet are both grounded in one another; that the north pole of the magnet exists depends upon there being a south pole of the magnet and vice versa (Bliss 2014, 249).¹²

I do not think anything can *directly* ground¹³ itself,¹⁴ and I am suspicious of apparent symmetrical cases of grounding. But despite my suspicion, I would not be particularly troubled by there being certain cases of grounding being symmetrical providing the relata of such relations are ultimately grounded in fundamental entities.¹⁵ As Gabriel Oak Rabin (2018) has suggested, grounding being non-symmetric is compatible with reality being hierarchically structured. It is only if all cases of grounding are symmetric that it would be make no sense as to how one entity could be ontologically *prior* to another. If two entities grounded one another but were both grounded in some entity which they did not ground, then it is clear that this third entity would be relatively more fundamental than the two entities it grounds. If symmetrical cases of grounding only occur between derivative entities, grounding can still be well-founded. In any case, the assumption that grounding is asymmetric is overwhelmingly supported by those in the grounding literature. When we say that some entities are grounded in others, what we are describing is *prima facie* an asymmetric explanatory relation.

What I think what is particularly threatening to the notion of grounding though are the attacks upon its transitivity. As we saw in the Socrates cross-categorical example, it was the fact that some *transitive* relation was required which led me to postulate “Big-G” grounding. It is grounding

¹² It should be noted that any challenge to the asymmetry of grounding is also a challenge to its irreflexivity, presuming the transitivity of grounding.

¹³ By direct grounding I mean *immediate grounding*, which I will elucidate on in a moment.

¹⁴ See Raven (2013, 196-198) for a response to direct attacks on grounding’s irreflexivity.

¹⁵ Though it would possibly undercut the argument that grounding is well-founded because it is *super-internal*: in cases of symmetric grounding the relation does not appear to obtain only in virtue of *one* of the relata, but rather both. Perhaps in response, one could hold that grounding is super-internal only in the asymmetric cases or hold that there are actually two grounding relations corresponding to the distinct small-g relations at issue in these cases, and that both of these relations are super-internal. The latter move however will not work if the same small-g relation connects both entities and is what is responsible for the symmetric dependence.

always being transitive which enables it to be a *generative* relation; and which will eventually lead us to suppose it must be well-founded. Jonathan Schaffer (2012) has raised a number of counterexamples to grounding being transitive. Suppose, for example, that a certain sphere has a dent. It is plausible to suppose that the dent partially grounds the shape of the sphere; the maximally determinate shape the sphere has is in part due to it having a dent, after all. It also seems the case that the sphere's shape grounds the fact that the sphere is more-or-less spherical. But given grounding's transitivity, that would mean the sphere being more-or-less spherical is partially grounded in in the dent. But the sphere's dent does not plausibly seem to provide any explanation at all for the sphere being more-or-less spherical; if anything, the sphere is more-or-less spherical *despite* it having the dent.¹⁶¹⁷

Michael Raven (2013) is not convinced by any of Schaffer's counterexamples, as he holds that they all implicitly rely on the following principle:

Irrelevance: If F is irrelevant to G , then it is not the case that F helps ground G (Raven 2013, 198)

Raven is deeply suspicious of Irrelevance and does not think it is obvious that a ground should necessarily be relevant to what it grounds. I agree with Raven, but I think we need to be careful here. After all, much of the reason why people are attracted to ground is because of its connection metaphysical explanation. When an entity is grounded in some others, we hold that we can explain

¹⁶ It should be noted however that Schaffer (2012) thinks that we can recover the notion that grounding is a generative relation by supposing it is a contrastive relation. That is, we should formulate grounding as being a quaternary relation that includes a non-obtaining ground as an alternative and a non-obtaining grounded entity as an alternative. So, the claim that the dent grounds the sphere's shape would be formulated as 'that the sphere has a dent *rather than having no dent* grounds that it has a certain shape S *rather than S^** '. This is of course inspired by contrastive treatments of causation, and Schaffer claims that by holding that grounding is contrastive we can restore grounding's transitivity and overcome his counterexamples. I prefer the idea that we can maintain grounding is transitive without having to suppose it is a quaternary relation, but I really don't mind if the reader prefers Schaffer's solution to the one I'll put forward.

¹⁷ Takho (2013) and Rodriguez-Pereya (2015) have also argued that grounding is not transitive if we take truthmaking to be a case of grounding. Consider the fact 'Socrates is white'. That fact is a truthmaker for the proposition <Socrates is white>, which in turn is a truthmaker for the proposition <There are propositions>. But 'Socrates is not white' is not a truthmaker for <There are propositions> (Rodriguez-Pereya 2015, 523). One way to respond to this counterexample is to deny that truthmaking is a species of grounding itself.

the former in terms of the existence and intrinsic nature of the latter. In some sense then, grounds are explanatorily relevant to what they ground. Irrelevance then appears to be true after all.

I do not think this is the case though, providing we can distinguish between something's *immediate* and *mediate* grounds. For Φ to mediate ground Δ is for it to be the case that:

Mediate Grounding: Φ mediate grounds Δ =df there is some Γ such that (i) Φ grounds Γ and (ii) Γ grounds Δ

An immediate ground is a ground *which need not be mediated*, as (opposed to *not being mediated*) something can both be an immediate and mediate ground of something else. Consider the following example from Kit Fine. The disjunctive fact 'A \vee (A \vee A)' is grounded in A immediately, as the disjunct on the left obtains immediately in virtue of A . The disjunctive fact however is also mediate grounded in A , as the right disjunct is grounded in 'A \vee A', which in turn is grounded in A . A both is an immediate and mediate ground of 'A (A \vee A)' (Fine 2012, 50-51).

Given this distinction, we can define a replacement notion for Irrelevance which will capture the link between grounding and explanatory relevance. Let me define this as Irrelevance*:

Irrelevance*: If F is explanatorily irrelevant to G , it is not the case that F helps ground G *immediately*

The idea here is that an immediate ground must be explanatorily relevant to what it grounds. If some entities immediately grounds another, those entities must underwrite some metaphysical explanation of why the grounded entity exists and has the intrinsic nature it has. Irrelevance* seems to capture what we mean when we say that grounds must provide an explanation of what they ground. This principle however is perfectly compatible with holding that some *mediate ground* is not explanatorily relevant to something it grounds. Providing this mediate ground grounds an immediate ground which is explanatorily relevant to the grounded entity, it does not matter whether it is a good explanation of this entity. Consider again the case of the dented sphere. The

sphere's dent plays no explanatory role in explaining why the sphere is more-or-less spherical. But the fact that the sphere is more-or-less spherical is both grounded and explained in the fact it has some maximally determinate shape, which in turn is both partially grounded and explained in the sphere's dent. But all this is compatible with Irrelevance*, as there is no purported immediate ground here which is not explanatorily relevant to what it grounds.¹⁸

I think the lesson to be learned here is that metaphysical explanation is not transitive, but that does not undermine grounding being so providing we distinguish the two notions. Grounding is not metaphysical explanation, but rather *underwrites it*. This is just as causal explanation is not causation but is underwritten by causation. Grounding is said to be something akin to 'metaphysical causation'.¹⁹ Thus, as it is a mistake to conflate causation with causal explanation, it would also be a mistake to conflate grounding with metaphysical explanation. Providing we do distinguish these two notions from one another, we can avoid counterexamples to grounding be transitivity while preserving its connection to metaphysical explanation via Irrelevance*.²⁰

1.1.3. *Grounding as a cross-categorical relation*

So far, the way I have used grounding suggests that it is a relation whose relata can be of any arbitrary ontological category. That objects, properties, sets and so on, can all be the relata of grounding relations. Supporters of this view include Jonathan Schaffer (2009; 2016) and Ross Cameron (2014; forthcoming). But this is controversial. Some philosophers instead claim that grounding is a relation between facts; a view which has been expressed by Gideon Rosen (2010)

¹⁸ It should be noted however that Raven (2013, 199) thinks a case can be made for thinking that the dent does provide some partial explanation for why the sphere is more-or-less spherical. But I'm not going to concern myself with that here, as I'm more interested in outlining a general response to transitivity worries.

¹⁹ This is the view of Jonathan Schaffer (2016), who holds that we can structure grounding in "the image of causation". Alastair Wilson (forthcoming) goes even further and argues that grounding *actually is* metaphysical causation. The difference between grounding and ordinary (nomological) causation, for Wilson, is that the mediator for causation is the laws of nature whereas for grounding it will be something else (i.e. composition, property instantiation etc...). Bernstein (2016), though, is sceptical though that grounding is like causation at all and thinks that there are important differences between the two.

²⁰ This means I should be counted as being a 'grounding separatist': I hold that grounding is not metaphysical explanation but underwrites it. By contrast, those who hold that grounding *is* metaphysical explanation are 'grounding unionists'.

and Paul Audi (2012a; 2012b). Others, however, hold that grounding is not even a relation. Rather, grounding is instead a non-truth functional sentential operator; a view which is held by Fabrice Correia (2010) and Kit Fine (2012).²¹ This raises the matter of whether I am justified in holding that grounding is a cross-categorical relation, and what implications this might have for my dissertation if I am wrong about this.

To begin with the latter, not much. If some grounding theorists are sceptical of my conception of ground, then they can simply paraphrase my claims about ground in terms of their own conception of it. Take the following grounding claim I will often make throughout the dissertation:

Cross-Categorical: The Cosmos grounds all its proper parts

Those who prefer regimenting grounding as a relation between facts can paraphrase this as:

Facts: Facts about the Cosmos ground all the facts about its proper parts²²

While those who hold that grounding is a sentential operator can paraphrase this as (where ‘*because*’ stands for a sentential operator):

Sentential Operator: That there are proper parts of the Cosmos is *because* there is a Cosmos

But having said that, I do think there is good reason to think that grounding is a cross-categorical relation. Like Schaffer (2016, 83-90), I think opponents of the cross-categorical view arguably are conflating grounding with metaphysical explanation. Like we do with causation and causal explanation, we need to distinguish between explanations and the relations which back them.

²¹ Their motivation for this is ontological neutrality; they do not want to necessarily commit themselves as to whether the purported relata of the grounding claim exist or whether there even is a relation of grounding (see Correia 2010, 254; Trogdon 2013, 6).

²² It’s worth mentioning, however, that Paul Audi (2012a, 103) rejects that parthood is a species of grounding because he thinks that one cannot plausibly regiment such grounding claims if one thinks the relata of grounding are facts and that they are states of affairs. This is because he thinks that if we translate parthood grounding claims in terms of facts (conceived as states of affairs) you would have to invoke ‘existence’ as a property; for instance, “the fact that the parts exist ground the fact the whole exists”. Audi, however, thinks that as existence is not a genuine property, we should reject that grounding can occur between objects. However even if Audi is right about this, I can’t see why one would need to necessarily invoke an existence property to explicate how an object is grounded in its parts. Chris Daly (personal communication), for one, suggests to Audi that one could just hold that there are some facts about some whole which are grounded in some facts about its parts.

Regimenting something either as a sentential operator or as a relation between facts is more apt for metaphysical explanation than it is for the grounding relation which backs it. Suppose we regiment a certain causal claim as follows:

Facts: The fact that the ground was dry and the fact that lightning struck caused the fact there was a fire

Sentential Operator: There was fire a because the ground was dry and lightning struck

According to Schaffer, neither of these two regimentations seem plausible for causation. As he says, “[i]t is because there is a causal relation between the events involved ... that there even arises a causal explanation at all (Schaffer 2016, 85).”²³ Similarly, we need to regiment grounding as a cross-categorical relation which backs metaphysical explanation, rather than it itself being metaphysical explanation.

This is further supported by the fact that, as we saw earlier, that grounding is transitive while metaphysical explanation is not. The sphere’s dent is a partial ground for it being more-or-less spherical, even though plausibly it does not help explain at all why the sphere is more-or-less spherical. Once we distinguish grounding from metaphysical explanation, the more inclined will we be to hold that it is a cross-categorical relation which underpins metaphysical explanation.

1.2. Metaphysical Foundationalism

1.2.1. *Grounding as a super-internal relation*

In this section, I’m going to argue in favour of metaphysical foundationalism and hold that it is a metaphysically necessary truth. To do so, I’m going to argue that there *must* be some fundamental entities because grounding is a super-internal relation. But what do I mean by this?

²³ It should be noted that Schaffer is relying upon the fact that causation is a relation between events, as opposed to facts. This is controversial. D.H. Mellor (1995), for instance, holds that the relata of causation are facts. This leads Wilson (forthcoming, 4) to judge that grounding too is a relation between facts, given his thesis that grounding *is* metaphysical causation.

One theoretical utility it is purported that grounding has, is that it can explain why *derivative* entities (i.e. grounded non-fundamental entities) are pieces of an *ontological free lunch*. What is grounded is ‘nothing over and above’ its grounds, and in postulating such entities we are not adding anything that is an ‘addition to being’. The being of what is grounded is inherited from its grounds, and if they too are grounded then they will inherit their being from what grounds them. As we shall see later on this chapter, it is this “transference of being” model that has led many to suppose that grounding is well-founded: that all derivative entities are grounded in fundamental entities.

Is there any reason though for supposing grounding can deliver such a benefit? Well, a good reason to think it can is if we suppose grounding is *super-internal*. That is:

Super-Internal: A relation is *super-internal* =df necessarily, for all x and y , if Rxy then necessarily, if x exists then y exists in virtue of the existence of x and Rxy obtains in virtue of the existence of x (Cameron 2014, 95)

Basically, a super-internal relation is a relation that holds in-virtue-of only one of the *relata*, and where the existence of that *relatum* ensures that the relation holds and also that the other *relatum* (or *relata*) exists and has the intrinsic nature it has. Put the generating *relatum* in place, and the other *relatum* and the *relation will just come along with it for free*.

According to Karen Bennett (2011, 32-33) it is this structural feature of grounding which makes it *generative*. Suppose you’re a physicalist. You are not going to want to say that the relation between the physical and the mental obtains in-virtue-of both *relata*. Rather, you are likely going to insist that it is the physical facts that the relation obtains in-virtue-of, and those physical facts make it the case the mental facts exist and have the nature they do. Settle the physical facts, and God ‘need do nothing’ to ensure the mental facts will come along with them. Fix the grounds and what they ground (as well as the grounding relation between them)²⁴ will come along with it for free.

²⁴ Bennett thinks that this conception of ground helps one solve the ‘grounding’ grounding problem; the question of what grounds the grounding relations themselves (i.e. if A grounds B , what grounds the grounding relation between

Grounding being super-internal is what allows it to do much of the work we want it to do (Bennett 2011, 32-33).

Ross Cameron (2014) holds that it is grounding being super-internal which explains why mereology is ontologically innocent (i.e. why mereological fusions are ‘no addition to being’ above their proper parts), as well as other puzzles in mereology. For instance, why is it that we take it not to be a problem that I am co-located with my proper parts, whereas we do in the cases of objects which share all their proper parts? The answer for Cameron is that it is plausible to suppose that we are grounded in our parts. It is because my location property obtains in virtue of the locational properties of my parts, as to why I am co-located with them. It also seems too, that grounding being super-internal gives us a potential solution to the exclusion problem for mental causation. If mental properties are fully grounded in physical properties, then any overdetermination here is not problematic, for the mental cause is ‘nothing over and above’ the physical cause of the event they both mutually cause. Grounding being super-internal explains why this is not a problematic case of overdetermination; the event being caused is not being caused by two distinct portions of reality.²⁵

Holding that grounding is a super-internal relation commits one, though, to grounding necessitarianism:

Grounding Necessitarianism: If Φ grounds Δ at time t and world w , then in any arbitrary world and time at which Φ obtains, Δ also obtains²⁶

A and B). If the grounding relation obtains in virtue of the grounding relatum, there is no need to postulate, for instance, a distinct grounding relation via which the original grounding relation is grounded (Bennett 2011, 35). In more recent work however, Bennett (2017) comes to reject that grounding (or what she calls *building*) is super-internal and thinks that the extrinsic features of the ground often matter in whether the grounding relation holds. She still holds though that the grounding relation obtains in-virtue-of the ground, so still thinks she has a solution to the grounding grounding problem. Louis deRosset (2013) also posits the same solution to this problem, though arrives at it independently from Bennett.

²⁵ See Kroedel and Schulz (2016) for a solution to the exclusion problem which relies on grounding, though they do not appeal to grounding being super-internal as part of their solution (though both authors are grounding necessitarians, which is implied by grounding being super-internal).

²⁶ Rosen (2010, 118) defines this principle as ‘Entailment’ (where ‘ \leftarrow ’ denotes full ground, $[p]$ an arbitrary fact and Γ a plurality of facts): If $[p] \leftarrow \Gamma$ then $\Box (\wedge \Gamma \supset [p])$

Grounding necessitarianism seems to be upheld by most grounding theorists, but it is nevertheless controversial. Grounding contingentists reject that grounds always *necessitate* what they ground and think it is possible that a ground need not ground what it does at a certain time and possible world. In which case, grounding contingentists will undoubtedly reject that to explain *ontological free lunch* that grounding must be a super-internal relation. Instead, it will just be a primitive feature of grounding that derivative entities are ‘nothing over and above’ what grounds them.

Personally, I’m sympathetic towards grounding necessitarianism, but a thorough defence of it is beyond the scope of this chapter.²⁷ However, I think if one is going to assert that derivative entities are ontologically innocent, grounding contingentism threatens to make the relationship between the grounds and the grounded too *modally loose*. If something is ‘nothing over and above’ its grounds, that suggests the mere existence of the grounds is sufficient to account for what it grounds. Fix the grounds and you fix what they ground. If the existence of the grounded entity is not necessitated by its grounds, it seems to suggest that they are ‘something over and above’ them.²⁸ By contrast, if we accept that grounding is a super-internal relation we do get a satisfying explanation of why grounded entities are a free lunch, as the existence of the grounds is sufficient to account for what they ground.²⁹

1.2.2. *Metaphysical Foundationalism*

²⁷ For arguments against grounding necessitarianism, see Leunenberger (2014) and Skiles (2015).

²⁸ I think this is somewhat similar to the complaint made against weak composition as identity (CAI), that it cannot account for the innocence of mereology. Proponents of weak (CAI) (i.e. Lewis 1991) claim that composition is only *analogous* to identity, rather than being a relation of identity (i.e. strong (CAI)). Thus, the innocence of mereology is explained in terms of its likeness to identity as opposed to it to being identity. But I don’t find this a convincing explanation of the innocence claim, as (unlike strong (CAI)) in asserting that there are mereological fusions one is committing oneself to a distinct thing apart from its parts. I struggle to see how a mere analogy explains why mereology is innocent (see Yi 1999). I think weak (CAI)’s failure indicates the problems grounding contingentism arguably faces in asserting grounding is contingent.

²⁹ It should be noted however, that if you’re a grounding contingentist who nevertheless thinks grounding is well-founded, then the version of monism I’m going to argue for will still very probably be of some considerable interest to you. My defence of (WPM) is neutral on whether grounding is necessary or contingent (though the debate about it being necessary or contingent will need to be formulated to fit a counterpart-theoretic framework (see chapter six)); accepting (WPM) does not require accepting grounding is super-internal. I only argue that grounding is super-internal here to motivate why one would believe grounding to be well-founded, but the reader doesn’t necessarily have to buy this in order for them to be attracted to (WPM).

Metaphysical foundationalism is the conjunctive thesis that: (i) reality is hierarchically structured (by grounding relations), and (ii) is well-founded: “maximal³⁰ chains of phenomena ordered by the grounding relation terminate in a fundamental ground (Bliss MS, 1).” In other words, to be a metaphysical foundationalist is to hold that there are grounding relations at different levels of reality and chains of those relations terminate at entities which themselves are ungrounded and ground everything else. To be a metaphysical foundationalist is to hold that grounding must be well-founded: all non-fundamental entities are grounded in some fundamental entities (Dixon 2016b, 440).³¹ Foundationalists suppose that derivative entities must exist in-virtue-of fundamental entities, without which there would be nothing else at all. As Jonathan Schaffer (2010a, 37) puts it: “There must be a ground of being. If one thing exists only *in virtue of* another, then there must be something from which the reality of the derivative entities ultimately derives.”

Metaphysical foundationalism can then be seen as being analogous to epistemic foundationalism. As the epistemic foundationalist holds that justification cannot stretch back forever (or be circular) and must terminate at basic beliefs which support the epistemic agent’s other beliefs, the metaphysical foundationalist holds that grounding cannot stretch back forever without a source and must terminate at fundamental entities which ground the grounded entities. Similarly, metaphysical versions of epistemic infinitism and coherentism have recently been considered by metaphysicians; where chains of grounded entities stretch back forever without a fundamental ground (metaphysical infinitism) or that there is no fundamental ground as grounding can proceed in a circle (metaphysical coherentism) (Schaffer 2010a, 37). I’m supposing that grounding is asymmetric, which would rule out metaphysical coherentism; so, to show that foundationalism

³⁰ Following Dixon (2016b, 453), I take a maximal grounding chain to be one which terminates at some ungrounded entities. By contrast, non-maximal grounding chains are those (whether finite or infinite in length) which do not terminate at some ungrounded entities.

³¹ See footnote one for how I’ve formulated this differently than Dixon (2016b). One grounding structure discussed by Dixon, *fully pedestalled grounding chains*, which he uses to support his definition, will be discussed at length in this thesis; as it will turn out that on my view the entire Cosmos will ground its parts via such a grounding structure. It should also be noted that Rabin and Rabern (2016) also arrive at this formulation of well-foundedness, independently of Dixon.

then is true then I'm going to need to rule out infinitism. Why then think that grounding must be well-founded?

The most commonly suggested reason that grounding is well-founded is that an infinite regress of derivative entities would be vicious, as in such a regress it would be unclear as to why any particular entity has any being at all. Without a source of being, there would seem to be no explanation for the existence and nature of any of the derivative entities. It would not be clear as to how being ever 'got off the ground at all'. This is the *transference of being* argument in favour of grounding being well-founded. But why suppose the transference of being model of grounding is correct? Well, it certainly seems to be correct if we think that grounding is a super-internal relation: that the intrinsic nature of the grounding *relatum* is *sufficient* for the grounded entity to exist and for there to be a grounding relation between it and its grounds. If we think that the existence of the grounds alone is sufficient to generate what it grounds, then it looks like there has to be some ungrounded entities which generate the derivative entities. Suppose there is an infinite grounding chain which contains entities which are all pieces of an *ontological free lunch*. In which case, what exactly is it those entities are nothing over and above? Nothing? This point is also acknowledged by Ross Cameron (2014, 100, fn 23), who says:

“Does this mean, if there is an infinitely descending chain of entities, each grounded by the next, that I can avoid being ontologically committed at all? Surely not! But if not, that might cause you to doubt the claim that derivative entities are a free lunch: when everything is derivative it's not the case that everything is a free lunch, so why should the derivative things be a free lunch in the lucky case when there's a bottom level?”

Schaffer (2016, 95-96) also seems to be aware that it's grounding being super-internal that leads to an infinite grounding regress being vicious. If grounded entities inherit their being from their grounds, then there must be a source as there cannot be inheritance without one. Just as one cannot be rich in virtue of having an infinite sequence of debtors (each borrowing from the

previous debtor), one cannot have being in-virtue-of an infinite sequence of grounds (each *borrowing* their being from their immediate ground).³² Hence, unless there are some fundamental entities, “being would be infinitely deferred, but never achieved (Schaffer 2010a, 62).”

Subsequently, it becomes clear as to why certain objections that Ricki Bliss (2013) puts forward against metaphysical foundationalism do not succeed. Bliss is sceptical that the transference model would lead to an infinite grounding regress being vicious, as she questions what is problematic about each entity having its being ‘conditionally’. Considering the idea that a chain of entities which have their being conditionally must terminate at some entities which have it categorically, Bliss wonders why having such a property (i.e. being) conditionally is an inferior mode of property possession. She goes on to argue that an infinite regress should only be considered vicious if an explanation of a certain phenomenon fails at the first level of analysis but is repeated at every subsequent level: the explanatory failure which occurs at that first level being that the *explanans* is of the *same form* as the *explanandum*. The same failed form of explanation reoccurs at each explanatory level.³³ She does not think therefore that an infinite regress of entities is vicious if the phenomenon we are trying to explain is how each particular entity exists or has being. In explaining the existence of *y*, we do not also need to explain the existence of its grounds, the *xx*. This is because our explanations of *y* and the *xx* are not of the same form; our explanation of the latter will not be exactly like that of the former. Even if we do not have an explanation for the *xx* at hand, they are still nevertheless a satisfactory explanans for *y*. To justify this, Bliss (2013, 414, fn46) points to causal explanations:

³² I’m assuming that every grounded entity is immediately grounded. However, it might be possible that some grounded entities lack immediate grounds (see section three of chapter five for a discussion of this point).

³³ A typical example of this is the homuncular theory of perception, where perception is being explained via a homunculus which sits behind the eye. The problem is that the homunculus would itself need a homunculus to explain how it perceives and thus perception would never ultimately be explained. By Bliss’ analysis of vicious regresses, what makes such a regress vicious is that the same failed form of explanation is reoccurring at each level of explanation, such that it is never actually explained how perception works (Bliss 2013, 411).

“The smashing of the window by the tree is adequately explained in terms of the storm, plus other relevant details such as the brittleness of the glass, etc. Although one might wonder why anything exists at all, our explanation of the broken window is not inadequate because it does not make recourse to the Big Bang or God.”

To explain the cause of a particular effect we do not necessarily think that the cause has gone unexplained if we are unable to postulate some ‘first cause’ to explain it. Suppose the window broke because somebody threw a rock at it. This is a distinct event from the window’s breaking which provides an adequate causal explanation for the why window broke. And even if we don’t know why the person threw the rock, that does not mean we do not have a causal explanation for why the window broke. Just because we cannot provide an ultimate or global account of some phenomenon, that does not mean a ‘local’ account of it must be inadequate. In the case of grounding then, Bliss thinks that just because we cannot provide some fundamental ground for a derivative entity and its immediate grounds, it does not mean that neither cannot be adequately explained by derivative entities.

But once we understand that grounding is super-internal, Bliss’ objections very much lose any force they might have otherwise had. Consider Bliss’ causal analogy. Causal relations are typically considered to be external relations which occur between distinct regions of space-time; nobody thinks they are super-internal relations. As Schaffer (2016, 95) points out, effects exist in their own right and are not pieces of an *ontological free lunch* which are ‘nothing over and above’ their causes. Not even fans of the cosmological argument and the principle of sufficient reason (PSR) think that effects are in any way less real than their causes (except perhaps God). Hence to explain why the window smashed, it is a perfectly sufficient explanation that it is because, for instance, someone threw a rock at it. Nobody thinks that the smashed window’s *being* needs to be explained by the rock. But grounding is a different story. Grounded entities are *generated* by their grounds and have no being in their own right. If we are looking for an explanation for *why each entity has*

being, then then explanatory demand is not satisfied by explaining it in terms entities whose own being needs to be explained. As has already been said, pieces of an ontological free lunch need there to be something they are ‘nothing over and above’. There have to be entities which are a meal we’ve paid for. If grounding is super-internal it must terminate at some fundamental entities.³⁴

Resultantly, I think the metaphysical infinitist has to deny that the transference of being model is correct and instead try offer another model of how derivative entities get their being. A model which would allow there to be an infinite regress of derivative entities. Matteo Morganti (2015) has made such an attempt of formulating such a model, which he bases upon infinitist accounts of epistemic justification in which justification for a proposition *emerges* from its chain of reasons. Epistemic infinitists face a similar worry to their metaphysical counterparts, in that they have no way of accounting for why an agent could ever have justification for a proposition if that justification is had conditionally in virtue of an infinite chain of reasons. If *p* provides justification for a proposition *q* but *p* itself needs to be justified in virtue of some reason *p**, which itself requires justification by a reason *p*** and so on *ad infinitum*, it is not clear how *q* could ever be justified. Such a regress seems to be vicious if one holds to the transference model of justification, in which justification is fully transferred from one proposition to another. If *q* depends on justification being transmitted to it for being justified, then it does not seem possible how it could ever receive it via an infinite chain of reasons.

If one, however, holds to an emergence model of justification, then such a regress would not be vicious. According to this model of justification, justification emerges gradually from the *chain as a whole*. Jeanne Peijnenburg and David Atkinson (2013) attempt to construct such a model, in

³⁴ Though I think Bliss’ causal analogy fails even if grounding is not super-internal. Even if one favours a deterministic interpretation of quantum mechanics, it at least seems metaphysically possible that causation is indeterministic. Few people today hold that it is a metaphysically necessary truth that causation is deterministic. Whereas even most grounding contingentists would accept that grounding is never indeterministic. They would accept that specifying the grounds and *some relevant background conditions* (i.e. the fact that some preempting entity doesn’t exist which precludes the ground grounding the grounded entity) ensures the grounded exists. For some arguments that grounding (or what Bennett calls *building*) is always deterministic, see Bennett (2017, 50-52).

which they interpret ‘ p is a reason for r ’ as ‘ r is more probable if p is probable than it is if p is not probable’ (2013, 552). Suppose that p has a certain unconditional probability of being true, and that we begin by adding intermediate justifying reasons between p and r which have a certain conditional probability of being true. Peijnenburg and Atkinson demonstrate that the more one adds intermediate reasons between p and r , p ’s role will gradually become less and less in determining what r ’s probability value is. When the length of such a chain becomes infinite, p becomes irrelevant in determining the probability of r . Instead, the conditional probabilities (i.e. the intermediate reasons) fully determine what r ’s probability value is, and thus no initial source of justification need be postulated in order for r to be justified. R ’s probability (and hence justification) comes from the infinite chain itself as a whole. When infinite in size the chain itself plays a role in determining whether r is justified. Hence on the emergence model of justification, justification need not originate from any source in order for a proposition to be justified.

Morganti makes use of Peijnenburg and Atkinson’s work by arguing that being could also emerge in the way justification does. A derivative entity, x , has its being fully determined by an infinite chain of grounds in which “*the infinity of the series is the fundamental requisite for the being ... [of x] ... to be fully realized* (Morganti 2015, 562).” The being of x will be determined by all the levels of reality which are ontologically prior to it, with each level being as important as each other in ensuring that x has being. There is no need for any ‘source of being’ as each entity will have its being provided by the infinite chain of grounds *as a whole*.

While justification might well emerge in the way Peijnenburg and Atkinson think it does, I don’t think their model can be applied to grounding or metaphysical explanation. As Olley Pearson and Donnchadh O’Conaill (MS, 16) have pointed out, Peijnenburg and Atkinson interpret ‘ p is a reason for r ’ in a much weaker sense than what grounding is taken to be. If one interprets ‘ p is a reason for r ’ as a stronger conditional, such as ‘if p were true, q would be true, and if p were not true, q would not be true’, then justification cannot emerge; which Peijnenburg and Atkinson (2013, 550)

themselves admit would be the case. Instead they understand ‘ p is a reason for r ’ as being the weaker conditional ‘ r is more probable if p is probable than it is if p is not probable’. But not even grounding contingentists take grounding to be this modally weak. If one replaces any of a derivative entity’s full grounds without replacing them, that entity will cease to exist. For some derivative entity x to exist, then all the entities which ground it will need to exist to ensure that x is grounded. Take away my full grounds at some mereological level (i.e. my molecules) and I cease to exist. But on the emergence model of justification, in an infinite series one will be able to subtract any of r ’s reasons without any effect on r ’s probability value. Even if you remove a reason, the length of the chain will still be infinite and thus will bestow the same value upon r . Indeed, it was this feature which allowed one to remove p as a justifying reason yet for r to still be justified. As such, I do not think the emergence model of being can plausibly be applied to either grounding or ontological dependence,³⁵ and hence there is no rival to the transference model of being. Therefore, given that grounding is super-internal, it must be well-founded.

1.3. Conclusion

In this chapter, I have argued that reality is hierarchically structured by relations of *metaphysical ground* and that these relations terminate at fundamental entities. Grounding is *well-founded*, and hence metaphysical foundationalism must be true as a matter of metaphysical necessity. I have showed this by arguing that there is such a relation of grounding and that it is super-internal. Given grounding is super-internal, it must be well-founded on pain of there being a vicious regress in which no entity ever got being. If all derivative entities are pieces of an ontological free lunch, then there must be something which they are ‘nothing over and above’. They cannot be nothing over

³⁵ I mention ontological dependence here, because even if one is a grounding sceptic, I extremely doubt you’ll think that one can subtract a full small-g grounding relation in the sense you can subtract a reason on the emergence model of justification. Subtract away all my molecules (presuming parts are ontologically prior to the wholes they compose) and I will cease to be.

and above nothing, after all. Therefore, grounding relations must terminate at the fundamental entities.

If this is true, though, this leads to speculation as to what exactly it is that such fundamental entities are. Are there multiple fundamental entities or is there perhaps just one? What must be required of the *fundamentalia* for them to do the work we require (i.e. provide 'being' for all the derivative entities)? In the following chapter, I aim to explore what plausible positions there could be which answer the first of these questions, while obeying the constraints posed upon them in answering the second. I aim to explore what exactly the fundamental could be.

Chapter Two: Fundamental Mereology

In the previous chapter, I argued that grounding is well-founded: that all derivative entities are grounded in fundamental entities via *maximal*¹ grounding chains. This was because I held that grounding is a super-internal relation, such that the grounded entity and the grounding relation between it and its full grounds, hold in-virtue-of and are guaranteed to exist if the entities doing the grounding exist. Indeed, it is this structural feature of grounding which makes it a *generative* relation. But if this is so, then grounding must terminate at some fundamental entities on pain of a *vicious* regress. If each derivative entity is a piece of ontological free lunch which obtains in virtue of its grounds, then there must be a *source* for why it exists and has the intrinsic nature it has. For if not, then what exactly is it the grounded entities would be ‘nothing over and above?’ Nothing? If derivative entities are no additions to being, then there must be some entity or entities which are *additions* to being to account for the derivative entities. Grounding therefore must be a well-founded relation.

The thesis that grounding must necessarily be well-founded is that of *metaphysical foundationalism*, and as such there can be no possible world in which there are entities which are not ultimately grounded in the fundamental entities. The aim of this chapter is to explore what the fundamental entities could be. Are they mereological simples? Or is it perhaps the entire Cosmos (i.e. the object which is composed out of all other objects) which is what is fundamental? In considering this, I will look at what constraints the *fundamentalia* will need to abide by to be able to sufficiently ground all the derivative entities. As we shall see, it will be required that the fundamental entities obey what Jonathan Schaffer (2010a, 38) calls the *Tiling Constraint*: that the

¹ As set out in the previous chapter, I take a maximal grounding chain to be one which terminates at some fundamental entities. By contrast, non-maximal grounding chains are those (whether finite or infinite in length) which do not terminate at any fundamental entities (Dixon 2016b, 453).

fundamental entities must collectively cover a world while being disjoint from one another. Though we will need to modify it, to account for certain views and possibilities that Schaffer's initial formulation of it precludes. This includes the possibility that *all entities taken collectively* (as opposed to *distributively*) are the *fundamentalia* and that all individual entities are grounded in this fundamental collective: a position which Raul Saucedo (MS) denotes as *Collective Allism*. I do not believe that such possibilities should be ruled out *tout court* at the very beginning of our theorizing.

In the first section of this chapter, I will consider what ontological category the fundamental entities might belong to. While I will not explore this matter in rigorous detail, I will hold that there is good reason to suppose that the fundamental entities are concrete objects (or are *pluralities* of concrete objects), as opposed to being tropes, platonic universals or states of affairs. This is because these other views may well be subject to Bradley-style vicious regresses, in which grounding *never fully terminates* at some fundamental entities. Following this I will set out the Fundamental Mereological Question (FMQ), which asks what concrete object or objects are fundamental. In the second section, I will set out a pluralized version of the Tiling Constraint and provide some arguments in its favour. For one, I'll point out that my version accommodates positions that Schaffer's singularized version of the constraint cannot. In the third section I will then consider what positions can meet the constraint. Ultimately, I'll conclude that only Priority Pluralism, Priority Monism and Collective Allism can satisfy the Tiling Constraint.

2.1. The Fundamental Mereology Question

In the previous chapter I argued that there was a relation of *metaphysical ground* which hieratically structured reality and was well-founded: all non-fundamental entities are grounded in fundamental entities (Dixon 2016b). All the derivative entities must supervene on and be 'accounted for' by the fundamental ones. As such, the plurality of all the fundamental entities will need to be a *minimal supervenience base* for every entity in the world. Duplicating all the fundamentalia will suffice in

duplicating all the derivative entities they ground. The question is what exactly could such fundamental entities be that make up such a base?

The first thing to consider is what ontological category such entities might belong to.² I think there are four plausible answers to this question. The fundamental entities are either platonic universals, bundles of tropes, states of affairs or concrete objects. I think that only these four sorts of entities could be the ones in which all the derivative entities are fully grounded. The first of these views is *Deep Platonism*: the thesis that particulars are fully grounded in universals (Carmichael 2016). On this view, my existence and intrinsic nature will be ultimately grounded in universals that are instantiated by either me or whatever objects ground me.³ The second position is that of a bundle theory of tropes: the thesis that particulars are fully grounded in bundles of tropes, with each trope in the bundle being connected together through the relation of compresence. On this view, what will be fundamental are those tropes which constitute the concrete objects in which all other concrete objects are grounded. Suppose that all composite objects are grounded in mereological simples, for example. Then what will be fundamental will be the tropes that constitute each of the simples. The third position is the facts or states of affairs view: that the *fundamentalia* are states of affairs, from which concrete objects and properties are composed out of *non-mereologically* (Armstrong 1997). Suppose the Cosmos grounds all its proper parts and instantiates a certain distributional property, *D*. Then what will be fundamental will be the fact or states of affairs that

² It should be noted that in exploring what the fundamental entities are, I am only considering what fundamental entities would be necessarily required to provide a minimal supervenience base for all entities which *supervene on the physical*. I am open, for instance, to there being worlds in which substance dualism is true. In exploring what the fundamental entities are, though, I am only interested in those entities which could plausibly ground all the derivative, physical entities that there are, and not in any non-physical entities along the lines of souls or angels. This qualification should be borne in mind, when I formulate the Tiling Constraint.

³ Of course, it is possible to hold that both particulars and universals are fundamental, and thus that neither are grounded in one another. Such a position seems to be held by Van Inwagen (2004), who thinks we need universals (including *uninstantiated* ones) to make sense of quantification over “things which can be said *of* things (2004, 132)” (i.e. unsaturated assertibles) when we translate them into first-order logic. Van Inwagen rejects, however, that such universals are more ontologically fundamental than their constituents. If you conceive of platonic universals in such a way, then you should probably embrace a restricted version of the Things-First thesis on which some class of derivative entities (which perhaps are only derivative concrete objects) are fully grounded in fundamental objects.

‘the Cosmos has D ’ which is composed out of the Cosmos and D .⁴ The fourth position is what Schaffer (2010b, 344, fn3) calls the *Things-First* thesis:⁵ that all derivative entities are fully grounded in fundamental objects. Again, suppose that all composite objects are grounded in the mereological simples that compose them. Then the mereological simples will be the fundamental entities.

In this dissertation, I will assume that the Things-First thesis is correct, and thus what is fundamental are some class of concrete objects. Giving a rigorous defence of the Things-First thesis is probably a task which would require a PhD in itself, and this not the intention of my thesis. What I am trying to do in this PhD is consider what is fundamental *if we presume that the Things-First thesis is true*. However, if one is of the mind that Deep Platonism or a bundle theory of tropes is correct, I hold that this PhD thesis will still be of much interest to you. For even though no concrete object will be fundamental, the question of which concrete objects are *basic* will still remain. To say that some concrete objects xx are basic is to hold that the xx are not grounded in any other concrete objects yy . That is (where xx and yy stand for plural variables, ‘B’ Basic, ‘C’ concrete and ‘ \leftarrow ’ that some entities are fully grounded in some others):

Basic: $B_{xx} =_{df} C_{xx} \wedge \neg(\exists yy (C_{yy} \wedge xx \leftarrow yy))$ (Schaffer 2010a, 38)⁶

⁴ Some caution is needed here, given that one might hold that Armstrong should be interpreted as thinking states of affairs about distinct objects are as fundamental as one another; hence ‘this electron has mass’ is just as fundamental as ‘the Cosmos has D ’. Furthermore, if one holds that facts are the relata of grounding, one might have a problem in claiming that objects and their properties are *themselves* grounded in states of affairs, given that only facts (conceived as states of affairs) would be able to enter into grounding relations. But I don’t think there is anything in Armstrong’s conception of states of affairs which rules out some states of affairs grounding others, especially if we recall his solution to Bradley’s Regress. For him, the initial states of affairs of ‘ a is P ’ would be the truthmaker for the state of affairs ‘there is a state of affairs of a is P ’ and so on, and thus the former fact would be more ontologically fundamental than the latter (1997, 118-119). And if we hold that grounding only obtains between facts, we could simply hold that objects and properties *ontologically depend* upon states of affairs, which is perfectly compatible with holding that facts about certain objects and properties are grounded in other facts about distinct objects and properties.

⁵ One of my supervisors, Matt Tugby, is of the view that the name ‘Things-First’ might be potentially misleading in that someone might take it as expressing that particulars are the only entities that exist. It should be noted that this is not the case, and it only expresses the claim that if there are universals that they are going to have to be grounded in particulars.

⁶ This formulation differs from Schaffer’s original formulation, in that I make use of plural rather than singular variables in defining basicness. This is because, unlike Schaffer, I am open to the idea that some objects can be basic even though each of them *distributively* are not. As we shall see, one position on what is fundamental, Collective Allism, holds that all objects are fundamental *collectively* even though *each* of them are derivative entities.

Even if then it is the case that there are no fundamental objects, the question of which objects are basic will still need to be answered. After all, it seems there would have to some basic objects even if they were not also fundamental, for otherwise there would be a vicious grounding regress. For *reductio*, suppose that wholes are grounded in their proper parts and the world is gunky (i.e. every object is composed out of proper parts). In which case, it would seem there would be no basic objects and there would be an infinite regress of grounding which never terminated at any entities. For there to be some fundamental properties which ground everything else (i.e. for grounding to be well-founded), there need to be some basic objects which instantiate them. Furthermore, what the basic objects are would be informative in respect to what the fundamental properties are. For example, if the bundle theory of tropes is correct and the Cosmos is the basic object, then what the fundamental entities would be are tropes that constitute the Cosmos.⁷ So even if you reject the Things-First thesis, this dissertation will still be of great interest to you.

I do think, however, that there is good reason to hold that the Things-First thesis is true, in that at least other two rival views may well suffer from Bradley-style vicious grounding regresses. If, for instance, *A is F* is grounded in *A* instantiating the universal *being F*, then if *A* instantiating *F* is a contingent fact, then it seems as if there must be some other universal which when instantiated *necessarily* binds them together. So, *A* instantiating *F* will need to be grounded in *A* and *F* instantiating *instantiation*; but given this is also contingent it too will require a ground, and so on *ad infinitum*.⁸ In the case of trope bundle theory, if some tropes make up a bundle, they must be linked together via some compresence trope, so they can constitute the bundle. But this seems to require a ground, as those tropes did not have to make up that specific bundle. Another compresence trope is needed to ground the original compresence trope connecting the other

⁷ Though see chapter nine, where I discuss the view that the Cosmos is grounded in its tropes as a potential solution to the problem of heterogeneity. I hold that (WPM) provides a better solution to the problem than the trope view would.

⁸ For a discussion of this, see Dixon (2018, 61-70). Dixon discusses two variants of this regress (i.e. the *naïve* and *sophisticated* instantiation regresses) and rejects a number of responses one could give in response to it.

tropes, but this too requires a ground, for it and the other tropes did not have to make up that bundle. And so on *ad infinitum*.⁹ By contrast, I will argue that two Things-First theories can avoid vicious grounding regresses (i.e. Collective Allism and Weak Priority Monism (WPM)) and therefore there is some reason to think the Things-First thesis is preferable to its rivals.¹⁰

I'm going to assume then that the *fundamental* must be concrete objects, and that all derivative entities are thus all fully grounded in some object or objects. But what objects exactly are the fundamental ones? Let us call this *Fundamental Mereology Question (FMQ)*¹¹ (where *xx* is a plural variable):

(FMQ): What concrete objects, *xx*, are fundamental?

In the following two sections I'm going to consider what such objects could be and what criteria they would have to meet to provide a satisfactory answer to this question. But before I do so, I think that any answer to the (FMQ) also needs to provide a satisfactory answer to what I call the *Grounding Question (GQ)* (again, let *xx*, and also *yy*, stand for plural variables):

(GQ): For any entities, *xx* and *yy*, if the *yy* are grounded in *xx*, then *why* are the *yy* grounded in *xx*?

That is, if we hold that some entity/entities are grounded in some others, we need to provide an explanation as to *why* they are grounded in those entities. If we suppose that Socrates' singleton is grounded in Socrates, then we could explain that this is so because sets are grounded in their members. It is in the essence of a set that it must have a member (Fine 1994, 4-5), and it is this

⁹ It might be argued however that the regress depends on tropes being *transferable* (i.e. tropes could have belonged to different particulars than they do), and that by assuming they are non-transferable one could halt the regress. I do not have the space to discuss the matter in full detail (see Maurin (2010) for a discussion of trope bundle theory and Bradley's Regress).

¹⁰ What about the states of affairs view? I actually think Armstrong's solution (1997, 116-119) to Bradley's Regress solves the problem, because for him the fundamental entities are the states of affairs as opposed to either the universals or particulars; the state of affairs obtaining *necessarily makes it the case* that some particular instantiates a universal. However, I'm just not attracted to the idea that states of affairs are fundamental entities and hold that the constituents of them are more fundamental.

¹¹ I've taken the name of this question from Claudio Calosi (2014, 917).

fact which explains why Socrates' singleton is grounded in Socrates.¹² What I'm suggesting then, is that in producing an answer to the (FMQ), one must also be able to produce an answer to the grounding question. The pluralist, monist etc... must explain by 'what means' their *fundamentalia* ground the derivative entities, and if they cannot so, their answer to the (FMQ) will be implausible. As we'll see, a Priority Monist might try and answer the grounding question by arguing that proper parts are grounded in their wholes. It is the fact that each proper part is grounded in some bigger whole, such that we can trace the source of its being through chain of parthood to the maximal concrete object.¹³ And – if successful – this which would explain why the monist's *fundamentalia* (i.e. the Cosmos) is able to ground any of its proper parts. We will not, however, need to concern ourselves with the grounding question for the rest of this chapter.

Another couple of points need to be mentioned before we move on. Firstly, I presume that Existence Monism and mereological nihilism are false, and that composition at least occurs in some worlds. Mereological nihilism is the position that *it is necessary* that all objects are mereological simples, while Existence Monism is the view that it is necessary there is only one object: the Cosmos (Schaffer 2007; Horgan & Potric 2008; Cornell 2016). I'm going to presume both these views are false in this dissertation. However, I do think much of the motivation for believing in either of these theses' is undercut by grounding. If grounded entities are an *ontological free lunch*, we can have an ontology as parsimonious as the nihilist's while upholding common sense intuition that there *exist* ordinary objects such as my laptop, my housemate's television and my copy of the Wise Man's Fear.

¹² A possible rejoinder here is for someone to point out the possibility of there being *bare* grounding relations: grounding relations which are not underwritten by any small-g relation. One such example of such a bare grounding relation would be the claim that 'the Magic Mountain exists because certain facts about Thomas Mann obtain' (Wilsch 2015, 3297)." However, asserting a bare grounding relation will still need justification, such that it will involve giving some kind of answer to the (GQ). For instance, we can explain that the Magic Mountain is grounded in certain facts about Thomas Mann by holding that novels are grounded in facts about their authors.

¹³ It should be noted though that Schaffer (2010a, 44-45) thinks that it is possible that wholes can be grounded in their proper parts even if Priority Monism is true. I will discuss this later on in the thesis in both chapter five and chapter seven.

Secondly, it should be clear that I am supposing that one's answer to the (FMQ) is a *necessary answer*: that if one's answer to the (FMQ) is false in one world, it is false in all of them. For grounding to be well-founded, there must be a ground for all being in all worlds, and what that ground is must always be the same. Some philosophers though have questioned this inference and hold that one's answer to the (FMQ) can be *contingent* (even if grounding is well-founded).¹⁴ However, just as it seems to odd to think that the ontological category properties belong to (i.e. universals, tropes, classes etc...) can vary world to world, it seems to odd to think what sort of thing the *fundamentalia* are can vary world to world (Schaffer 2010a, 56). The fundamental nature of reality is very much a metaphysical matter, and in doing metaphysics what we seem to be doing is investigating what things hold true of everything in modal space. Furthermore, explanatorily, having an answer to the (FMQ) which can give a unified treatment of accounting for all what there is, is preferable than giving a disjunctive account where what is fundamental depends on what world we are referring to (Schaffer 2010a, 63). For instance, it seems simpler to hold that monism is necessarily true, than supposing it is true for some class of worlds, that pluralism is true for some other class of worlds and that Collective Allism true is for some other class of worlds. At the very least then, having a necessary answer to the (FMQ) is theoretically desirable on explanatory grounds.¹⁵

2.2. The Tiling Constraint

In this section, I'm going to sketch out the constraints that any answer to the (FMQ) will need to meet. It is not plausible, for instance, to suppose that a chair located on the 69th floor of the Shard is the only fundamental entity. Such an object could not provide a minimal supervenience base for

¹⁴ Siegel (2016), Benocci (2017) and Trogdon (2017), for instance, have argued that Priority Monism is contingently true. I'll discuss Siegel's argument in the eighth chapter, in the context of discussing Baron and Tallant's (2016) island universe objection to monism.

¹⁵ Ross Cameron (2008) has argued that we should (on contingent grounds) suppose there are fundamental entities, as if they exist then we would have a better unified explanation of all what there is in the actual world than if there were no such entities. Cameron's justification here seems isomorphic to the justification that *it is better* to have a unified (fundamental) explanation of all what there is *across modal space*.

every entity in the world. Any position on what the fundamental entities are then will need to obey what Schaffer calls the *Tiling Constraint*. Any position on what is fundamental will need to meet this constraint, so we will need to see what it demands before we can investigate what answers to the (FMQ) are compatible with it.

In specifying the Tiling Constraint and throughout this PhD dissertation, I will be assuming that *Minimal Extensional Mereology* (MEM) is true (Simons 1987, 31). This is the mereological system which is often considered to consist of the *minimum* necessary mereological truths and ensures that mereology is extensional: that no two or more distinct objects can be mereologically indiscernible. I take parthood (\leq) as a primitive which satisfies the following axioms:

Reflexivity: $\forall x (x \leq x)$

Anti-Symmetry: $\forall x \forall y ((x \leq y \wedge y \leq x) \rightarrow x = y)$

Transitivity: $\forall x \forall y \forall z ((x \leq y \wedge y \leq z) \rightarrow x \leq z)$

What these axioms entail is that (i) everything is a part of itself (ii) objects which are parts of each other are the same object and (iii) that if some object x is the part of an object y and y is the part of another object z , then x is a part of z . With the notion of parthood outlined we can now define proper parthood, mereological overlap and mereological disjointedness:

Proper Parthood: $x < y =_{df} x \leq y \wedge x \neq y$

Overlap: $O_{xy} =_{df} \exists z (z \leq x \wedge z \leq y)$

Disjointedness: $D_{xy} =_{df} \neg O_{xy}$

Proper parthood is thus a relation of strict partial order, in that it is irreflexive, asymmetric and transitive. Any two or more objects which overlap must share at least one common part, and any two or more objects which are disjoint cannot share any parts. To ensure that mereology is extensional, however, we need the following axiom:

Strong Supplementation Principle (SSP): $\forall x \forall y \neg(x \leq y) \rightarrow \exists z (z \leq x \wedge Dzy)$

(SSP) holds that if an object x is not part of some other object y , then it must have some other part, z , which is disjoint from y . Given Anti-Symmetry, (SSP) entails that any objects which are composed out of the same parts are numerically identical.¹⁶ This is because (SSP) entails the ‘Uniqueness of Composition’ (UC); the strongest of the extensionality principles, which states that any two mereological fusions of any sum of parts are the same object.¹⁷

I have made the decision to assume that (MEM) is true as opposed to *Classical Extensional Mereology* (CEM), because (CEM) guarantees that there is a maximal concrete object given its axiom that composition is unrestricted: that any arrangement of parts has a mereological fusion. As we shall see, however, one of the major objections to Priority Monism comes from the possibility of mereological junk (Bohn 2009a), which would rule out there always existing a maximal object in each possible world. In his original formulation of the Tiling Constraint, however, Schaffer assumes “that the [fundamental] actual concrete objects collectively cover the cosmos without overlapping (2010a, 38).” But it isn’t appropriate to assume that such an object exists in formulating the constraint when the very existence of such an object might be called into doubt by opponents of monism. It is clear then that not only should we not presume (CEM) from the outset, but that Schaffer’s Tiling Constraint needs revising.

Another reason why the Tiling Constraint needs to be revised is because I think it’s coherent that some entities can be fundamental *even if each one of them is not*. Schaffer originally formulates the Tiling Constraint in terms of singular logic, so for some entities to be fundamental *each* of those entities would have to be fundamental. It is coherent to suppose though, for instance, that

¹⁶ It should be noted that (SSP) entails another of (MEM)’s axioms, the ‘weak supplementation principle’ (WSP): that if x is a proper part of y , then there must be some z which is a proper part of y and is mereologically disjoint from x . To get the full strength of (MEM), though, we need another axiom which is not entailed by neither (WSP) nor (SSP), which is Product: that if x and y mereologically overlap, then they must have some common part, z , which is the mereological fusion of their common parts. Product, however, is not required for mereology to be extensional.

¹⁷ By comparison, a weaker extensionality principle, such as the ‘extensionality of proper parthood’ (EPP), is compatible with two distinct objects being composed out of the same sum of mereological simples, for instance; providing they have at least one distinct proper part (Varzi 2008, 110).

every object in the world is fundamental when taken collectively, even though *each* of them is not. The distinction I am making is that some things can be fundamental *collectively* even if they are *not distributively*. We could say that some plurality of objects are fundamental, even if each of those objects are derivative entities grounded in those objects taken collectively. *Prima facie*, this looks to be a violation of the irreflexivity of grounding. If each entity in a plurality is grounded in that plurality (i.e. grounded in itself and the other entities taken collectively), then each entity will figure in its own grounds. It seems as if then that each entity partially grounds itself, but this cannot be so if grounding is an irreflexive relation. But I don't think this is the case. Just because an entity is amongst some plurality which is a ground does not entail that *it* (i.e. the entity) does any grounding. What does the grounding is the *plurality of entities*, rather than each of them. I'll have more to say on this matter in chapter six, so I would ask the reader to suspend their judgement on this for now if they are still sceptical that this would not involve a violation of grounding's irreflexivity.

What the above shows is that the Tiling Constraint needs to be able to accommodate *pluralities of* entities, rather than just individual entities. The constraint therefore (unlike in Schaffer's initial formulation) needs to be formulated in terms of plural logic. Therefore, in addition to there being the singular variables we have in singular first order logic, I'm going to hold that there are plural variables (i.e. xx) and that these can be bound by the same quantifiers which bind singular variables. A plural variable, however, can be satisfied by a single thing, so singular predication implies plural predication. 'There is something that is polka-dotted' entails 'there are some things that are polka-dotted' (presuming the domain of the existential quantifier is the same). But plural predication does not necessarily imply singular predication, as plural predicates can be collective. Some predicate P is *distributive* if it applies to some things iff it is true of each of those *individual* things, while P is *collective* if it is not distributive. 'Some things weigh more than a tonne' can be read either as applying to each individual thing (the distributive reading) or only to all those things taken

together (the collective reading). If the predicate ‘weigh’ is collective, then we cannot infer from ‘some things weigh more than a tonne’ that ‘something weighs more than a tonne’.¹⁸

I’m also going to assume that there is a two-place logical predicate, ‘ \ll ’, which expresses the relation of *is-one-of/are among*. If I hold then then that $a \ll bb$, then what I am saying is that a is one of the things denoted by bb . If I hold that $aa \ll bb$, then what I am saying is that the things denoted by aa are amongst the things denoted by bb . If the *relata* on either side of this relation are the same (i.e. $a \ll a$) then the relation should be understood as identity. The is-one-of relation satisfies the following axioms:

Reflexivity: $\forall xx (xx \ll xx)$

Anti-Symmetry: $\forall xx \forall yy ((xx \ll yy \wedge yy \ll xx) \rightarrow xx = yy)$

Transitivity: $\forall xx \forall yy \forall zz ((xx \ll yy \wedge yy \ll zz) \rightarrow xx \ll zz)$

Like parthood then, the is-one-of relation is reflexive, anti-symmetric and transitive. Everything is one of itself. Things amongst each other are the same things. And if some xx are amongst some yy , and yy are amongst some zz , then xx are amongst zz . The is-one-of relation is thus a partial order relation, just as parthood is.

A plurality of some things is just those things, so there can be no empty pluralities; a plurality must contain at least one thing. Furthermore, any system of plural logic must obey the following axioms:

Comprehension: $\exists y \psi(y) \rightarrow \exists xx \forall y (y \ll xx \leftrightarrow \psi(y))$

Extensionality: $\forall xx \forall yy (\forall z (z \ll xx \leftrightarrow z \ll yy)) \leftrightarrow (\psi(xx) \leftrightarrow \psi(yy))$

¹⁸ Collective predicates are much of the reason why we need irreducible plural logic. We cannot, for instance, translate the sentence ‘Whitehead and Russell wrote the Principia Mathematica’ as ‘Whitehead wrote the Principia Mathematica and Russell wrote the Principia Mathematica’; neither wrote the Principia Mathematica by themselves, but only together. One might try and translate the plural terms into talk about sets or objects, but it seems difficult to believe that a set wrote the Principia Mathematica (Boolos 1984, 448). See Oliver & Smiley (2001) for criticism of strategies which aim to accommodate plurals in singular logic.

The plural comprehension principle states that for every satisfiable predicate ψ there is some plurality of things which satisfy it. Resultantly, every entity must be amongst some plurality. The plural extensionality principle states that pluralities which are co-extensive are indiscernible. Assuming then the ‘Identity of Indiscernibles’, it follows that they are one and the same plurality. Any two pluralities which consist of the same things are the same plurality. Suppose then there are four Fremen warriors. Then given plural comprehension and extensionality and the identity of indiscernibles, there is a *unique* plurality which solely consists of those Fremen.

Now that I’ve set out (MEM) and plural logic, I can now formulate a revised Tiling Constraint, which is based off the work of Raul Saucedo (MS). I hold that every derivative object must mereologically overlap with some plurality¹⁹ of fundamental entities and any property p must supervene on those entities²⁰; and that any entity amongst a plurality of fundamental entities must be mereologically disjoint from a member of a *distinct* plurality of fundamental entities. Unlike Schaffer’s original formulation, this allows to there to be no maximal object, as there need be no such object in order for either of these constraints to be satisfied. It also permits that the fundamental entities might be only fundamental when *taken together*, yet not distributively. This version of the Tiling Constraint then is open to potential coherent answers to the (FMQ) which Schaffer’s version rules out, while preserving the spirit of his version. It is still the case that the *fundamentalia* must provide a minimal supervenience base, which accounts for all what there is in the world; “[i]n a slogan: no gaps, no overlaps (Schaffer 2010a, 38).”

The Tiling Constraint consists of two sub-constraints; the *Covering* constraint and the *Minimality* constraint. That is (and let ‘F’ stand for ‘is fundamental’ and S for ‘supervenes on’):

¹⁹ Recall, a plurality can be satisfied by a single entity, so this version of the Tiling Constraint is still compatible with monism.

²⁰ Given I am presupposing the Things-First thesis is true and am only looking for a minimal supervenience base for *physical* reality, the reader should obviously not take p to be a non-physical property.

Covering: $\forall x \forall p (\exists yy (Fyy \wedge (Oxyy \wedge Spyy)^{21})$

Minimality: $\forall xx \forall yy ((Fxx \wedge Fyy) \wedge (xx \neq yy)) \rightarrow (Dxyy)$ (Saucedo MS, 24-25)

Covering states that all fundamental objects must overlap every object that there is and that every property must supervene upon them, while Minimality states distinct fundamental pluralities of entities must be mereologically disjoint. The former guarantees that the *fundamentalia* be a supervenience base for all that there is, while the latter guarantees that such a supervenience base will be minimal.

The reason for favouring the Covering constraint is obvious. If grounding is well-founded then all derivative entities must be grounded in fundamental entities, and so the class of fundamental entities must account for all what there is. If not, then there would be entities in the world whose being was unaccounted for. As for the Minimality constraint, there are two reasons for adopting the constraint. Firstly, is that *fundamentalia* are ontologically independent of any other entity, and therefore any plurality of fundamental entities should be freely recombinable with one another. Entities which overlap one another modally constrain one another; for instance, two Siamese twins cannot be located ten miles away from one another, if they retain all their common parts. No distinct pluralities of *fundamentalia* therefore can overlap with one another if their members should be freely recombinable. Secondly, we should aim for ontological parsimony in our metaphysical theorizing, and thus we should be able to account for all what there is in the world with the least amount of fundamental entities we require. Suppose that all mereological simples are fundamental, but in addition we hold that the chair on the 69th floor of the Shard is also fundamental. Unless there are emergent properties, however, the chair will supervene on the

²¹ Why I have specified that any property must supervene upon the fundamental entities? Wouldn't just stating any derivative object must overlap the fundamentalia be enough, to ensure that everything supervenes upon the fundamentalia? No. Suppose the mereological simples are fundamental, and that there is a composite object, Esther, which has an emergent property, *p*. Esther will mereologically overlap with the simples, but it will not follow that its property, *p*, supervenes on the simples. We need then a supervenience clause, to make clear that are fundamental objects are a supervenience base for all what there is.

simples and their intrinsic properties; the chair's existence and nature will be 'accounted for' by the simples. Having the chair then in one's fundamental supervenience base would be ontologically profligate, and so we should only include entities in such a supervenience base that our needed to *exhaustively* account for what there is in the world (Schaffer 2010a, 40-41).

2.3. Answering the (FMQ)

With the Tiling Constraint thus formulated, we are now in a position to contemplate what answers to the (FMQ) which are compatible with the constraint. Schaffer initially holds that there are only two potential answers to the (FMQ). Priority Pluralism: the thesis that more than one entity is fundamental. And Priority Monism: the thesis that only one entity is fundamental. Proponents of the former generally hold that it is the mereological simples which are fundamental, given their supposition that wholes are grounded in their proper parts. By contrast, monists are committed to holding that it is the maximal concrete object, *U*, which is fundamental, as it is the only *single* object that could meet the Tiling Constraint.

But this is only so on the 'singularist' version of the Tiling Constraint. By introducing plural logic into debates about fundamentality, Raul Saucedo (MS) argues that other potential answers to the (FMQ) become available. Saucedo holds that it is coherent to think that some entities can be collectively fundamental even if *each of them* are not fundamental, and that there can still be a distinction between the fundamental and derivative entities even if *all entities* are fundamental. On the pluralized version of the Tiling Constraint, Saucedo holds that the following distinctions make sense and are tenable:

Allism: Every entity is one of the fundamental entities

Someism: Only some entities are one of the fundamental entities

Individualism: Every fundamental entity is fundamental distributively and not collectively with others

Collectivism: Every fundamental entity is fundamental collectively with others and is not so distributively (i.e. is *non-distributively* fundamental)

Indiscriminativism: Every fundamental entity is fundamental collectively and distributively

That Collectivism and Individualism make sense, suggests the following principles may not be necessarily true:

Cumulativity: $\forall x \forall xx (x \ll xx) \rightarrow (Fx \rightarrow Fxx)$

Distributivity: $\forall x \forall xx (x \ll xx) \rightarrow (Fxx \rightarrow Fx)$ ²² (Saucedo MS, 11)

If Distributivity necessarily held for instance, then it would not be possible for some entities to be fundamental taken collectively but not distributively. As we shall see, given that I think Saucedo's own answer to the (FMQ) (i.e. Collective Allism) is intelligible despite violating Distributivity, I think that both conditionals are certainly open to question. And like Saucedo, I will end up denying Distributivity in defending (WPM).

How many answers are there to the (FMQ) which could meet the Tiling Constraint? Saucedo holds there are four: Individualist Priority Pluralism, Collective Priority Pluralism, Priority Monism and Collective Priority Allism. This is because he thinks that any Indiscriminativist view (i.e. Indiscriminate Pluralism²³ and Indiscriminate Allism)²⁴ will violate the Minimality constraint, as they involve distinct pluralities mereologically overlapping one another. On both views, every fundamental entity is both distributively and collectively fundamental, so suppose then all mereological simples are fundamental in both these ways. Each simple is itself a plurality (as everything *is one of itself*), so there will be mereological overlap between it and the plurality of all the simples; a violation of Minimality. The same is also true of Individualist Allism.²⁵ Supposing

²² Indiscriminativism is simply then the conjunction of these two conditionals.

²³ The position that there are many fundamental entities, which are fundamental both distributively and collectively.

²⁴ The position that *all* objects are fundamental entities and are fundamental both distributively and collectively.

²⁵ The position that all objects are fundamental entities and are so distributively.

every object is fundamental distributively, then the chair in the Shard and its simples will be fundamental and overlap; again, a violation of Minimality (Saucedo MS, 28). Furthermore, Individualist and Indiscriminate Allism seem to very much go against our intuition that there are grounding relations between parts and wholes. Proper parthood is generally taken to be an example of grounding,²⁶ and their does seem to intuitively to be at least ontological dependence between wholes and their parts. To maintain this, we must hold that many objects are derivative entities. Even the Tiling Constraint aside then, both these versions of Allism are implausible anyway.

This leaves us with four potential answers to the (FMQ) which could satisfy the Tiling Constraint:

Individualist Pluralism: Many, but not all, objects are *each* fundamental entities

Collective Pluralism: Many, but not all, objects are *collectively* fundamental entities

Priority Monism: There is *only one* fundamental entity

Collective Allism: All objects *collectively* are fundamental entities

The first three answers here are someist views: they hold that that only *some* entities are fundamental, while many others will be derivative.²⁷ Collective Allism, by contrast, holds that every entity is a fundamental entity, though only so collectively. By pluralizing the Tiling Constraint, we can see that there are actually two distinct versions of pluralism; one on which every fundamental entity is so distributively and one on which every fundamental entity is so collectively. I think the former is what pluralists would preferably want to defend; that it is each, for instance, mereological simple which is fundamental as opposed to them only being fundamental collectively.²⁸ The

²⁶ Though as mentioned in the previous chapter, Paul Audi (2012a, 103) is sceptical that parthood is a species of grounding. See footnote 22 of the previous chapter for a brief response.

²⁷ In formulating the original Tiling Constraint, Schaffer makes no distinction between Someism and Allism, though he does formulate Priority Pluralism such that it is incompatible with Allism (i.e. as it involves a negation of the Cosmos being basic) (Schaffer 2010a, 43). However, we've already noted that we should not presuppose the existence of the Cosmos in formulating the Tiling Constraint.

²⁸ Though I think many pluralists might actually accept Indiscriminate Pluralism: that the 'many' fundamental entities are distributively and collectively fundamental. Indiscriminate Pluralism though conflicts with the Minimality Constraint, so has been ruled out.

definitions of both these versions of pluralism, however, should be interpreted as being true of *at least one possible world*, rather than being necessarily true. It is doubtful that pluralists are necessarily against there being a world which contains a single fundamental entity; for instance, a world which only contains a single extended simple. Rather, what pluralists claim is that it is not a metaphysically necessary truth that there is only one fundamental entity, and that there are worlds in which more than one object is fundamental. Furthermore, as we've already seen, pluralists generally accept the following:

Atomism: The objects which are fundamental are the mereological simples (Schaffer 2010a, 44)

This of course arises because the pluralists think that wholes are grounded in their proper parts, as well as the fact that the fundamental entities existing on some 'intermediate' mereological level sounds somewhat arbitrary.²⁹

Priority Monists, however, hold that only one object is fundamental: the mereological sum of all objects, *U* (i.e. the Cosmos). Monists hold that in every possible world there is a single fundamental entity, and this entity is the Cosmos. Given this, monists generally think that proper parts are grounded in the wholes they compose, and that we can trace the being of each sub-cosmic object via chains of proper parthood back to the Cosmos. All derivative entities then will be grounded in this Cosmic Whole, and *no other object will be fundamental*.

But I don't think this latter point is necessarily correct. It is only correct if we suppose that *composition is not identity*. Composition as Identity (CAI) is the position that composite objects are identical to the parts which they are fusions of; that composition literally *is a form of identity*. Both Saucedo and Schaffer suppose that (CAI) is false when defending their respective answers to the (FMQ). Schaffer (2010a, 35) claims that "if the one literally *is* the many, then monism and pluralism would no longer be opposing views – indeed both "sides" would turn out to be right."

²⁹ This point will be further discussed in the upcoming chapter on mereological gunk.

Furthermore, the reflexivity of identity appears to be in tension with the irreflexivity of grounding. If wholes ground their parts but are also identical to them, this would imply that the parts ground themselves, violating grounding's irreflexivity. *Prima facie*, (CAI) seems to conflict with the notion of there being a hierarchy of being.

But this is a mistake. To begin with, it is crucial that one disambiguates the sense that wholes are identical to their parts; proponents of (CAI) generally hold that it is the thesis that the parts *taken collectively* are identical to the wholes they compose. And as we've already seen, the *collective* plurality of some things grounding *each* of those things does not necessarily involve a violation of grounding's irreflexivity. I'll discuss this point at greater length later on in the dissertation, but it seems to me that as long as we are careful not to hold that the whole is identical to each of its proper parts, then there is no contradiction in supposing it is *identical to all of them together* and yet grounds each of them.

Resultantly, I think it becomes clear as to why Schaffer is mistaken in thinking (CAI) would break down the distinction between monism and pluralism. I take Priority Pluralism (of both variants) to be the thesis that *some* privileged entities at a certain mereological level are fundamental. And if Priority Monism is true, this is false irrespective of whether (CAI) is true or not. It is still the case that *no object is itself fundamental other than the Cosmos*, and while it is true to say that the plurality of all the Cosmos' proper parts is fundamental, that plurality just is the *same thing* as the Cosmos. There is no thing that is fundamental which is not identical with the Cosmos. Schaffer is wrong; there is still a real distinction between monism and pluralism even if composition is identity.

If we are open to the idea of (CAI), then there are in fact two variants of Priority Monism:

Strong Priority Monism (SPM): The Cosmos is fundamental and only one thing

Weak Priority Monism (WPM): The Cosmos is fundamental and is *identical to the collective plurality of its proper parts*

In rejecting (CAI), Schaffer clearly holds that (SPM) is correct. But if we accept (CAI), then (WPM) is true if Priority Monism is true. It should also be noticed that (WPM) agrees with Collective Allism in supposing that all objects taken collectively are fundamental; Collective Allism (as Saucedo (MS, 6) notes) collapses into a version of priority monism if (CAI) is true. The aim of this PhD dissertation is to defend (WPM). I will show that not only is (WPM) a coherent view, but that *it is the answer* to the (FMQ). All other answers to the (FMQ) suffer from problems, such they cannot be plausibly answer the (FMQ). And what this shows is that not only then is (CAI) compatible with debates about fundamentality, but also of great help in developing positions on it.

Collective Allism obviously then is the thesis that all entities are fundamental *collectively* and not distributively. All objects taken collectively are fundamental, but they are not identical to any object. What is fundamental is just all those objects collectively. And Collective Allism clearly obeys the Tiling Constraint as (i) the collective plurality of all objects obviously overlaps all objects and (ii) it does not overlap with any distinct plurality of fundamental entities, as it is only the fundamental plurality. I think however Collective Allism should be rejected unless composition is identity; for if the universal plurality is not identical to any particular, it lacks the required integration to be a fundamental entity. I'll have more to say about this, though, in chapter seven. In the next three chapters what I will be doing is critiquing Priority Pluralism and (SPM). Arguing that while (SPM) is preferable to pluralism, that both positions are untenable.

2.4. Conclusion

In this chapter, I have considered what sort of things could be fundamental and have arrived at the conclusion that there are four possible answers to this question: Individualist Priority Pluralism, Collective Priority Pluralism, Priority Monism and Collective Allism. I came to this conclusion by supposing that the *fundamentalia* are concrete objects, and hence that any position on what is

fundamental must satisfy the Tiling Constraint. The fundamental objects must provide a minimal supervenience base for the world.

In the following two chapters, I will assess (Individualist and Collective) Priority Pluralism as a position. I do not think it is a tenable as an answer to the (FMQ) because it is incompatible with atomless gunk and emergent properties. Ignoring Collective Allism for now, I will argue that this gives us good reason to suppose that Priority Monism is true. But as we'll see in chapter five, Priority Monism (at least its strong variant) seems to have a big worry of its own.

Chapter Three: The Argument from Gunk for Priority Monism

In the preceding chapter, I put forward the Fundamental Mereology Question (FMQ) and considered what constraints any answer to it would need to meet. As a result, I concluded that there were three positions which could answer the (FMQ) while meeting the Tiling Constraint. These are Priority Pluralism,¹ Priority Monism and Collective Allism. I will postpone discussion of the latter for now, and will temporarily presume that the other two views are the only options on the table for the metaphysical foundationalist. Pluralism is the position that there is more than one fundamental entity, while Priority Monism is the view that there is only one (i.e. the maximal concrete object). Pluralism is generally seen as the more intuitive position, but Jonathan Schaffer has offered many arguments in favour of Priority Monism; ranging from that it provides an “elegant and economical account of truthmakers (Schaffer 2010c, 307)” to that it is plausible that space-time is a substance and thus would be ontologically prior to any of its sub-regions (Schaffer 2009b). However, the two arguments for Monism from Schaffer I will mainly concentrate on are the arguments from gunk and emergent properties.

The aim of this chapter is to argue that mereological gunk is metaphysically possible, and on the basis of this that Priority Monism² is true (given that one’s answer to the (FMQ) must be necessarily true). A world w is gunky iff every concrete object in that world possesses a proper part, and hence gunky worlds are worlds in which there are no mereological simples; denying the pluralist any entities which could serve as their *fundamentalia*. I will begin the chapter by setting out what gunk is and why it is incompatible with pluralism, before arguing that we should believe it to be metaphysically possible. I will argue that gunk is metaphysically possible mainly on the

¹ To be precise, there are two distinct versions of pluralism which I held were tenable: Individualist Pluralism and Collective Pluralism. In this chapter however, the argument from atomless gunk should be seen as an attack on both.

² I of course mean Priority Monism as a general position, rather than specifically either the weak or strong versions of the view. I hold that the arguments from gunk and emergence equally support either Strong or Weak Priority Monism (though it might be thought that (WPM) might undercut the argument from emergence, though we shall see later on in the dissertation that it does not).

grounds that it is conceivable, and that conceivability is (at least) a strong guide to metaphysical possibility. Following this I will consider and reject two objections to the possibility of gunk; one from Hud Hudson (2001) based on the ‘Doctrine of Arbitrary Undetached Parts’ (DAUP) (Van Inwagen 1981) and the necessity of space-time being composed out of points, and another from Robbie Williams (2006) in which he argues that the metaphysical possibility of gunk is an ‘illusion’ being generated by certain non-gunky worlds. I will argue that both of these objections fail, and thus will conclude that the possibility of gunk supports monism.

3.1. The argument from gunk for Priority Monism

In the previous chapter I outlined that pluralism was the thesis that there is more than one fundamental entity (though not every entity is fundamental)³, and that pluralists generally are committed to Atomism: the position that what is fundamental are mereological simples (Schaffer 2010a, 43-44). Most pluralists are committed to atomism because it provides them a minimal and non-overlapping supervenience base⁴ which is not grounded in any smaller entities, given that pluralists generally hold that proper parts ground the objects they compose. One of the strongest arguments in favour of pluralism, in my view, is the intuition that wholes are grounded in their parts. It would be difficult then for pluralists to both preserve this is an argument for their view, while maintaining the *fundamentalia* exist on some intermediate mereological level and ground the mereological simples (which they have as proper parts). Perhaps the pluralist could hold that *everything* below a certain a mereological level was fundamental, and thus entities on distinct mereological levels in such a substructure were equally fundamental and there were no grounding relations between them. Maybe so, but that would still leave us with the problem of identifying where the cut-off point would be between the derivative and the fundamental; at which mereological level does the derivative end and the fundamental begin? Schaffer (2010a, 63), for

³ As mentioned in the previous chapter, the thesis that every concrete object is fundamental is to subscribe to Allism. Pluralism is a ‘Someist’ thesis in regards to what is fundamental.

⁴ See the previous chapter for my account of the Tiling Constraint.

instance, asks us to imagine a world which consists of nothing more than a homogenous pink sphere. No intermediate level of the sphere seems objectively more privileged than any other, so identifying any such level would appear to be arbitrary. The only non-arbitrary level for the pluralist to select would be the bottom;⁵ that is, whatever mereological simples the sphere ultimately decomposes into. Hence pluralists, it seems, should be atomists.

However, the pluralist's commitment to atomism raises a grave problem for them; namely, the possibility of mereological atomless gunk. Some object is gunky iff every part of it has a proper part, and as such a gunky world is one which will be devoid of any mereological simples. The problem for the pluralist then is obvious; in gunky worlds there are no mereological simples and hence no fundamental entities. For *reductio*, suppose that a gunky world did contain simples. Those simples would then have proper parts, but then they could not be simples as they would have proper parts. *Ergo*, gunk is incompatible with pluralism, as any gunky world would not contain any simples that could be the pluralist's *fundamentalia*.⁶ There would be an infinite descent of objects that would never terminate in any fundamental entities. By contrast, Priority Monism is perfectly compatible with gunk, as there still could be a universal object in gunky worlds. Assuming (for now) then that pluralism is the only other plausible position on what is fundamental, the metaphysical possibility of gunk entails that monism is true (Schaffer 2010a, 61-64).

The metaphysical possibility of gunky worlds then is an argument for Priority Monism. The argument from gunk for Priority Monism can be presented as follows:

- | | |
|---|---------------|
| (1) Atomism is false in any world which is gunky | Ass. 1 |
| (2) Atomless gunky worlds are metaphysically possible | Ass. 2 |

⁵ Because identifying the top level would seem to involve accepting that monism is true in that world (i.e. as everything would be grounded in the universal object). Given that one's answer to the (FMQ) must be necessarily true, hence pluralism would be necessarily false.

⁶ In worlds that contain a mixture of simples and gunk, pluralism would still be false, as even though there would be mereological simples, there would not be enough of them to serve as a minimal supervenience base for all what there is in the world. The Covering constraint would therefore be violated.

- (3) If *Atomism* is true, it is necessarily true **Ass. 3**
- (4) Atomism is false **MT. 1,2,3**
- (5) If Pluralism is true, then Atomism is true **Ass. 4**
- (6) Pluralism is false **MT. 4,5**
- (7) If Pluralism is false, Priority Monism is true **Ass. 5**

Therefore,

- (C) Priority Monism is true **MP. 6,7**

For now, I will assume (7) is correct on the assumption that Priority Monism and Pluralism are the only two options on the table. My reasoning for rejecting the potential third option, Collective Allism, will appear later on in this thesis.

(4) and (6) are just valid inferences, so their truth will depend on the truth of the premises that entail them. (1) meanwhile is obvious. Worlds which are gunky are those which lack any mereological simples, and atomistic worlds by definition are those which contain mereological simples. To plausibly deny the gunk argument then, the pluralist then must deny either (2), (3) or (5). Let's consider each of them, starting with (3).

(3) is supported by the foundationalist thesis that whatever sort of thing is fundamental is so as a matter of metaphysical necessity. I have already argued at length that there must exist at least one fundamental entity on pain of a vicious regress, so the pluralist can only “*go disjunctive* (Schaffer 2010a, 62)” in regards to atomism to resist the premise. That is, they could concede that some other theory (e.g. monism) is true in gunky worlds, but maintain that atomism is ‘true’ on the grounds that it is true in the actual world (which they would maintain contains no gunk). This is unsatisfactory for two reasons. Firstly, there seems to be no strong empirical evidence that our own world is not gunky. As we shall see in the next section, science suggests that it is an open question whether it is so. Secondly, one's answer to the (FMQ) must be a necessary truth, so

accepting some other theory distinct from pluralism is true in certain possible worlds would be to be concede that pluralism is false.

But perhaps the pluralist could deal with such objections by arguing that while pluralism is necessarily true, what's necessarily true is not atomism, but rather that there is some *fundamental supervenience base*. Perhaps in many worlds this minimal supervenience base will contain mereological simples, but in infinite descent⁷ worlds what this base will be is a structure that consists of a *boring* infinite descent of entities. For such a structure to consist of boring infinite descent would be for each level of the structure to contain no novel features below the highest level. Imagine, for instance, an infinite descent world where a certain level contained nothing but bosons and fermions. Suppose, however, the fermions contained smaller fermions of the same sort, and those fermions contained yet smaller fermions and so on *ad infinitum*. Given the repetitiveness of each level, such descent would be boring.

Such a hypothesis is taken seriously by Tuomas Takho (2014), who suggests that the world's mereological structure could terminate in a *non-mereological* kind of structure that consists of a boring infinite descent of objects, where the entities in the mereological structure depend for their existence upon it. So, suppose the boring structure consists (at least in part) of fermions. Then the electrons and nucleons, atoms, molecules and medium-sized dry goods would all be grounded in the fermion substructure. The fermions at each level however would not be grounded in fermions at distinct levels, as their relationship to each other is of a non-mereological kind.⁸ So, in such a world grounding would plausibly be well-founded in a fundamental supervenience base (i.e. all the entities in the mereological chain would depend upon entities in the non-mereological chain), even though such a world would be devoid of any smallest objects. The fact that such a boring

⁷ I say infinite descent as opposed to gunk, for as we'll see that Takho (2014, 261) supposes the mereological chain terminates at some entities, and the infinite chain those entities are among is of a non-mereological kind. So, strictly speaking, such a world isn't gunky.

⁸ As we shall see in a moment, that Takho offers little elucidation as to what a non-mereological kind of structure is, is part of the reason why I reject this pluralist strategy.

substructure would be boring would then crucially avoid Schaffer's worry that a non-atomistic pluralism would lead to arbitrariness. The pluralist could just argue that what separates the derivative from the fundamental in an infinite descent world is that the fundamental substructure is boring while the derivative structure is not.

I'm not however convinced that such a pluralism would be tenable. Firstly, I don't know what Takho means by the boring structure being of a "non-mereological" kind. I can entertain, for instance, the notion that distinct states of affairs are composed non-mereologically out of their constituents (Armstrong 1997), but I don't know what it is for some objects to have smaller objects as part of their structure yet not be proper parts of them. I'm somewhat mystified as to how an object can be a part of distinct object yet not be a *mereological* part of them. Takho gives very little indication as to what this non-mereological relationship between objects in the boring structure is supposed to be,⁹ but without any elucidation I'm sceptical that this non-mereological kind of structure is even coherent.^{10,11} If this boring structure therefore is mereological, grounding would not be well-founded as each part of the structure would be grounded in its proper parts. Secondly, it does nothing to deal with the problem of there being non-boring infinite descent

⁹ He talks of the non-mereological structure *generically ontological necessitating* the mereological structure (i.e. the mereological structure cannot exist unless there are some objects of a certain type) (262, 2014), but this tells us little as to what this non-mereological structure is. He also mentions the possibility that things in the non-mereological structure could symmetrically depend upon one another (264, 2014). However, this still does not tell us much about what the structure exactly is and would also violate the formulation of well-foundedness of grounding that I'm holding to in this thesis (see the first chapter).

¹⁰ One suggestion might be that the boring structure consists of what Ned Markosian (2015) and other philosophers have called 'Stuff': namely what can only be referred to by mass nouns and which is allegedly what 'things' (i.e. objects) are constituted out of. However, as someone with somewhat 'Lewisian' intuitions, the notion of stuff barely seems any less mysterious to me than this non-mereological structure that Takho refers to. At the very least, if I can make sense of stuff at all, then I understand it as being *derivative* upon things; for instance, there is some *portion* of matter *in-virtue-of* some subatomic particles (i.e. objects) arranged a certain way in some spatiotemporal region. Furthermore, it seems the things in Takho's boring structure *are things* and cannot be stuff. For instance, in Hans Dehmelt's (1989) physical model, that Takho considers, there is an infinite regression of subquarks. Given these are subatomic particles, they surely must be understood as being objects. I don't think stuff can help the pluralist here.

¹¹ Another suggestion is that all that there is to the boring substructure is that it consists of co-located simples, and that there is no 'structural relationship' between any of the simples at the different layers. I go onto consider and reject the possibility that gunk is an illusion being generated by co-located simples of different sizes later on, so I ultimately don't think this would succeed either. Though on my reading of Takho, it's extremely doubtful this would be an accurate reading of him. While strictly speaking all the things in the boring substructure will be simples (as they won't have any proper parts), there does seem to be a constitutive non-mereological relationship between the entities on each layer.

worlds, in which there are novel features at each mereological level. In such worlds it would seem arbitrary to select any level as being the ‘top’ of the *fundamentalia*. I do not think then that boring infinite descent can save a non-atomistic pluralism. And it is for this reason that not only should premise three be accepted, but also premise five (i.e. as that premise suggests any version of pluralism is necessarily atomistic).

This then leaves (2). Can the pluralist plausibly deny that mereological gunk is metaphysically possible? I do not think they can and will make clear as to why in the rest of this chapter. I’m going to consider and reject two objections to gunk’s possibility, but before I do so I’m going to provide some reasons as to why we should think it is possible.

There are a number of reasons as to why one might think gunk is possible: (i) it’s conceivable; (ii) it’s logically consistent (i.e. it is *negatively*¹² conceivable and there are gunky models in mereology, including in Classical Extensional Mereology (CEM)) (Simons 1987, 41); and (iii) it has been taken seriously by scientists and philosophers. I’m not going to discuss (ii) much, as while logical consistency gives us reason to think that gunk is *not* logically impossible, I’m not sure it provides us much reason in itself to think gunk *is* metaphysically possible. If one is inclined to think the space of logical possibility is wider than metaphysical possibility, showing that something is logically consistent is not sufficient proof for thinking it is metaphysically possible. Nevertheless, the fact that gunk is logically consistent certainly wards off some potential scepticism which it might have otherwise been subject to.

Now gunk certainly seems *positively*¹³ conceivable. Imagine, for instance, that every atom in our universe contains a miniuniverse which is just like our own, and suppose that every atom in that

¹² Some scenario *S* is negatively conceivable when one cannot rule it out *a priori* (Chalmers 2002, 149). For instance, a unicorn is negatively conceivable because we cannot rule out there being such things *a priori*, whereas a round-square is not negatively conceivable as we seemingly can rule it out *a priori*.

¹³ Unlike negative conceivability (where something is merely negatively conceivable if we can’t rule it out *a priori*), some scenario *S* is positively conceivable iff we can imagine a situation that verifies *S*. To positively conceive of something does not necessarily involve a perceptual mental image, as there are things which we seemingly can conceive which cannot be contained in a mere perceptual image (i.e. the Soviet Union winning the Cold War). Often positively

miniuniverse contains a miniuniverse, and so on *ad infinitum*. In such a world there would be an infinite descent of parthood relations and so the world would be gunky. Or suppose that every concrete object is extended and has two halves. Again, such a world would lack any mereological simples and therefore be gunky (Schaffer 2010a, 61). Both sorts of world postulated here are gunky and seem (positively) conceivable; and while it is contentious whether conceivability actually entails possibility,¹⁴ it certainly seems that conceivability of something constitutes strong evidence for its metaphysical possibility. It seems metaphysically possible, for instance, that flying pigs could have evolved or that Napoleon could have won the Battle of Waterloo via modern weaponry because such scenarios are positively conceivable. At the very least then, I think the following principle is plausible:

CONCEIVABILITY-TO-POSSIBILITY: We should presume *S* is metaphysically possible iff (i) *S* is positively conceivable, and (ii) there is no good independent reason to think *S* is not metaphysically possible¹⁵

I think this principle is so weak that nobody could seriously deny it; basically, if something is conceivable there must be some *reason* why there is no possible world in which it exists. Things which are either logically or metaphysically impossible are so precisely because they are either inconsistent with logical or true metaphysical principles. Things do not fail to feature in modal space for no reason at all. Certainly, as we have seen, gunk does not in any way seem logically inconsistent. It cannot be claimed then by the pluralist that gunk is impossible because it harbours some logical contradiction. So, if the opponent of gunk then cannot give us some *metaphysical*

conceiving something then involves *modally imagining* it to be the case: that is, one modally imagines *S* iff one modally imagines a world/situation that verifies *S* (Chalmers 2002, 150-151).

¹⁴ See Strohminger & Yli-Vakkuri (2017) for a brief summary of the debate.

¹⁵ Stephen Yablo (1993, 32-37) would probably be sympathetic to this principle, given he thinks that conceivability is a reasonably good guide to possibility yet can go wrong. He proposes a couple of models of modal error which purport to explain how it is someone can conceive of something metaphysically impossible; where the error results when there is some defeater, *q*, to the proposition being conceived, *p*, when either the agent either fails to know that either *q* or that *q* entails that *p* is necessarily false. To take an example of Yablo's, Oedipus could imagine that he could have been King even if Jocasta did not exist, because he does not know that his mother is Jocasta. If he still persists in his error upon realizing Jocasta is his mother, it is because he does not understand that her being his mother entails he could not exist without her existing.

reason to think gunk is not possible, the conceivability of it should be taken as strong evidence that it is possible.¹⁶

Not only is gunk conceivable though, it has been taken seriously as an idea by both philosophers and scientists. Philosophers alleged to have taken gunk seriously include Anaxagoras, Descartes, Pascal, Leibniz, and Whitehead. Now, I do think we need to be careful here though, as this could appear to be an argument from authority. Just because notable philosophers believed in a certain idea doesn't necessarily suggest that idea is true, no more than Isaac Newton believing alchemy was a legitimate science entails that it is a legitimate science. But the fact it has been taken seriously by philosophers since the Pre-Socratics should at least supplement (i): that gunk is genuinely conceivable. After all, it surely would not have been taken seriously for all this time unless people thought we could genuinely conceive of gunk. Furthermore, some philosophers have argued that gunk could be of some theoretical use in explaining certain phenomena. Dean Zimmerman (1996) has argued that if we think that contact between solid objects is metaphysically possible then they would have to be gunky. Peter Forrest (2004) has argued that if space-time is either gunky or discrete then the problem of the Banach-Tarski paradox (i.e. which entails, for instance, that a ball could be rearranged into two balls the same size as the original) would not arise for spatial regions. Scientists too have taken the idea of gunk seriously enough to speculate the actual world might be gunky. Hans Dehmelt (1989) has proposed a physical model in which there is a quark/lepton substructure based on the substructure of the triton (the nucleus of hydrogen's radioactive isotope, tritium); where there would be an infinite regression of smaller and smaller subquarks. Howard Georgi suggests that effective quantum field theories may form an infinite tower "which goes down to arbitrary short distances in a kind of infinite regression ... a series of layers without end (1989, 456)." Even though there is not any evidence as of yet that the actual world is gunky, it is

¹⁶ For one, it seems implausible to me that gunk's impossibility is an *a posteriori necessity*. Even if we could presumably prove that the actual world is not gunky, that does not entail there cannot be other gunky possible worlds in the same way that discovering water is H₂O rules out there being a possible world where it is XYZ.

certainly not an absurd theory to hold in contemporary science. Indeed, Jonathan Schaffer (2003) has argued there is hardly overwhelming evidence to suggest that there will be a complete microphysics or whether that a complete microphysics would even postulate mereological simples. For one, the history of science so far is one which involves finding deeper and deeper structure, and there is no reason to suppose that we won't find more and more structure to the world as science progresses. That the actual world being gunky is a live hypothesis in science then, gives credence to gunk being metaphysically possible.

Therefore, I think there is strong reason to suppose that gunk is metaphysically possible. Not only is it conceivable, but it is an empirically open question as to whether the actual world is gunky or not. Gunk too, as we have seen, also might be of some use in solving certain metaphysical puzzles. Now while all of the above isn't incontrovertible evidence for gunk's possibility, I certainly think it shifts the burden of proof onto those who do not think it is possible. So, how then might the pluralist try and show, despite evidence to the contrary, that gunk is not in fact possible?

3.2. The objection from (DAUP) and pointy space

One way in which the pluralist could deny the possibility of gunk is by holding that it is metaphysically necessary that space-time is continuous¹⁷ and that spatiotemporal regions occupied by concrete objects are also occupied by objects in their proper sub-regions. Such an objection to gunk has been put forward by Hud Hudson (2001, 88-90), where he claims that gunk is incompatible with space-time being continuous/pointy. If space-time ultimately decomposes into extensionless points, and for any spatiotemporal region pervaded¹⁸ by some object there is some object which exactly occupies that region, then there would have to be mereological simples which

¹⁷ To say that space-time is continuous is to hold that it ultimately decomposes into point-sized spatiotemporal regions. As such, any extended spatiotemporal region can be forever divided into smaller extended spatiotemporal regions. By contrast, if it is discrete then it will ultimately decompose into extended atomic spatiotemporal regions, and if it is gunky it will never ultimately decompose into some smallest regions.

¹⁸ Following Parsons (2007, 203), let us say an object, *x*, *pervades* some region *r* iff *r* is not entirely free of *x*. Suppose there is some proper subregion of *r*, for example, that is exactly occupied by one of molecules. In which case *x* pervades that region.

occupy the point-sized regions. Assuming the structure of space-time is metaphysically necessary, gunk would be impossible.

Hudson's argument against gunk crucially relies upon the *Doctrine of Arbitrary Undetached Parts* (DAUP):

(DAUP): Necessarily, for every concrete object x , if r is the region of space/space-time occupied by x , and if r^* is any exactly occupiable sub-region of r , there exists a concrete object y that occupies r^* and which is a part of x .¹⁹

Quite simply, according to (DAUP) any composite object which occupies a composite region of space must have proper parts located in the proper subregions of that region. If I then occupy a certain of region space which has proper subregions, then (providing that region is occupiable) there will be some concrete objects in those subregions which I possess as proper parts. With (DAUP) set out, Hudson formulates his argument against gunk as follows:

- (1) DAUP
- (2) Necessarily, no hunk of atomless gunk exactly occupies a point-sized region
- (3) Necessarily, any hunk of atomless gunk exactly occupies some region or other
- (4) Necessarily, any region has at least one point-sized region
- (5) Necessarily, any point-sized region is exactly occupiable

Therefore,

- (C) Necessarily, there is no atomless gunk

To summarize, if (DAUP) is true then any object which exactly occupies a region of space would have to have parts in any proper subregion of that region that is occupiable. If space-time is necessarily continuous, any such region would either be point-sized or would ultimately

¹⁹ This is an amended version of the formulation put forward by Peter Van Inwagen (1981, 123). I add in space-time, to make this version more friendly to the perdurantist.

decompose into point-sized subregions. Given (DAUP) and presuming point-sized regions are occupiable, any object would ultimately decompose into some point-sized mereological simples. Hence, gunk would be metaphysically impossible.

I am willing to grant Hudson the second, third and fifth premises of his argument, but the first and fourth premises strike me as being suspect. Let's look at premise one first. Why believe (DAUP)? Hudson claims that anyone who is inclined to think gunk is possible is motivated by (DAUP) or something akin to it; that we suppose gunk is possible because we think each object has parts at any of its subregions. But this is surely false, as the main reason why many people think it is possible is because it is conceivable.²⁰ Even if (DAUP) were false, this would no way undermine me imagining, for instance, that every atom in the world contains a miniuniverse and so on *ad infinitum*. Instead, we might be tempted by (DAUP) because we think there is *mereological harmony* between concrete objects and the spatiotemporal regions they occupy. That is, the geometrical and mereological properties of concrete objects seem to be “*a perfect mirror* of the geometrical and mereological properties of their containing space-time regions (Schaffer 2009b, 138).”²¹ But both mereological harmony and (DAUP) have been called into question by the metaphysical possibility of extended simples. Extended simples are mereological simples which have extension; they lack proper parts yet exactly occupy extended regions of space. A number of contemporary philosophers consider extended simples to be metaphysically possible,²² yet if they are then (DAUP) is false. For if there can be extended simples, that means an object could occupy a composite region of space-time without having any proper parts in its

²⁰ McDaniel (2006, 44) thinks that gunk is possible, for example, because he can conceive of it rather than because of (DAUP) (which he rejects).

²¹ The system of mereological harmony will need to be at least the strength of (what Matt Leonard calls) MH₂, as these are the weakest systems of harmony which disallow there being gunk in continuous space. For a discussion of differing systems of mereological harmony, see Leonard (2016).

²² See Simons (2004) and McDaniel (2007b).

subregions. The possibility of extended simples would then undermine the first premise of Hudson's anti-gunk argument (McDaniel 2006, 44-45).²³

But I'm not going to deny premise one. This is because I'm sympathetic to supersubstantivalism and do not think extended simples are possible *unless* they exactly occupy extended yet *atomic* regions of space. And such a notion of extended simples would not be in conflict with (DAUP), as it only requires objects to have proper parts if they occupy *composite* regions of space. So, instead it is the fourth premise I think which should be rejected. Why think that the actual world is pointy, let alone this being a metaphysically necessary truth? Couldn't it just be a contingent truth as to whether space-time is either continuous, discrete or gunky?

Hudson doesn't seem to have a problem with gunky space *per se*,²⁴ but holds that "the claim that "space is gunky" must have its truth-value as a matter of necessity (2001, 90)." And if this were so, this would rule out the possibility of there being point-sized simples, which Hudson holds would be a price too high to pay. However, he does not give any argument for why we should suppose that the substructure space-time has (i.e. whether it is gunky, discrete or continuous) should be metaphysically necessary. My only thought is that Hudson thinks the substructure of space-time should be settled *a priori* via the armchair, just as I argued (in the previous chapter) that one's answer to the (FMQ) must be metaphysically necessary as doing metaphysics involves consideration of truths which *hold across modal space*. Just as we suppose that whether objects are composed out of temporal parts or not and what ontological categories properties belong to (i.e. tropes, universals etc...) can be settled via the philosophical armchair. But this does not seem

²³ However, it might be possible to motivate Hudson's argument by replacing (DAUP) with MH₂: a system of mereological harmony weak enough to allow extended simples, but strong enough to disbar there being gunk in continuous space. However, if extended simples are possible then it seems much of the motivation behind mereological harmony (of any strength) dissipates. The reason why I'm attracted to mereological harmony is because I'm attracted to the idea that objects and their spatiotemporal regions are aligned, and if extended simples are possible, then they would not be perfectly aligned. If there is misalignment due to extended simples, then I think we should open to the idea that there could be other sorts of misalignments between objects and their spatiotemporal regions (i.e. gunky objects in continuous space) which would also undermine MH₂.

²⁴ A pluralist however could object to gunky space on the grounds that it would fall foul of measure-theoretic paradoxes. Jeff Sanford Russell (2008) though has a sketched out a couple of accounts of gunky space which do not fall foul to such paradoxes yet are consistent with classical mereology.

plausible in respect to space-time's ultimate structure. Surely the substructure of space-time is an empirical matter, to be decided by physicists and not philosophers? And I just cannot see what knockdown *a priori* arguments there are for supposing that a certain view of space-time is true.²⁵ Rather, it seems that discovering space-time's substructure is *a posteriori* matter, which is to be decided by science. Peter Forrest (1995, 340-341) agrees with this and has argued that empirical tests could establish whether space-time is discrete or continuous. Suppose we discovered that all elementary particles 'jumped' from one region of space to another, without occupying any region between the two. Such experimental evidence would give us reason to think that space-time is discrete, and this suggests the nature of space-time is to be settled by doing physics and not through the armchair.²⁶ I therefore think we should reject premise four of Hudson's argument.

3.3. The objection from the 'illusion' of gunk

Another way the pluralist might try and deny the metaphysical possibility of gunk is by explaining it away. When we think that we are conceiving of a gunky world, we are not actually conceiving of it, but instead are conceiving of a world which looks gunky, but which is not gunky. Such an argument is made by Robbie Williams (2006), who argues that the following principle is plausible:

²⁵ Well, one of Zeno's paradoxes might give you reason to think one of the views about space-time can't be true; however, none of his paradoxes are really taken that seriously in contemporary metaphysics. Though, as mentioned earlier, the Banach-Tarski paradox might give one reason to think that space-time is not continuous (Forrest 2004), though even if this is so it would not necessarily settle whether space-time was gunky or discrete. Also see Forrest (1995) for some objections to discrete space and his responses to them. And again, see Russell (2008) for some responses to measure-theoretic paradoxes which might afflict gunky space.

²⁶ Michael Traynor (2013) has argued that the structure of space-time is contingent for similar reasons and thinks that (if we hold that possible change is as fine-grained as time) a perdurantist should hold that certain facts about persistence are contingent. Instantaneous temporal stages, for instance, will be thicker in terms of their temporal extent if time is discrete than in worlds in which it is continuous. I'm sympathetic to his reasoning here and think that certain facts about persistence can be contingent if certain facts about space-time are contingent. What I don't think is contingent, however, is whether objects have temporal parts (at every interval of time they persist) at all; whether objects perdure or endure does not seem to be a contingent matter.

Illusions: If scenario w is (positive) *prima facie* conceivable, then either it is possible, or there is some genuinely possible world w' that generates the *illusion* that w is possible (Williams 2006, 503).²⁷

Now it can be argued that the Illusions principle is plausible because we do not judge our seeming ability to conceive of worlds containing composite objects to be a fatal problem for mereological nihilism.²⁸ The nihilist can explain away the fact we can conceive of composite objects by arguing that this fact can be accounted for by worlds which contain only mereological simples. The illusion of worlds containing composite objects are possible, the nihilist can say, is being generated by worlds in which there are mereological simples arranged certain ways (i.e. 'chair-wise', 'table-wise' etc...). Perceptually such worlds are indistinguishable from ones in which there are composite objects, so the reason why we seem able to conceive of composite objects is not because worlds containing such objects are possible; rather, it is because there are worlds which contain simples arranged in certain ways. And because of this, we do not think our apparent ability to conceive of composite objects is a significant problem for mereological nihilism.

By contrast, the apparent conceivability of gunk is considered a significant problem for pluralists (as well as nihilists) as they have had difficulty in explaining it away. But as Williams (2006) suggests, there may be worlds which would account for the illusion of gunk's possibility. Emergence nihilism is the view that mereological simples can be extended and partially co-locate with one another. Resultantly, the emergence nihilist allows for there to be worlds in which, for instance, me, 'my' torso and 'my' heart are real concrete objects. They will not however be composite objects or proper parts, but will be mereological simples which are co-located with each other. The

²⁷ This is an amended version of the Illusions Principle, where I've formulated the conceivability in terms of what Chalmers (2002, 153-154) calls 'prima facie' positive conceivability: where some scenario S is prima facie positively conceivable where we can imagine a situation in which S is verified on *first appearances*. This distinguishes it from 'ideal' positive conceivability: where some scenario S is ideally positively conceivable where we can imagine a situation in which S is verified after 'ideal rational reflection'.

²⁸ We could also hold that it is plausible because we think that water is necessarily H_2O , even though it seems we can conceive of a world where it has a different chemical compound (Kripke 1980). What explains our seeming ability to conceive the latter is that we're actually imagining a world which contains a liquid with the same phenomenal surface qualities as water.

emergence nihilist then can also allow worlds in which there is an infinite descent of such simples; I, for instance, may be co-located with infinitely many layers of simples which get smaller and smaller at each layer. In such worlds there is infinite descent, yet they are not gunky as every object in them does not possess any proper parts. According to the emergence nihilist, it is worlds such as these which give off the appearance of there being an infinite descent of parthood chains, as such worlds seem perceptually indistinguishable from gunky ones.

The pluralist then could take a leaf out of the emergence nihilist's book and argue that gunk is an illusion which is being generated by worlds in which either (i) every object is fundamental²⁹ or (ii) in which every object below some mereological level is fundamental. Either sort of world would generate the illusion of gunk, yet in these worlds there would still be mereological simples which could serve as the pluralist's *fundamentalia*. The pluralist thus can explain away gunk's possibility, by holding that it's *prima facie* conceivability is generated by worlds in which there are co-located extended simples.³⁰

Jonathan Tallant (2013) thinks it would be a mistake for the pluralist to make use of such a strategy in defending atomism, as it would still lead to grounding not being well-founded. A world in which there is an infinite descent of co-located simples is still a world in which there is infinite descent; there is no *bottom level* at which grounding relations can terminate. As Tallant says:

“But if we explain away the illusion of the possibility of gunk, but in doing so continue to deny that there is a bottom level, then we still lack a ground to being; we still lack the bottom level from which metaphysical explanation may ‘snake upwards’. We have simply reached the conclusion in a different way (2013, 434-435).”

²⁹ This would not be a version of Individualist Allism, as in non-infinite descent worlds there would be derivative objects grounded in the mereological simples. There might be concerns however that such a version of pluralism would lead to violations of minimality, just as in the previous chapter that Individualist Allism could lead to it being violated. However, this is not actually the case, as Minimality only bars distinct (pluralities of) fundamental entities overlapping, and a world containing nothing but mereological simples does not involve fundamental entities mereologically overlapping.

³⁰ Such a defence of pluralism is in fact made use of by Jacek Brzozowski (2008).

I don't think this response works, however, as it really doesn't seem like the pluralist actually needs a bottom level in such a world. If mereological simples of different sizes can be co-located with one another, then one can just hold that (as we've seen) that all these distinct simples are fundamental. And given fundamental entities are not grounded in other fundamental entities, there will be no regress of grounding in worlds such as these.³¹ An infinite descent of co-located simples does not imply there is nothing fundamental.³²

Nevertheless, I do not think the 'Illusions' strategy is viable for the pluralist. Firstly, while I do think the Illusions principle is itself plausible,³³ I'm very suspicious that the illusion of gunk could be generated by the sort of world that Williams describes. If one is going to hold that the possibility of some world w is an illusion being produced by some other world w' , then obviously the differences between them need to be slight enough such that it is plausible to suppose one could mistake w' for w . For instance, as we saw earlier, the reason why nobody holds that there is a conceivability argument against nihilism in terms of non-gunky worlds is because the nihilist can explain our ability to conceive of ordinary objects, by holding that they are an illusion produced by worlds where mereological simples are arranged certain ways. Similarly, our ability to conceive of worlds where water is XYZ rather than H₂O, can be explained by us conceiving of a liquid which has the same phenomenal surface qualities as water (Kripke 1980). It seems believable that in both these cases a modal error might have arisen due to confusion, and thus the illusion of the possibility of the metaphysically impossible world is explained. By contrast, nobody would think that the illusion of water being XYZ could be generated by, for instance, a world containing nothing but flying pigs, as these two scenarios seem utterly unlike one another. They are, as it were, 'too far part'.

³¹ Either because there won't be any grounding relations between any objects at all because every such object will be a mereological simple (and thus fundamental), or because all objects below a certain level are simples and grounding will terminate at them.

³² After writing this chapter, it came to my attention that Naoaki Kitamura (2016, 158) has effectively raised the same objection to Tallant, independently of my own work.

³³ Which is important, as I'll utilise the principle to explain away junk in the fifth chapter.

My problem with the pluralist's response here is I think gunk worlds and infinitely descending co-located worlds are 'too far apart'. For, as Williams concedes himself (2006, 505), worlds such as these are going to be very ontologically extravagant. There are going to be laws of nature which dictate that whenever a mereological simple travels from one location to another, some smaller simples will also be co-located with it as it travels. So, for example, it is a law of nature that whenever I move, some hand-shaped simples always come along with me. Such a world is also going to contain strange *alien* perfectly natural properties such as 'hand-hood' and 'table-hood', as all mereological simples (no matter their size) will instantiate perfectly natural properties as they are fundamental entities. Is it plausible that when we conceive of a gunky world, we are conceiving of a world along these lines and that we 'miss out' these strange laws and properties? Now the pluralist could of course respond by holding that the infinite descent of co-located simples starts at a mereological level much further down than the medium-sized dry goods, and this explains how we 'miss out' the weird laws and properties when think we can conceive of a gunky world. But then, what about the nested universe case, where each atom in every universe in the parthood chain contains a universe? Wherever we decided the cut-off point was between the derivative and the fundamental, there would always be (relative to the universe in question) 'macroscopic' objects which were governed by the laws and instantiated the properties which seem so strange.

My second worry is that this pluralist strategy will collapse into mereological nihilism. Let us imagine a possible world in which the nested universe case is true, and that each universe in the chain is pretty much identical to one another. Let us also presume that the pluralist believes there is such a thing as proper parthood. For after all, the majority of pluralists do want to believe that composition occurs in at least some possible worlds; and much of the reason why they are attracted to fundamentality and grounding is because (as we observed in the previous chapter) they can maintain the common-sense notion that composition occurs, while having the same ontological commitments as the mereological nihilist. But, let us suppose a pluralist holds that in a certain world (where infinite descent occurs) there are chains of proper parthood which go down to a

certain mereological level, and below that level there is an infinite descent of co-located simples. How then do we identify where the cut-off point is between the mereological structure and the co-location of simples of different sizes? It seems impossible to tell via empirical means. Our reasons for supposing that some object is a proper part of another at some level, are the same for supposing that at any other level some object is a proper part of another. There is *no non-arbitrary answer* we could give in response to the question of where the mereological structure ends and where the co-location of simples begins. It seems the only non-arbitrary thing to say is that *every object* is a simple in such a world. So, it seems like the pluralist needs to hold that everything is fundamental in an infinite descent world.

It then seems like if the pluralist still wants to insist composition occurs at least in some possible worlds, they have to say the following: that in non-infinite descent worlds composition (at least sometimes) occurs, but in infinite descent worlds it never occurs and all there is are co-located mereological simples of different sizes. But this looks very *ad hoc*. It seems like the only reason why anyone would believe this is to save pluralism from gunk, while also holding that composition can occur. It also risks violating the necessity of composition.³⁴ I think then the pluralist (who favours this strategy) has no choice but to deny that composition ever occurs and needs to embrace emergence nihilism. Now, in fully embracing emergence nihilism, the pluralist could hold they can preserve common sense because medium-sized dry goods will still exist on their view (i.e. as co-located simples). But to me, the idea that in *every world* where there seems to be composition there actually are co-located simples just seems a bit bonkers.³⁵ It certainly seems like an almighty

³⁴ Suppose I were composed out of my organs in the actual world, but in an infinite descent world I am merely co-located with them as we will all be simples. This violates the necessity of composition, as if my simples compose (arranged a certain way) me in one world they should compose in every world (if they are arranged the same way). And holding that composition is contingent seems like a steep price to pay for the pluralist (though see Cameron (2007) for a defence of the contingency of composition).

³⁵ For instance, it is one thing to think that there are unicorns in some possible worlds, but it is quite another thing to think unicorns *exist in every possible world*. My point is that given the strangeness of emergence nihilism, I really do not think it is an acceptable price to pay to rule out gunk.

high price to pay to avoid monism, and I do not think it is a price worth paying.³⁶³⁷ I therefore do not think that appealing to the Illusions principle is a viable strategy for the pluralist.³⁸

3.4. Conclusion

In this chapter I argued that the metaphysical possibility of gunk entails Priority Monism. If mereological gunk is metaphysically possible, then there are possible worlds which lack any mereological simples which can be the fundamental entities for the pluralist. Given the failure of non-atomistic versions of pluralism, the mere possibility of gunk worlds shows that pluralism is false given the foundationalist thesis that whatever is fundamental is so as a matter of metaphysical necessity. I argued that we should hold that gunk is possible mainly on the grounds that it is conceivable, and I've argued that two objections which have been raised against it being possible fail: Hudson's objection from (DAUP) and continuous space, and a pluralist attempting to explain it away via Williams' Illusions Principle. I conclude, therefore, that there are strong grounds to suppose that gunk is possible, which would indicate that pluralism is false and Priority Monism is true.

³⁶ Furthermore, it should be noted that in the second chapter that I said was going to presuppose mereological nihilism was false. So, showing that the Illusions strategy leads to nihilism is enough to show it is in trouble, given certain presuppositions I made in putting forward the (FMQ).

³⁷ Another reason why appealing to infinitely descending co-located simples troubles me is that I am sceptical extended co-located simples are possible. If there are extended simples, then I believe they could only occupy extended yet atomic regions of space-time (see Braddon-Mitchell and Miller (2006)), and I certainly don't think they can be co-located with one another. However, some philosophers (e.g. Simons (2004) and McDaniel (2007a)) have argued that physics suggests that bosons are extended simples which can be located in the same space-time regions as one another, though this is controversial (i.e. see Schaffer (2009b)). I do not however wish to get bogged down however in arguing whether simples of this sort are possible, so I've avoided discussion of this in the chapter.

³⁸ Could the pluralist perhaps instead argue that the illusion of gunk is being generated by worlds containing point-sized simples? There will be infinitely descending chains of parthood in such a world, after all, so perhaps such worlds could generate the illusion of gunk? I don't think they can, because they wouldn't be able to explain away the nested universe case, for example. If there is an infinite series of smaller and smaller universes each located in a universe, I cannot see how such a series could converge at pointy space. Furthermore, as we'll see in chapter five, point-sized simples might not get the pluralist out of jail, as they themselves might lead to grounding's well-foundedness being violated (Cotnoir 2013b).

Chapter Four: The Argument from Emergence for Priority Monism

In the previous chapter, I argued that the metaphysical possibility of gunk implied that Priority Monism is true. For given the thesis that one's answer to the Fundamental Mereology Question (FMQ) must be a necessary one, the mere possibility of gunk rules out Priority Pluralism, leaving monism as the only tenable answer to the (FMQ). In this chapter however, I will sketch out another famous argument given for priority monism by Schaffer (2010a, 50-57); that is, the argument from emergent properties for Priority Monism.¹ The argument is that emergent properties are at the very least metaphysically possible, if not actual; which would rule out pluralism as the mereological simples would not be sufficient in accounting for all the derivative entities in the world.² Emergent properties are properties of composite objects which are not fixed by the intrinsic properties of their proper parts and the spatiotemporal relations between them. Duplicating the simples alone would not then suffice in duplicating the plurality of all concrete objects, and thus pluralism would violate the Tiling Constraint.³ The only entity, then, which could ground all the derivative entities in the world, would be the Cosmos. The possibility of emergent properties entails (on the assumption it is the only other plausible answer to the (FMQ)) that Priority Monism is true.

I will start the chapter by setting out the argument from emergence for Priority Monism, showing that *prima facie* there is an incompatibility between emergent properties and the atomistic thesis that world can be sufficiently grounded in mereological simples. I'll argue that quantum entanglement indicates that emergent properties are instantiated in the actual world. I will then

¹ Though as we shall see, Schaffer and Jenann Ismael (*forthcoming*) have updated the argument in respect to the case of quantum entanglement.

² This isn't quite precise, as Schaffer presents the argument from the possibility/actuality of emergence as two arguments: one is the fact there are entangled systems in the world (2010a, 50-55), and the other is that emergent entities are at least metaphysically possible (2010a, 55-57). However, I think it's simpler and easier to just take the two as being one single overarching argument; where the case of quantum entanglement is just taken as further evidence for the possibility of emergent properties, given we know that such properties are (allegedly) actual.

³ See the second chapter for the pluralized version of the Tiling Constraint. To be precise (as we'll see), the Covering sub-constraint would be violated, as that demands the *fundamentalia* be a supervenience base for all what there is in the world.

consider three pluralist strategies at attempting to accommodate emergent properties. The first strategy is that the pluralist drops the necessity of atomism, and develops a disjunctive answer to the (FMQ) in which composite objects (those which instantiate emergent properties anyway) can be fundamental. The second is that of *Relational Holism*: that there are external relations which hold between the individual particles aside from their spatiotemporal ones (Teller 1986). By adding such relations to the pluralist's supervenience base, the pluralist can hold that it is the instantiation of such relations by the mereological simples which can account for the emergent properties. The third and final strategy is that of *plural collective instantiation*: that emergent properties are *fundamental*, plural collective properties, in that they can be instantiated by multiple particles *collectively*, even though they do not supervene on the *individual* (distributive) properties and relations of the individual particles. In which case, duplicating the mereological simples will suffice in duplicating the emergent properties providing we duplicate the simples *plurally* as well as individually (Bohn 2012, 217-220). I reject the first strategy because disjunctive accounts of fundamentality are undesirable, and that this version of pluralism cannot rule out the Cosmos itself instantiating emergent properties. I reject the latter two strategies as neither provide a good explanation for how the emergent properties obtain in virtue of the mereological simples, and thus go onto conclude that the actuality/possibility of emergent properties does indeed entail that Priority Monism is true.

4.1. The argument from emergence to Priority Monism

Some property *F* is emergent iff it is an intrinsic property instantiated by a composite object which does not supervene on the intrinsic properties and the spatiotemporal relations of the object's proper parts. Duplicating the proper parts of the object and their exact spatiotemporal arrangement to one another will not then suffice in duplicating any emergent property of the object. It is because of this that emergent properties are described as novel, irreducible features

of the world, and, as such, objects which instantiate them are very much more than the sum of their *individual* proper parts.⁴

If emergent properties are possible, then pluralism would be false as it would violate the *tiling constraint*. As discussed in the third chapter, for the *fundamentalia* to satisfy the tiling constraint it must be the case that (i) every entity in the world either overlaps with at least one of them or at least fully supervenes on them, and (ii) no fundamental entity overlaps with any other distinct fundamental entity. The first of these requirements is that of *Covering*, which demands that the plurality of all fundamental entities should be sufficient in generating all the other entities that there are in the world. That is, the *fundamentalia* should provide a complete account of the world and everything in it. If you duplicate the *fundamentalia* and their external relations to one another, then you also duplicate the plurality of all what there is in the world. Then suppose for *reductio*, that the mereological simples are fundamental and that there are emergent properties. In which case, the latter do not supervene on the simples, and thus there are entities which do not fully supervene on the *fundamentalia*. But given *Covering*, this cannot be so, as everything must supervene on the *fundamentalia*. Given that one's answer to the (FMQ) must be necessarily true, if there are possible worlds which contain emergent properties, pluralism is false.

By contrast, Priority Monism has no problem with emergence, as duplicating the Cosmos will suffice in duplicating all the properties of its parts; even if some of those properties do not supervene on the properties and relations of mereological simples (supposing there are any). It is perfectly compatible with monism that the Cosmos and some of its parts have properties which are not instantiated by proper parts of those parts. According to Schaffer, emergent properties

⁴ I say individual proper parts here, as I'll go on to later argue that emergent properties are compatible with Composition as Identity (CAI) in the thesis. It is often assumed that the two are incompatible, as (CAI) is taken as the thesis that an object is identical to its parts, it cannot be the case the whole has properties its parts do not have too, unless one rejects the Indiscernibility of Identicals (II) (McDaniel 2008). I will argue later, in the sixth chapter, that the (CAI) theorist can overcome this objection by postulating that emergent properties are fundamental collective properties. This strategy is pretty much the same as the pluralist strategy to deal with emergent properties I'll consider in the fourth section of this chapter, though (as we'll see) I do not think it will work for the pluralist.

expose the fact that there is an *asymmetry of supervenience*. Proper parts must supervene on their mereological fusions, but mereological fusions need not supervene on their proper parts. It is metaphysically impossible that there are *submergent properties*: properties which are instantiated by proper parts which do not supervene on the intrinsic properties of the objects they compose. For instance, an object having a proper part which is green all-over entails that that object has a property of having a proper part which is green all-over. Fix the whole and you fix the nature of the parts. There is then an asymmetry of supervenience which arises because of the possibility of emergent properties. Resultantly, the monist can always give a complete account of reality while the pluralist cannot necessarily do this. The possibility of emergent properties then entails (presuming there is no other plausible answer to the (FMQ)) that monism is true (Schaffer 2010a, 56-57).

The metaphysical possibility of emergent properties is an argument for Priority Monism, as only it and not pluralism can account for such properties in the worlds in which they exist. The argument from emergence can be presented as follows:

- | | |
|---|----------------|
| (1) Emergent properties are metaphysically possible | Ass. 1 |
| (2) Pluralism is false if emergent properties are metaphysically possible | Ass. 2 |
| (3) Pluralism is false | MP. 1,2 |
| (4) If Pluralism is false, Priority Monism is true | Ass. 3 |

Therefore,

- | | |
|-----------------------------|----------------|
| (C) Priority Monism is true | MP. 3,4 |
|-----------------------------|----------------|

I will assume that (4) is correct here. As mentioned in the previous chapter, my reasoning for rejecting the potential third option, Collective Allism, will appear later on in the thesis.

Now (3) is just a valid inference from the first two premises, so the success of the argument from emergence will very much depend on the truth of both. I have already that (2) is true. Emergent

properties do not supervene on the intrinsic properties and spatiotemporal relations of the parts of the object which instantiate them, which is a violation of the tiling constraint. However, later in the chapter we'll consider three different strategies on how the pluralist might accommodate emergent properties, so (2) might not turn out to be so obvious after all. For now, though, I am going to assume it's true and turn to (1). Do we have any good reason to hold that emergent properties are metaphysically possible? Well like gunk, emergent properties seem to be *conceivable*, and (as discussed in the previous chapter) conceivability seems to be a strong (even if not necessarily infallible) guide to metaphysical possibility, thus the conceivability of emergent properties is good evidence for them being metaphysically possible. There is however evidence that emergent properties exist in the *actual* world. Quantum entanglement has been taken to be a phenomenon which involves emergence, as the quantum state of the entangled particles cannot be deduced from the those of the individual particles. And it is entanglement which Schaffer uses to argue for the existence of emergent properties (2010a, 50-55). In the following section, I'll argue that there is good reason to think emergent properties are actual, let alone merely possible, justifying the first premise.

4.2. Quantum entanglement and the 'conceivability' of emergent properties

Let us look then at quantum entanglement. A quantum state is *entangled* if it cannot be expressed as the sum of the quantum states of the proper parts of the composite object it is a state of. The quantum state of any particles in the entangled state cannot be described separately from that of the others. Each of the entangled particles are such that we can determine the states of each one based on measuring the states of the others, even though they may be at some considerable spatial distance from one another.

Like Schaffer (2010a, 51-52), and Ismael and Schaffer (forthcoming, 11-12)), I'll use the example of the singlet state in the EPR thought experiment (Einstein et al. 1935) to demonstrate what entanglement involves. Suppose that two particles – Alice and Bob - are produced together in a

singlet state, before being fired off in different directions. When they still interact, however, the state of their singlet will be:

$$|\psi\rangle_{\text{Alice, Bob}} = 1/\sqrt{2} [(|\uparrow\rangle_{\text{Alice}} + |\downarrow\rangle_{\text{Bob}}) - (|\downarrow\rangle_{\text{Alice}} + |\uparrow\rangle_{\text{Bob}})]$$

With ‘ $|\uparrow\rangle$ ’ standing for a particle being in a spin-up state and ‘ $|\downarrow\rangle$ ’ standing for a particle being in a spin-down state. Given the state of the singlet, by Born’s Rule there is a 50% chance that Alice will be measured as being spin-up and Bob measured as being spin-down, and a 50% chance that Alice will be measured spin-down and Bob measured spin-up. The two particles are *anti-correlated* with respect to spin, and resultantly it is certain that the total spin of their state will be 0. It is simply not possible that both particles will take the same spin value. What this means, though, is that when both particles are fired off in different directions, measuring the spin of one of the particles will determine what the spin is of the other and vice versa. But it seems rather incredible that the measurement of one particle’s spin should affect that of the other, when (i) there is nothing about the state of their singlet which specified *which one* would be spin-up and the other spin-down, and (ii) any causal interaction between the two which resulted from measuring one of them would be faster than the speed of light given they are space-like separated.

Such seeming action-at-a-distance led Einstein to hold that quantum mechanics must be incomplete, in that the states of entangled systems were missing information which would completely specify the subsequent behaviour of the entangled particles (Einstein et al. 1935). Theories which aimed to provide such information are *hidden variables theories*, but they are not regarded as plausible in contemporary physics. For one, Bell’s Theorem (Bell 1964) has shown that no *local* hidden variables theory can match the statistical predictions of quantum mechanics, and as a result any hidden variables theory needs to be *nonlocal*: that entangled particles can be affected by other entangled particles which are space-like separated from them. Measuring Alice to be spin-up, for instance, will mean Bob will be spin-down, regardless of their distance from one another. This would mean, however, that such causation would need to be *instantaneous*,

which is utterly implausible, as it would violate the Special Theory of Relativity (STR).⁵ As such, entanglement indicates that reality is *non-fully separable*: fixing the intrinsic states and the spatiotemporal relations of any two or more particles, does not suffice in fixing the intrinsic state of the system/composite object they are both parts of. As Tim Maudlin (2007, 639) says:

“In quantum theory, then, the physical state of a complex whole cannot always be reduced to those of its parts, or those of its parts together with their spatiotemporal relations, even when the parts inhabit distinct regions of space. Modern science... contains an ineliminable holism.”

The non-separability of the entangled particles then implies their quantum state is emergent, as that state is not supervenient on the states of the individual particles. Quantum entanglement then gives strong reasons to think that not only are emergent properties possible, but that they *actually* exist.

Even if entanglement is not a case of actual emergence, however, the fact it is a strong candidate for being emergent is still strong evidence for the *metaphysical possibility* of emergent properties. This is because the very fact we *at least seem to coherently talk* about it being an emergent phenomenon suggests that we can *positively conceive*⁶ it as being emergent. Suppose then that some hidden variables theory was correct, and that, therefore, the state of the entangled particles could be derived from the states of the individual particles. Well, that would still not prevent us from conceiving of there being a world in which the two particles were anti-correlated and that *there were no hidden variables* which specified their respective spins prior to their entanglement. That contemporary physics suggests that our world is such then strongly suggests that we can coherently conceive of there being such a world. So, the very fact we can even coherently talk of

⁵ Many non-local hidden theories variable theories have also been ruled out by experimental testing (i.e. Groeblacher et al. 2007).

⁶ As stated in the previous chapter, something *S* is positively conceivable iff we can imagine a situation that verifies *S*. To positively conceive of something does not necessarily involve a perceptual mental image, as there are things which we seemingly can conceive which cannot be contained in a mere perceptual image (i.e. the Soviet Union winning the Cold War). Often positively conceiving something involves *modally imagining* it to be the case; that is, one modally imagines *S* iff one modally imagines a world/situation that verifies *S* (Chalmers 2002, 150-151).

quantum entanglement involving emergence, points to the fact that emergent properties are positively conceivable.

Recall the following principle of modal epistemology I defended in the previous chapter:

CONCEIVABILITY-TO-POSSIBILITY: We should presume some scenario, S , is metaphysically possible just in case (i) S is *positively* conceivable, and (ii) there is no good independent reason to S is *not* metaphysically possible

As I've stated previously, I think this principle is so weak nobody seriously could deny it. Things are which either logically or metaphysically impossible are so because they are incompatible with either logical or metaphysically necessary truths. Things do not fail to feature in modal space without any *reason* at all. And while it is contentious that conceivability *entails* possibility, it certainly seems that the conceivability of something provides good evidence for its metaphysical possibility. Conceiving of something being the case provides *defeasible* proof that it is metaphysically possible.⁷ Positively conceiving of emergent properties such as entangled quantum states is strong evidence that emergent properties are metaphysically possible.

I hold then that we have strong evidence that the first premise is correct. Not only can we positively conceive emergent properties, but quantum entanglement gives us reason to think that such properties exist in the actual world. The first premise of the argument from emergence is plausibly true.

4.3. Reply #1: Priority Pluralism [A V E]

The first response I'm going to consider involves the pluralist developing a new account of their answer to the (FMQ), which involves dropping the necessity of atomism. I argued in the previous section that emergent properties are metaphysically possible if not actual, but a critic could

⁷ As noted in the previous chapter, Stephen Yablo (1993, 32-37) very much agrees that conceivability is good evidence for something being possible even though he thinks this can go wrong and attempts to provide models of modal error when conceivability does lead us astray.

maintain that I have not demonstrated that the *right sort* of emergent properties are possible such that they entail that monism is true. While pluralists generally hold that the fundamental entities are mereological simples (i.e. ‘Atomistic’ pluralism), they could reject the necessity of this being the case. Instead, they might argue that the composite objects which instantiate emergent properties should be counted as fundamental entities, so maybe the following disjunctive theses of pluralism could work (with *xx* being a plural variable):

Priority Pluralism [A V E]: Some *xx* are fundamental iff they have no proper parts or instantiate emergent properties

The pluralist would be denying the second premise of the argument from emergence in going down this route, and this very much stems from the fact that the monist has yet to demonstrate that a certain sort of emergent property is possible. That is, that the *entire Cosmos itself* either instantiates or could instantiate some emergent property. If duplicating some partition of entities short of the entire Cosmos does suffice in duplicating it, then the move from emergence to monism is not sound.

Schaffer, however, argues that there is good reason to think the Cosmos is one vast entangled system. For one, if the universe began in the Big Bang, then given everything interacted at the Big Bang and thereafter subsequently evolved by Schrödinger’s equation, such entanglement will be preserved. One, though, does not even need an initial entanglement, as Schrödinger evolution tends to spread entanglements, such that eventually we should expect every particle in the universe to be entangled with every other (2010a, 52-53; Ismael & Schaffer forthcoming, 20). Furthermore, given that two of the fundamental physical interactions (i.e. gravity and electromagnetism) are infinite in range, everything in the universe *is* interacting with each other in any case. As such,

everything in the universe will be entangled with one another to some degree.⁸ Therefore, it is plausibly the case that the Cosmos is entangled.

The problem, however, is whether the Cosmos is entangled *enough* such that its quantum state cannot be derived from *any* partition of its proper parts. That is, the quantum state of the universe may be *partially separable*. Claudio Calosi (2014, 925-926) has questioned whether the monist is justified in assuming that the entanglement of a 2-particle system entails that some n-particle system will also be entangled to the extent that its state cannot be derived from *some partition* of its proper parts. Just because a quantum state is not fully separable into the states of the individual entangled particles that compose it, does not entail that it is entangled such that it is not separable into some partition of those particles. Suppose then that $D_{1, \dots, n}$ is the state of the system $S_{1, \dots, n}$ which is composed out of the quantum systems S_1, \dots, S_n . This is a case of *true n-particle entanglement* iff there are no bipartite cuts such that the result is a product state. That is:

$$D_{1, \dots, n} \neq |\psi_{1, \dots, i}\rangle \otimes |\psi_{i+1, \dots, n}\rangle$$

Otherwise, even though $S_{1, \dots, n}$ is non-separable (into the individual component particles) that does not entail its state will not be a product state of the states of some partition of its proper parts. In the 2-particle case considered in the EPR thought experiment, there is no distinction between non-fully separable states and *true n (i.e. 2)-particle entanglement*, but this is not so clear in systems with a greater number of particles. The problem for the monist is that they need to demonstrate that the Cosmos is in a *true multipartite* entangled state, yet there neither exist any conclusive criteria nor experimental tests to prove that it is in such a state. It is thus far from certain that duplicating some partition of the Cosmos' proper parts won't suffice in duplicating it.

Even so, I still think that Priority Pluralism [A V E] is not a promising escape route for the pluralist. For one, it may conflict with the *Minimality* condition of the Tiling Constraint.

⁸ It is because of this that McKenzie and Muller (2017) hold that any answer to the 'Special Composition Question' (SCQ) which invokes entanglement will just amount to unrestricted composition.

Presumably, objects which are fundamental because they instantiate emergent properties (i.e. objects with entangled states) are going to have fundamental entities (i.e. mereological simples) as proper parts, which would mean that at least one fundamental entity is going to mereologically overlap with some others. The pluralist could respond by further modifying the account such that some entities are fundamental iff either (i) they instantiate emergent properties, or (ii) they have no proper parts and do not compose any object which instantiates emergent properties.

Such a move, however, looks rather *ad hoc*. It seems suspiciously convenient for the pluralist that fundamental mereological simples are never proper parts of fundamental composite objects, and that fundamental composite objects never have fundamental simples as proper parts. Furthermore, suppose a mereological simple at time t is not a proper part of an object with emergent properties, but at time t' it is. Then it seems even though the simple is fundamental at t , it then being a part of some object t' means it now is no longer fundamental and needs a ground. This looks rather weird and mysterious, and it seems better to suppose that the simple was never fundamental to begin with if it requires a ground at t' .⁹ It would also entail, for example, that in some spatial-temporal regions of a possible world that some simples grounded their composites (which lack emergent properties), while in others the simples there would be grounded in composite objects with emergent properties. And those composites with emergent properties would ground the objects they were proper parts of. You would have grounding relations going up and down the mereological hierarchy, and *fundamentalia* existing at different 'levels' yet never overlapping with other *fundamentalia*. Furthermore, let us assume that everything is entangled in our world, yet there is no case of true multipartite entanglement but at least some entangled states

⁹ If one is a perdurantist, then one could argue that the simples exactly located at t and t' are not the same simple, but only temporal stages of a four-dimensional object of what we otherwise might suppose is a mereological simple. Therefore, no simple is ever fundamental at one time, but ceases to be fundamental at another time. However, it still seems strange that this four-dimensional object is partially grounded in a simple located at some 'earlier' space-time region and is partially grounded in a composite object it is a proper part of (i.e. the object with the emergent property) at some 'later' space-time region. Earlier on it needs to be grounded in a proper part but is later grounded in something it is a proper part of. It seems to me better to suppose it is ultimately grounded in some fundamental objects which have the same sort of nature throughout (i.e. things which lack proper parts or (like the Cosmos) are not the proper parts of anything else).

are emergent.¹⁰ In which case, no mereological simples in the world will be fundamental and there will be grounding relations which go up and down.

The point I'm trying to make is that as well as being *ad hoc*, pluralism [A V E] is a disjunctive account of fundamentality; and disjunctive accounts of fundamentality are inevitably piecemeal and messy. Theoretically, it seems better to suppose that what is fundamental is always the *same sort* of entity, and that all derivative objects are grounded in a *common source*. And if we are monists, then our common source is going to be the Cosmos: the maximal mereological fusion of all the concrete objects in the actual world. Like Schaffer then,¹¹ I hold that a non-disjunctive treatment of fundamentality should be preferred to a disjunctive one,¹² and that on these grounds monism should be preferred to pluralism [A V E].

But even this aside, I think a Priority Pluralism of this sort seems untenable. For, in granting that proper parts of the Cosmos can instantiate emergent properties, it would then seem arbitrary to insist that the Cosmos itself cannot instantiate some emergent property. Even if duplicating some partition of the Cosmos' proper parts suffices in duplicating the actual world (i.e. in the case of entanglement), that does not entail that this will suffice for any possible world. Perhaps then the Cosmos, for example, is not in a true multipartite entangled state, so this would not be an emergent property. But I do think it's positively conceivable that it could be in such a state, and thus we have strong evidence that there is some world where the Cosmos is entangled such that no duplication of some partition of its proper parts will suffice in duplicating it.¹³ If so, then there are

¹⁰ It seems to me that Calosi (2014) would be willing to grant me these assumptions, based on what he claims in the paper. Calosi agrees that in the case of a 2-particle entangled state that it is non-separable into any partition of its proper parts, and he also seems to agree that everything in the universe will be entangled to some degree. And of course, he is open to the idea that there is no true multipartite entanglement.

¹¹ As we saw in the previous chapter, Schaffer speaks of his dislike of a disjunctive treatment of fundamentality when considering how a pluralist might respond to the possibility of gunk (Schaffer 2010a, 63).

¹² The pluralist might attempt to drop the atomistic disjunct of their account, and simply hold that *only* objects which instantiate emergent properties are fundamental. This is implausible as they would then need to account for the possibility of worlds which *do not contain* any emergent properties. If a pluralist is going to hold then that composite objects which instantiate emergent properties are fundamental, then they will have to argue in favour of some disjunctive account of fundamentality (as they cannot drop the atomistic disjunct).

¹³ The pluralist would have to argue that it is a metaphysical necessity that there is no true multipartite entanglement, which would may well involve accepting a *modal necessitarianism* view about the laws: that the laws of nature in the

worlds in which pluralism [A V E] is false; and thus given that one's answer to the (FMQ) must be necessary, pluralism [A V E] is false simpliciter.

4.4. Reply #2: Relational Holism

The next two strategies I'm going to consider also involve the pluralist rejecting the second premise of the argument from emergence, but holding to the necessity of atomism being true. Both strategies then involve the pluralist maintaining that the properties and external relations of the mereological simples *do suffice* in duplicating the Cosmos and all its contents.

The solution I'm going to consider in this section is that of *Relational Holism*: there are external *fundamental* relations which hold in addition to the spatiotemporal relations of the mereological simples. Paul Teller (1986) postulates that there are such relations in physics given quantum entanglement;¹⁴ that there need to be external relations between the entangled particles to account for the entangled states of the systems they are parts of. These relations will not supervene on their intrinsic properties and spatiotemporal relations, but rather will be *fundamental* relations as their existence and nature will not obtain *in-virtue of* any other relation or property. In response to the argument from emergence then, the pluralist could argue that by adding such relations to their fundamental supervenience base they can successfully duplicate the entire Cosmos and its properties, providing one duplicates the fundamental external relations of the mereological simples as well as their intrinsic properties and spatiotemporal relations. Suppose then that two particles are in an entangled state. Then not only will the two particles be spatially related to one another, but there will be a relation (i.e. an *entanglement relation*) which dictates that the two particles will be anti-correlated with one another with respect to their spin. The same move then

actual world are the laws of all the possible worlds (Wilson 2013). Such an extreme view, however, is not very popular in the literature on laws, and the pluralist would also need to be sure that there was no true multipartite entanglement in the actual world.

¹⁴ Teller also considers whether classical physics gives rise to such relations, but thinks this is only so if one presumes a relationist theory of space-time (1986, 74-76).

could be repeated for any emergent property, and thus the pluralist's supervenience base will be sufficient providing we admit in fundamental external relations into the base.¹⁵

Schaffer (2010a, 54) initially has two different replies to the relational holist, but I think neither of these responses are convincing.¹⁶ The real problem with this response is that it *denies the appearances* of what goes on in cases of entanglement and emergence. Trying to accommodate emergent properties through fundamental external relations is *ad hoc*. Indeed, this is something that Schaffer notices in his joint paper with Jennan Ismael. In responding to the relational holist, Ismael and Schaffer (forthcoming) think that the following principle of explanation is plausible:

Source Inference: If non-identical entities *a* and *b* are modally connected,¹⁷ then either (1) *a* and *b* are grounding-connected, in that either (i) *a* grounds *b*, or (ii) *b* grounds *a*, or (iii) *a* and *b* are joint results of some common ground *c*; or (2) *a* and *b* are causally connected, in that either (i) *a* causes *b*, or (ii) *b* causes *a*, or (iii) *a* and *b* are joint effects of some common cause *c* (Ismael & Schaffer forthcoming, 9-10)

I agree with Ismael and Schaffer that this principle is plausible. If there is a modally robust connection between two entities or events, that suggests that there “is a unified way of explaining an otherwise mysterious modal connection (Ismael & Schaffer forthcoming, 9).” Suppose that

¹⁵ George Darby (2012) considers whether this sort of move could protect David Lewis' doctrine of *Humean Supervenience*: that everything supervenes on local qualities at space-time points and their spatiotemporal relations. Darby ultimately concludes that such a move won't work however, as the matters of particular fact everything else supervenes upon will be global as opposed to local, and represents a departure from Lewis' mosaic picture of the world. Darby's reason for thinking this is actually similar to one of Schaffer's replies to the relational holist, in that there are going to have to be distinct fundamental relations for each *n*-placed entangled system.

¹⁶ Schaffer's first response is that it far from obvious that particles will be retained in fundamental physics, so (at least in the actual world) it might be unclear whether there are even any relata to instantiate fundamental entanglement relations. Matteo Morganti (2009, 277) has argued though even if physics drops particles, the pluralist could just identify the basic constituents as fields. Schaffer's second response is that the physical unity of properties will be lost by positing entanglement relations. Take the property of having a spin 0, for example. It seems this property could be had by different *n*-particle entangled systems, but Schaffer argues that this cannot be so if one posits entanglement relations, as one cannot attribute the *same relation* to systems with different numbers of entangled particles. One thus would need a 2-particle entanglement relation for 2-particle systems, a 3-particle entanglement relation for 3-particle systems and so forth. However, it looks much preferable for the spin property to be had in the same way by the different systems, as opposed to positing a distinct entanglement relation for each *n*-particle system which has that spin value. Morganti (2009, 278) and Calosi (2014, 924) have argued that this problem can be avoided by positing *ensembles* of entanglement relations, and the physical unity of properties could be preserved by applying a 2-place entanglement relation twice or more over in accounting for *n*-entangled systems.

¹⁷ That is, the two are *modally constrained* by one another.

someone owns a maroon cardigan. Then the cardigan's determinable property of it being red is modally connected to the determinate property of its being maroon; if the cardigan is maroon, then it must be red. Given the explanation required seems to be non-causal,¹⁸ this suggests that either (i) the determinable property is grounded in the determinate property, (ii) the determinable property grounds the determinate property, or (iii) both properties share some common ground.¹⁹ Source Inference, therefore, seems to be a plausible principle; modal connections require an explanation.

With 'Source Inference' on board, Ismael and Schaffer (forthcoming, 16-20) go on to argue that the modal connection between entangled particles requires explaining. As we have already seen, it's implausible that entangled particles are causally related to one another given that they are space-like separated, so the explanation required must be an explanation in terms of grounding. And it is implausible that one of the particles grounds the other(s) as (i) grounding is asymmetric, whereas the relationship between the particles is symmetric (measuring the spin of any one determines the spin of the others), and (ii) grounding is not taken to occur between objects which are mereologically disjoint from one another. Resultantly, entangled particles must be grounded in some common grounding source; namely, their mereological fusion. Thus, Ismael and Schaffer argue, the best explanation for the modal connection between entangled particles is that they are grounded in *some common whole*.

Ismael and Schaffer argue that by comparison the explanation (of the modal connection between the entangled particles) offered by the relational holist is going to be much poorer. Rather than trying to find an elucidating explanation behind the modal connection, the relational holist instead posits brute fundamental relations to account for it. Positing brute relations between entangled

¹⁸ It would be odd to think that determinates cause determinables, as what connects them is not mediated through any laws of nature. Like Wilson (2017), I think that one way to distinguish grounding from (*nomological*) causation is that the latter, but not the former, is mediated via the laws of nature.

¹⁹ In this case, (i) likely seems to be correct because it is commonly assumed that determinable properties are grounded in their determinates (see Rosen 2010, 126; Audi 2012b, 686-689).

particles would be an *ad hoc* move for the pluralist, and does not sit well with the ‘Humean’ intuition that no necessary connections should hold between distinct entities. Let us recall that Schaffer very much favours the *No Overlap* constraint,²⁰ because he thinks that fundamental entities should be freely recombinable with one another. In accepting fundamental external relations, though, the pluralist denies this. In fact, if we accept relational holism, then one could never infer from the failure of free recombination that two or more entities either share a common ground or that a grounding relation holds between them. For any modal connections between two entities, it could just be that there is some fundamental external relation which holds between them (Ismael & Schaffer forthcoming, 25).

Consider again the example of the maroon cardigan. I concluded that the modal connection between the two properties was best explained in terms of grounding. However, one could try and explain the modal connection by positing that there is some brute fundamental relation between the two properties. But this does not seem like a good explanation at all for why the two properties are modally connected. If we instead explain the connection in terms of one entity grounding the other, our explanation is going to be much more revealing. In accepting Source Inference, we hold that there is some unified explanation available in explaining modal connections between two or more entities. In positing brute relations, the relational holist does not.

I’m not sure whether every conceivable emergent property is going to be amenable to Source Inference. It might be that there are metaphysically possible emergent properties instantiated by certain objects, which do not entail there is some particular modal connection between the object’s proper parts. However, entanglement seems very amenable to Source Inference-style explanations. But Source Inference aside anyway, positing brute fundamental external relations just seems to be an *ad hoc* move. Positing such relations is not going to explanatorily match a

²⁰ No Overlap, of course, is simply the singularized version of the Minimality constraint.

monistic explanation of emergence; namely, that the possibility/actuality of emergent properties shows that duplicating the intrinsic properties and *all* their external relations will not necessarily suffice in duplicating the entire Cosmos. I therefore conclude that relational holism is not a promising strategy for the pluralist.

4.5. Reply #3: *Plural Collective Instantiation*

The third pluralist response I'm going to consider is similar to the previous one, in that it holds that pluralist's fundamental supervenience base consists of more than the mereological simples' *individual* intrinsic properties and spatiotemporal relations. But rather than positing brute fundamental relations, the sort of pluralist considered here will state that the simples *collectively* instantiate the emergent properties. That to duplicate the Cosmos and its contents, we need to duplicate the simples not just individually, but also *collectively*.

Recall, by a distributive property or predicate I mean that if some things have some property *G* then each of them has it. And some property or predicate *F* is *collective* iff it is not distributive; that is, having *F* does not entail that the things that have it each have it. The idea then is that, in plural logic, it is possible that some predicate applies to some entities which applies to none of them alone. Suppose that Ben, Charles and Mary are pushing two goal posts, which are too heavy to be pushed by any of them alone. Then 'pushing' here is a collective predicate, as it is false that it applies to Ben, Charles, or Mary alone.

The pluralist strategy here then is that if it is admissible to let *collective properties* into our ontology, then one can accommodate emergent properties by holding that they are *fundamental*, plural collective properties which are instantiated by the mereological simples. This response is advocated by Einar Bohn (2012, 218-220),²¹ who argues that we need not hold that emergent properties are only had by composite wholes, but rather are fundamental collective properties

²¹ It has also been advocated by mereological nihilists in explaining how there can be emergent properties if there are no composite objects; see Caves (2018) and Cornell (2017), as well briefly, Bohn (2012, 222) himself.

which are *collectively instantiated* by the mereological simples. We can say then that emergent properties are somewhat akin to ordinary collective properties, such as ‘pushing’ in the goal post example. In which case, the fact that the two entangled particles do not possess the ‘emergent’ entangled state, *Q*, does not entail that they cannot *collectively* possess such a property. *Q* will be a plural collective property had by the two particles *taken together*, and which they have in virtue of their *collective features*. According to Bohn then, there is no valid move from the entanglement of some things, for instance, to the fundamentality of one whole. Rather, “[w]e only get the fundamental *interconnectedness* of some *things*, not the fundamentality of one whole. That is what’s seen by taking plural logic seriously (2012, 219).”

I’m not convinced. I think this approach suffers from some troubling problems when looked at with scrutiny. To begin with (as we saw in the previous section) there are cases of emergence which result in there being modal connections between proper parts of the ‘emergent’ object. For instance, if two particles are entangled with one another, then one particle measuring spin up will mean the other particle must measure spin down. Assume then that the pluralist thinks this is so because the particles collectively instantiate some fundamental collective property. In which case, the quantum states of each individual particle obtain *in-virtue of* the collective property they instantiate. But then it seems like the individual particles are not themselves fundamental entities, as their states obtain in-virtue of properties which they *do not possess distributively*. Furthermore, the individual particles and the spatiotemporal relations which hold between them does not provide a minimal supervenience base for all what there is in the world. Each simple, then, cannot itself be a fundamental entity. The pluralist, it seems, must hold that that the particles taken

collectively (and not distributively)²² are fundamental, and that they ground each of the individual particles. It is the particles *as a collective* which are fundamental.²³

It might be thought that such a view would lead to a violation of the irreflexivity of grounding, as the mereological simples would ground themselves (Bailey 2011). But as we'll see in the sixth chapter, I do not think that this is necessarily so. Some things doing something collectively does not entail that *each* of them does that thing distributively, so this does not involve violating grounding's irreflexivity. My real concern is whether *mere pluralities* of entities can be fundamental or instantiate fundamental properties (which are not had by each individual entity in the plurality).

My worry here is very much tied up with a more general concern I have about fundamental plural collective properties. Their instantiation requires that they can be instantiated by many entities, yet the property itself does not supervene on the intrinsic properties and external relations of those entities. Now what then is instantiating the fundamental property is a *mere plurality*, which can be defined as follows:

Mere Plurality: A plurality is a mere plurality iff it is a plurality which is not identical to any entity

This will be true of any plurality unless *composition is identity*. If composition were identity, then the plurality of two entangled particles, for example, would be identical to their mereological fusion. But then it would follow from the Indiscernibility of Identicals (II)²⁴ (as well as the

²² Recall that in chapter two, I ruled out Indiscriminate Pluralism (the position that the mereological simples would be both distributively and collectively fundamental) as it would violate the Minimality constraint. Given a single thing can be a plurality, Indiscriminate Pluralism would entail that distinct fundamental pluralities would mereologically overlap, which is disbarred by the Minimality Constraint. However, even this aside, much of what I'll say about (mere) collective pluralities would also apply to an indiscriminate pluralist who advocates the collective instantiation reply to emergence.

²³ This would seem to suggest that the pluralist should be a collective pluralist: that what is fundamental are the mereological simples taken collectively and not distributively. However, the pluralist might hold that the simples collectively are fundamental iff they instantiate emergent properties and are distributively fundamental otherwise. This might raise the concern that such a view would be disjunctive, and disjunctive theories of fundamentality are inferior to more unified ones.

²⁴ Proof: Given (II), if $xx = yy$ then xx and yy must share all the same properties. So, if the parts are collectively fundamental, it follows that the whole they are identical to must be fundamental.

irreflexivity of grounding)²⁵ that the fusion would also be fundamental. In which case, this would seem to collapse the plural collective strategy into pluralism [A V E], given that it is view that composite objects can be admitted as *fundamentalia* providing they instantiate emergent properties. But we have already seen the shortcomings of pluralism [A V E] in third section of this chapter, so it seems desirable for the collective pluralist then to deny that composition is a relation of identity. This means that fundamental plural collective properties can only be instantiated by mere pluralities.

My worry then is that mere pluralities aren't the sorts of things which could instantiate fundamental properties. I will go into more depth about this in the seventh chapter, but it intuitively seems that mere pluralities just aren't the sorts of things which could be fundamental or instantiate fundamental properties. They cannot "act as one" in nature as they are not a single entity, but rather just a collection of them. Ontologically any mere plurality will be no different in kind than say a mere plurality of sand, which does not appear to be a very integrated thing at all. The idea here (as I will explicate upon in chapter seven) is that mere pluralities are dependent for their *identity* upon their members, in the same way sets are dependent for their identity upon their members.²⁶ For a mere plurality *to be the plurality it is* it must have certain members. The collective (mere) plurality of my molecules, for instance, seems identity dependent upon each of the molecules which comprise it. It is the plurality that it is *because* of each the things that it contains. Plausibly, if the identity of this plurality is dependent upon the things which that make it up, it is grounded in those things which make it up. Mere pluralities are nothing more than the things we are quantifying over and are not *entities* in their own right. I cannot then see how some things (not identical to an entity) can collectively be fundamental if distributively they are not; as

²⁵ Proof: Suppose the particles collectively grounded the whole they were identical to. Given the whole, however, is identical to its parts collectively, it would follow (given (II)) that the parts grounded themselves. The irreflexivity of grounding would thus be violated.

²⁶ This of course is Jonathan Lowe's (1998, 147) notion of identity dependence: where some *xx* depend on the identity of *yy* for their own identity.

given a collective plurality is identity dependent upon its members, its collective nature should supervene upon each of the things in the plurality.

I do not think then that mere pluralities can be fundamental. Instead, the sort of things that could instantiate fundamental properties are entities which are *integrated*;²⁷ that is, entities which are *one thing* and each of which “is not an arbitrary gerrymander but displays natural unity (Schaffer 2013, 68).” As we’ll see in chapter seven, I do think the Cosmos does qualify as being an integrated entity, as I hold that it evolves in accordance with the fundamental laws. A mere plurality by contrast is not, as it is not a single entity but is just many of them. And I think it’s very implausible that such a thing could bear fundamental properties.

4.6. Conclusion

In this chapter, I’ve set out to argue that the argument from emergence for priority monism is successful. I initially began by setting out the argument from emergence, before going on to show that we have a good reason to think that emergent properties are metaphysically possible. I then looked at three different objections to the second premise of the argument; Priority Pluralism [A V E], Relational Holism and Collective Plural Instantiation. As we have seen, these pluralist responses are flawed such that they are inferior to the monist’s account of emergence: that instantiation of emergent properties ultimately obtain in-virtue-of the entire Cosmos, and do not supervene on the nature of each of the simples and the spatiotemporal relations between them. Given this, we have strong grounds for holding that Priority Monism is true. The only necessary thing we can be sure that duplicates all the objects in the world and their contents, is the Cosmos itself.

²⁷ Similar thoughts are expressed by John Heil (2012, 48), who argues that bearers of emergent properties must be substances. I do not go as far to hold that anything which instantiates an emergent property is a substance in the sense Heil understands a substance to be, but I do think that anything which instantiates an emergent property is a *particular*. By the very definition of a mere plurality, it cannot be either a substance or a particular.

So far then, it looks as if there are some compelling arguments in favour of Priority Monism. Both mereological gunk and emergent properties are metaphysically possible; which given their incompatibility with pluralism, seemingly entails that only the entire Cosmos can be what is necessarily fundamental. Unfortunately for the monist, they face a big problem of their own; namely, the metaphysical possibility of *mereological junk*. In the next chapter, I'll look in detail at this problem. I'll conclude that the monist can rule out the possibility of junk, but at a steep price which may make the theory ultimately untenable.

Chapter Five: Priority Monism and Junk

In the previous two chapters, I argued that the metaphysical possibility of gunk and emergent properties successfully undermined Priority Pluralism. Hence on the supposition that monism and pluralism are the only tenable answers to the Fundamental Mereology Question (FMQ), the possibility of gunk and emergent properties entails that Priority Monism is true. However, in this chapter I'm going to look at a notorious problem that has been raised against monism: the metaphysical possibility of mereological junk (Bohn 2009a, 2009b). Some object is junky iff every part of it is a proper part, and as such a possible world will be junky iff every object in that world is a proper part. If such a world is possible though, it cannot contain a universal object, *U*, because there would be no object which is not a proper part in a junky world. Given the necessity of one's answer to the (FMQ), the mere possibility of junk threatens monism, as there would be possible worlds which contain no maximal concrete object. If junk is possible, Priority Monism is false.

Schaffer (2010a, 64-65) has attempted to undermine the possibility of junk, but I do not find his reasons for thinking that junk is impossible convincing. Instead, I will argue that the monist must undercut the thought experiments which seemingly support the possibility of there being junky worlds. I think this can be done by supposing that the possibility of junk is an *illusion* (Williams 2006) being generated by weak junk: an object being weak junky iff every proper part of it is the proper part of *another* proper part. Unlike the stronger variant of junk, weak junk is compatible with there being a largest concrete object and is thus seemingly compatible with monism. But while not as problematic for them as junk, I think the possibility of weak junk itself still poses considerable trouble for the monist. I'll argue that weak junk entails that there are infinitely long grounding chains which do not terminate at the Cosmos, which is a violation of the foundationalist supposition that all grounding chains terminate at the fundamental entities. Strong Priority

Monism (SPM), I'll argue, does not have the resources to explain how objects are grounded in the Cosmos in a weak junky world and therefore should be rejected.

In the first section of this chapter, I'll outline what mereological junk is, the problem it poses for monism, why it seems to be possible and argue that Schaffer's objections to it fail. In the second section, I'll show how thought experiments which indicate that junk is possible are an illusion being generated by weak junky worlds. Thus, there is no philosophical motivation to believe that junk is possible. But in the third section, I'll argue that weak junk would lead to a vicious grounding regress such that "[b]eing would be infinitely deferred, never achieved (Schaffer 2010a, 62)." And in the fourth and final section, I'll indicate that a monist has to hold that the Cosmos *immediately*¹ grounds all its proper parts in a weak junky world to avoid such a regress; but that on (SPM) it cannot be the case the Cosmos immediately grounds all its proper parts. Hence (SPM) is untenable as answer to the (FMQ). I will then suggest at the end of the chapter that on another version of priority monism (i.e. Weak Priority Monism (WPM)) one can have immediate grounding relations between the Cosmos and its parts, and hence a monist can solve the problem by embracing (WPM).

5.1. Priority Monism and the possibility of junk

In the third chapter, I argued that Priority Pluralism was incompatible with mereological gunk. Recall, some object is gunky iff every part of it has a proper part, and so is ultimately not composed out of any mereological simples. A gunky world then is incompatible with pluralism² being true. For *reductio*, suppose that a gunky world did contain simples. Those simples would then have proper parts, but then they could not be simples as they would have proper parts. *Ergo*, gunk is

¹ As mentioned in the first chapter of the thesis, an immediate ground is a ground which need not be mediated, where for x to mediate ground z is for there to be some y which is grounded in x and which grounds z . I say an immediate ground 'need not be mediated' as opposed to 'not mediated', as there are cases (as the reader will recall from chapter one) of ground being both an immediate and mediate ground (Fine 2012, 50-51).

² I'm presupposing that the only tenable version of pluralism which is plausible is the atomistic version, according to which what is fundamental are mereological simples.

incompatible with pluralism as any gunky world would not contain any simples which could serve as the pluralist's *fundamentalia*. There would be an infinite descent of objects that would result in a vicious grounding regress; hence the pluralist's "ontology would drain away down a bottomless pit (Schaffer 2007, 184)." Given that one's answer to the (FMQ) must be metaphysically necessarily true, the mere possibility of gunk renders pluralism false. Monism by contrast is perfectly compatible with gunk, as there would still be a maximal concrete object in a gunky world. If pluralism is the only other plausible answer to the (FMQ), the possibility of gunk entails that monism is true (Schaffer 2010a, 61-64).

But there seems to be a very similar problem for monism, however, which is the metaphysical possibility of mereological junk. Some structure is junky iff every element of it *is* a proper part of some other element within it. No junky structure can be co-extensive with some concrete object, for otherwise there would be an element of the structure (i.e. the entire structure itself) which would not be a proper part of some other element within it (Giberman 2015, 437). A junky world then is a world in which every object in it is a proper part, meaning a junky world would be devoid of any maximal concrete object, *U*. For *reductio*, suppose that a junky world did contain such an object. Then *U* would itself be a proper part, which is impossible as *U* is the fusion of every object and thus there is *nothing else* for it to be a proper part of.³ There would be an 'infinite ascent' of objects such that every whole would be part of some bigger whole. Grounding chains then would never terminate at anything, and thus like the pluralist in the case of gunk, the monist's ontology would be such that "being would be infinitely deferred, never achieved (Schaffer 2010, 62)." The

³ Given I have supposed that 'Minimal Extensional Mereology' (MEM) is correct, it is easy to demonstrate that junk entails that *U* cannot exist given the 'weak supplementation principle' (WSP – if *x* is a proper part of *y*, then there is some *z* that is a proper part of *y* and does not mereologically overlap with *x*) and the asymmetry of proper parthood. Let us start with (WSP): If *U* were a proper part of some distinct object, *U**, then given (WSP) there would have to be some proper part of *U**, *z*, which did not mereologically overlap with *U* and hence was not a part of it. This would, however, contradict that every concrete object is a part of *U*, and hence *U* could not exist (Bohn 2010, 297, fn1). As for asymmetry: suppose *U* is a proper part of *U**, then given proper parthood's asymmetry, *U** cannot be a proper part of *U*. But then since *U** would not be a part of *U*, *U* would not have every object as a part, contradicting that it is the universal object. Instead it would be *U** which would seem to be the universal object; but if that world is junky, *U** would have to be a proper part of another object and could not be the universal object given (like in the case of *U*) proper parthood's asymmetry (Cotnoir 2014a, 654-655).

mere possibility of worldless junk then would rule out Priority Monism, as it would violate the necessity of one's answer to the (FMQ).

Junk then is incompatible with Priority Monism, but is it metaphysically possible? Einar Bohn (2009a, 28-29; 2010, 297-297) argues so given that junk is (i) conceivable, (ii) logically consistent (given that there are non-classical mereological models which are compatible with junk) and (iii) that it's possibility has been defended by philosophers such as Leibniz and Whitehead. Indeed, Leibniz believed that the world was both gunky and junky⁴, stating that:

“For, although there are atoms of substance, namely monads, which lack parts, there are no atoms of bulk, that is, atoms of the least possible extension, nor are there any ultimate elements, since a continuum cannot be composed out of points. In just the same way, there is nothing greatest in bulk nor infinite in extension, even if there is always something bigger than anything else, though there is a being greatest in the intensity of its perfection, that is, a being infinite in power (Leibniz 1989b, 162).”

By itself however, (iii) looks suspiciously an argument from authority. Even if we respect Leibniz and Whitehead as philosophers, that does not mean just because they thought junk was actual/metaphysically possible we should think it metaphysically possible. Isaac Newton allegedly believed one could create the philosopher's stone; a legendary substance capable of turning base metals into gold and of giving a person immortality. Yet you would get short shrift from any modern chemist if you suggested it was reasonable to believe such a substance could be procured because Newton did. Rather, I think we should instead take (iii) as supplementing (i): that junk is conceivable. If (as suggested in chapter three) we take *positive*⁵ conceivability as providing good (even if perhaps defeasible) evidence for some situation being possible, that Leibniz and

⁴ A structure that is both gunky and junky is mereologically *hunky*: every element of it has a proper part and every element of it is a proper part of another element within the structure (Bohn 2009b, 198).

⁵ As stated in chapter three, a Scenario *S* is positively conceivable where we form some positive conception of *S* being the case, as opposed to merely not being able to rule it out *a priori* (i.e. negative conceivability). We *imagine* as situation which verifies *S* (Chalmers 2002, 149-150).

Whitehead thought the world was junky increases one's credence that it is conceivable and hence metaphysically possible. Indeed, the idea of junk seems to have been taken seriously in popular culture. At the end of the first *Men in Black* movie, the galaxy or entire universe is depicted as being a marble, which an alien puts into a bag. In the first *Dark Tower* novel, the evil sorcerer, Walter O'Dim, speculates as to whether the universe is an atom in a blade of grass (King 2003, 228-229).⁶ Barry Sonnenfeld and Stephen King are not exactly known as respected academics, but the fact they conceive of these scenarios indicates that the notion of junk is familiar to ordinary folk. So, this gives us good reason to think junk is actually conceivable.

And indeed, a junky world does at face value seem to be pretty easy to imagine. All we have to do is inverse Schaffer's miniuniverse thought experiment in favour of gunk, and instead imagine that "our universe is a miniature replica universe housed in a particle of an even bigger replica universe, and so on *ad infinitum* (Bohn 2009a, 28)." Or we could imagine that every object is spatially extended and is just one half of some other object that is spatially extended (Bohn 2009a, 28). Both look to be scenarios in which there is mereological junk; hence junk seems to be positively conceivable and thus we should suppose it to be metaphysically possible.

Schaffer (2010a, 64-65), of course, doubts that junk is metaphysically possible, and raises three objections to it being possible. Firstly, he argues that junk is ruled out by classical mereology given its commitment to unrestricted composition.⁷ But why accept either classical mereology or unrestricted composition? Given that Bohn formulates junk as an attack upon unrestricted composition,⁸ it would be an unconvincing move on the monist's part to insist on its truth when

⁶ To be precise, the exact scenario that O'Dim describes is that of a hunky world, in which everything has and is a proper part (King 2003, 228-229).

⁷ That this is so follows from the fact that there would be a collection of objects (i.e. all the sub-cosmic ones) which failed to compose any further object, and hence *not every* collection of objects would compose a further object.

⁸ Or at least upon it being a metaphysically necessary principle. Bohn (2009a, 30; 2009b, 195-198) thinks there is good reason to suppose that what junk's possibility indicates is that truths about composition are contingent. For a full exploration of the idea that composition is contingent, see Cameron (2007). In this PhD dissertation, I am of course assuming (along with the majority of metaphysicians) that composition is necessary. Of course, one good reason to suppose that this is so (as we saw in chapter one) is that grounding necessitarianism is true and that composition is a form of grounding relation. It thus follows if the parts arranged a certain way necessarily ground the whole, they necessarily compose the whole (Cameron 2014).

its truth is in part is the very thing in question.⁹ Secondly, Schaffer claims that as possible worlds are understood as concrete objects they cannot be junky, as they would “top off” the junk. But as Bohn (2012, 215-216) points out, there is no reason why one must treat possible worlds as singular concrete objects. Possible worlds could be instead understood as being possible concrete *pluralities* of objects (with the junky worlds being pluralities that are infinitely extended). Thirdly, Schaffer claims that there are virtually no plausible accounts of when composition occurs that allow for junky models. But what about, for instance, Ned Markosian’s (1998b) answer to the Special Composition Question (SCQ), Brutalism? The position that “[t]here is no true, non-trivial and finitely long answer to [the] SCQ (1998b, 218).” This is hardly an obscure and unknown account of when composition occurs, and it would allow for junky models. Therefore, I don’t think any of Schaffer’s responses here are very convincing at all.

Is there another response that the monist could give to the problem of junk? One thought might be that they could hold that composition *is* identity: that if some objects compose a further object then (the collective plurality of) those objects are identical to the composed object. It has been traditionally held that if Composition as Identity (CAI) is correct, then unrestricted composition is also true. In endorsing the existence of some objects, you endorse the existence of the sum they are identical to; the sum is simply nothing more than the objects which we already believe in. If this were true, (CAI) would entail that there is a fusion of all the sub-cosmic objects, and hence would rule junk out. But the thesis that (CAI) entails unrestricted composition has come under fire in the last few years. As Ross Cameron (2012, 533) has pointed out, (CAI) only entails that *if* some objects compose a further object, then they are identical to that object; but this does not entail that those objects *actually* do compose some object. That (CAI) entails unrestricted

⁹ Gabriele Contessa (2012) and Josh Spencer (2012) have argued that unrestricted composition does not necessarily entail there is a largest object; the former because he thinks proponents of unrestricted composition should only hold that *any pair* of objects have a fusion, and the latter because he thinks one can reject that plural quantification is absolutely unrestricted (i.e. it does not follow there is a plurality of all objects). Neither of these responses is of any help however to monism because both Contessa and Spencer deny there is a universal object. In any case, Cotnoir (2014a) has argued that both of these responses are problematic.

composition is at best controversial, if not unconvincing.¹⁰ In accepting (CAI), we really do not seem to be forced to accept the existence of a universal object.

Here's the monist's problem then. If we think the conceivability of gunk is strong evidence for its possibility, then it seems we should *also* hold that the conceivability of junk is strong evidence for its possibility. It appears just as easy to imagine a world being junky as imagining it being gunky. If we can imagine that every atom in our universe contains a miniuniverse which contains another miniuniverse and so on *ad infinitum*, we can inverse the thought experiment and imagine our universe is a miniuniverse in another miniuniverse and so on *ad infinitum*. As Bohn (2009b, 201) himself points out, “[t]here simply seems *prima facie* to be no substantial difference between conceiving of a junky world and of conceiving of a gunky world.” If we are confident then that our ability to conceive of gunk entails that Priority Pluralism is false, we should be just as confident that our ability to conceive of junk entails Priority Monism is false. Monism then looks to be in some trouble.

5.2. Priority Monism and the *illusion* of junk

Can the priority monist overcome the problem of junk? Ultimately, I think the monist's ability to resist the possibility of junk rests upon them successfully undermining its apparent conceivability. The monist needs to show there is a *substantial difference* between conceiving of a gunky world and conceiving of a junky world, and that this difference arises because our apparent ability to the conceive of the latter arises due to a confusion with something genuinely possible. If we are going to undermine junk's metaphysical possibility, then we need to *explain why it seems possible*. For instance, if we think that water is necessarily H₂O, then we can explain that we seem to imagine it having a different chemical compound by holding that what we are actually imagining is a different

¹⁰ For arguments against (CAI) entailing unrestricted composition, see McDaniel (2010) and Cameron (2012). For a response, see Bohn (2014). However, it should be noted that Bohn's defence of (CAI) entailing unrestricted composition appears to rely on a pluralistic metaphysics, on which “the mereological structure of the perfectly natural sorts of things is that of simples (Bohn 2014, 157)”; so, I do not think Bohn's argument is available to the monist.

chemical substance which has the same phenomenal surface qualities as water (Kripke 1980). What we need to show then, is that thought experiments that seemingly involve junk do not, but only indicate something weaker which is compatible with there being a maximal concrete object. I suggest the monist should argue that it is an *illusion* that junky worlds are possible, and that it is an illusion being generated by what I'll call *weak junk*.

In the third chapter, we saw that Robbie Williams (2006) made use of the Illusions Principle, by arguing that mereological nihilists could reject gunk's possibility by holding that its conceivability is generated by a genuinely possible world in which there is an infinite descent of co-located simples. In such a world, for example, instead of a person's left hand being a proper part of them, it will instead be a simple which is merely co-located with that person (who is also a simple). These emergence nihilist worlds will generate the illusion that gunky worlds are possible, in the same way nihilists would argue that ordinary non-gunky nihilist worlds generate the illusion that worlds containing composite objects are possible. Now, in that chapter, I voiced my scepticism that these emergence nihilists could generate the illusion of gunk being possible. Nevertheless, I think Williams' strategy is a good one, and monists should take a leaf out of his book.¹¹ If we are going to undermine the possibility of junk, we need to put something in its place. Like the nihilist in the case of gunk then, I hold that monists should utilise the Illusions Principle in rejecting junk:

Illusions: If scenario w is (positive) *prima facie* conceivable, then either it is possible, or there is some genuinely possible world w' generating the illusion that w is possible (Williams 2006, 503).¹²

¹¹ Another philosopher who seems to implicitly rely on the Illusions Principle is Ross Cameron (2016, 166-167), who uses it to deal with an objection to the version of the moving spotlight theory of time he defends. Cameron argues that it is impossible that one can change the temporal distributional property (TDP) one has, but the fact that this is conceivable is an illusion being generated worlds in which one has a different TDP (than what one originally had) in a future *hypertime*. It always will be the case, for instance, that Caesar will have a TDP that ensures he crossed the Rubicon, but he might have a different TDP in the hyper-future such that he did not cross the Rubicon.

¹² As noted in the previous chapter, this is an amended version of the Illusions Principle, where I've formulated the conceivability in terms of what Chalmers (2002, 153-154) calls 'prima facie' positive conceivability: where some scenario S is *prima facie* positively conceivable where we can imagine a situation in which S is verified on *first appearances*. This distinguishes it from 'ideal' positive conceivability: where some scenario S is ideally positively conceivable where we can imagine a situation in which S is verified after 'ideal rational reflection'.

What then could be generating the illusion of mereological junk? I suggest that it is the following thing:

Weak Junk: x is weak junky iff every proper part¹³ of x is a proper part of *another* proper part of x (which is *at least twice* the size of the original proper part).¹⁴

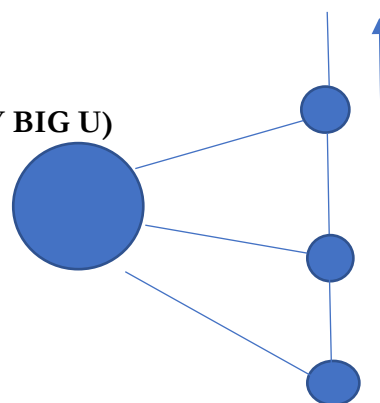
Weak junk like junk leads to there being an infinite ascent of objects, for if every proper part is the proper part of another proper part, no proper part will fail to be the part of something which is itself a proper part. Unlike junk though this does not entail that there isn't a maximal U (though U will have to be infinitely extended¹⁵), for just because every proper part must be the proper part of another proper part, *that does not mean those parts cannot also be the proper part of something which isn't part of anything else*. In other words, just because all proper parts are proper parts of another proper part, it does not follow that there is no thing that is not a proper part (i.e. it does not follow there is no U). To see this, consider the following two models:

Fig 1: A Junky World



...

(INFINITELY BIG U)



...

¹³ Or to be more precise, every *extended* proper part which is not infinitesimally small.

¹⁴ I add in this clarification to rule out structures which merely contain *dense* parthood chains as being classified as weak junky. Suppose that space-time is composed out of points (i.e. is *continuous*) and my chair has parts in every region of space-time it occupies. Then every proper part of the chair will be the proper part of another part. Clearly though, this is not what we typically think of as a case of infinite ascent.

¹⁵ This is so as it will have no boundaries due to the infinite ascent of bigger and bigger objects. If U were finitely extended, then it would have a proper part half its size which was not a proper part of another proper part twice as big as it is (as U is not a proper part of anything), and thus U would not be weak junky.

Figure One represents a junky model, as there is no largest object that each member of the parthood chain is part of. Figure Two on the other hand represents a weak junky model as there is a maximal concrete object that each member of the parthood chain is part of. What both models have in common, however, is that on both there is an *infinitely ascending* parthood chain of bigger and bigger objects. That a parthood chain is infinitely ascending does not preclude it from having an *upper bound*. This demonstrates that the existence of such chains is *not sufficient* to guarantee they are junky structures, and the junk theorist needs to do more to demonstrate that junk is possible.

A related observation is made by Duncan Watson (2010), who argues that Bohn's argument for junk is false given the fallacious inference from the possibility of infinite parthood chains to junk.¹⁶ Watson holds that it is akin to thinking that if there is an infinite series of 'constructed sets' that entails there is no set which contains all the constructed sets, which is false.¹⁷ I think much of Watson's response here is on the right track but needs to be refined. For in his own reply to Watson, Bohn concedes that the possibility of infinite parthood chains does not establish the possibility of junk but holds that in conceiving in junky worlds he is "conceiving of them in a logically consistent way (2010, 298)." Going back to the example of everything spatially extended being one half of something else, Bohn argues that it is clear that there is *nothing* that can play the role of a universal object in such a scenario. Bohn, therefore, maintains that there is still good reason to think that junk is possible and claims that the onus is on those who reject junk to explain it away.

I'm willing to meet Bohn's challenge here, and I'm happy to accept that he can 'conceive' of junk. But his conception that junk is possible is an illusion being generated by weak junky worlds. It is extremely hard to deny that thought experiments such as the nested universe case demonstrate

¹⁶ Weak junk has also been utilised by Sanson (2016), to show how a Lewisian modal realist could accommodate the possibility of junk. According to Sanson, if we restrict our domain to everything short of the Cosmos, then we have a domain which can represent the possibility of a junky world.

¹⁷ See Mormann (2014) for a discussion on the relationship between set theory and the possibility of junky worlds.

that infinitely ascending parthood chains are possible, but it is much easier to deny they entail junk. For in constructing a junky world, we must do two things: (i) conceive that each proper part is a member of an infinitely ascending parthood chain (i.e. the world is weak junky) and (ii) conceive that there is no biggest object in such a world. But in arguing that there is no universal object, why do we need (i)? Wouldn't just conceiving of there not being a biggest object be enough? After all, a mereological nihilist, for instance, would surely claim that they can conceive of a world in which there is no biggest object as it would contain no composite objects at all, yet no one would hold that this alone is a convincing argument against the necessity of there being such an object. Conceiving that there is no biggest object is something we do in *addition* to conceiving that the world in question contains infinitely ascending parthood chains. Is this therefore hard to see why the fact we seem to be able to conceive of a junky world should be any more of a threat to the monist than the fact we seem able to conceive of non-junky worlds in which there is no maximal concrete object.

In the third chapter, I was suspicious that the illusion of gunk could be produced by emergence nihilist worlds. I noted that it seemed difficult to believe that in conceiving of a gunky world, what we were actually imagining was a world in which there are laws of nature governing regularities such as the fact people are generally co-located with their left hand, and that there are *alien* perfectly natural properties such as 'hand-hood'. Is it plausible that when we conceive of a gunky world that we are conceiving of a world along these lines and that we 'miss out' these strange laws and properties? The differences between these worlds hardly seems to be slight. By contrast, the differences between a junky world and a weak junky world *do seem to be slight*. When we think of an infinite ascent of objects, we often 'miss out' the object which contains such an infinite sequence of proper parts. We *restrict our attention* to the infinite sequence and do not consider whether there is some object which contains them. And this visualization does not involve imagining any strange laws or properties. In fact, as we saw above, imagining a junky world actually

involves an extra task of imagining away that there is a biggest object.¹⁸ I must therefore conclude that it is very plausible that the apparent possibility of junk is indeed an illusion, and thus there is no motivation to believe junk is metaphysically possible. Unlike gunk, we can explain away junk's apparent possibility by arguing it is an illusion, and hence there is a substantial difference between conceiving of a gunky world and conceiving of a junky world. Our confidence in thinking gunk is possible does not force us to think the same of junk.

5.3. Priority Monism and the possibility of weak junk

Priority Monists can therefore overcome the possibility of junk, by arguing that it is an illusion being generated by weak junky worlds. The reason that junk is *prima facie* conceivable is not because it is possible, but because worlds in which there are infinitely ascending parthood chains are. But the existence of such chains is compatible with there being a maximal concrete object, and there is no reason why we must postulate that junky worlds are possible to account for the genuine possibility of such chains. The monist, therefore, can explain away the possibility of mereological junk, providing they are willing to accept the possibility of weak junk.

But accepting the possibility of weak junk still presents a problem for Priority Monism. Junk mainly posed a problem for monism as it precluded the existence of a universal object, which would serve as the monist's fundamental entity. Resultantly, in junky worlds there would be an infinite ascent of grounding chains which never terminate, violating the well-foundedness of grounding. The problem with weak junky junky worlds is that they also appear to violate the well-foundedness of

¹⁸ The proponent of junk might complain that it is implausible to suppose there could be an infinitely sized object. Is it really plausible to suppose we could conceive of a thing which lacks any definite mass or size (Morganti 2009, 282)? Even if this may seem strange to some people, I really do not think strangeness is strong enough a reason to rule out a certain view. For instance, if each subatomic particle in our universe contained a miniverse which contained another miniverse and so on *ad infinitum*, then it would be the case that every person is composed out of an infinite number of nested universes. This seems rather strange, but I think it's metaphysically possible. I also think it should be noted that unlike many objects (i.e. tables, laptops and other medium dry-sized goods), the persistence and composition conditions for the Cosmos are precise; providing there is at least one object, you will have an object which is the fusion of all objects. If we are inclined to by common sense to recognise objects whose persistence and composition conditions may be vague, then I think we should recognise an object whose conditions are precise. So, I don't see much concern in accepting that an infinitely extended object is possible.

grounding, as they will include infinite grounding chains which will never terminate at the universal object. To see this, I ask the reader to recall the *Grounding Question* (GQ), which I referred to back in chapter two (and let *xx* stand for a plural variable):

(GQ): For any entities, *xx* and *yy*, if the *yy* are grounded in *xx*, then why are the *yy* are grounded in *xx*?

That is, if we hold that some entity/entities are grounded in some others, we need to explain provide an explanation for *why* they are grounded in those entities which ground it. Suppose, for instance, we hold that my cricket ball instantiating the property of being scarlet grounds that it instantiates the property of being red. Then we could explain that this is so by the fact that more determinate properties ground the determinable properties they fall under. The ball's being scarlet is a more *specific* property, which *plays a role* in making it the case that the ball is red. To be red is to instantiate some *shade of red* (Rosen 2010, 129). In answering the (GQ), I hold that in the case of the properties 'scarlet' and 'red' we should answer it as follows: the property of being scarlet (when instantiated) grounds the property of being red because the property of being scarlet is a determinate of the determinable property of being red. Likewise, I think anyone seeking to give an answer to the (FMQ) must give an answer which is also capable of providing an answer to the (GQ). The pluralist and the monist must explain how it is their *fundamentalia* ground the derivative entities, and if they cannot do so, their answer to the (FMQ) will be implausible. It seems that the obvious response the priority monist could give is that proper parts are grounded in the wholes they compose. It is the fact that each part is grounded in some bigger whole, such that we can trace the source of its being through the parthood chain to the Cosmos.¹⁹

If this is so, then, we once more appear to have a vicious grounding regress; as there will be infinite grounding chains (i.e. the infinitely ascending parthood chains) which never terminate at the

¹⁹ It should be noted however that Schaffer (2010a) thinks that it is possible that sub-cosmic wholes can be grounded in their proper parts, and it is only *integrated* wholes which cannot be grounded in their parts if Priority Monism is true. In the fourth section, I'm going to argue that this is not possible if (SPM) is true.

universal object. Granted, there will be such an object, but it is very much unclear how it can ground any of its proper parts if every derivative object will be grounded in some infinitely ascending grounding chain which never terminates at that object. Indeed, this problem has also been noticed by Jonathan Tallant (2013)²⁰ and Aaron Cotnoir (2013b). Cotnoir also points out that the pluralist has a similar problem; that there are conceivable worlds which are atomistic yet contain infinitely descending parthood chains. For instance, any world which is ultimately composed out of point-sized simples and where every extended object has an extended object as a proper part, will be a world where parthood never terminates at the mereological simples. Again, it seems that despite the fact the pluralist has the simples she needs to be her *fundamentalia*, the well-foundedness of grounding will be violated as such chains will never terminate.

The problem then for both the monist and the pluralist is that they must deny that there can be either infinite ascending or infinite descending parthood chains, and this just seems to be *too strong*. As we've seen, there seems to be good evidence for the fact that infinitely ascending and descending parthood chains are possible (i.e. namely that both are *conceivable*), so ruling out worlds containing such chains seems extremely undesirable. Furthermore, the monist would also have to abandon their response to mereological junk that in terms of it being an illusion, so they could no longer explain it away anymore. It seems then that in accepting the possibility of infinitely ascending and descending parthood chains, both the monist and pluralist must accept that grounding chains which never terminate at their *fundamentalia*. And this grounding regress looks vicious.

Is a regress of this sort genuinely vicious though? Perhaps such grounding chains nevertheless do terminate at some *fundamentalia* even though they stretch infinitely back. Ross Cameron (2008, 4-5), Ricki Bliss (2013, 416), and Rabin and Rabern (2016, 360-363), have all argued that grounding

²⁰ Tallant (2013, 435) argues that even if junk and gunk can be explained away via the Illusions Principle, the problem of infinite ascent and descent remains. Tallant then seems very much aware that weak junk won't be as much help to the monist as it would first appear.

regresses of this sort are benign. Indeed, they even use the point sized simples (considered above) to *demonstrate* that grounding chains can be well-founded even though they are not *finitely grounded*. As Cameron (2008, 4) states:

“The intuition under discussion [well-foundedness] does not demand we should reach the ultimate ontological ground in a finite number of steps... It demands only there is a fundamental ground.”

The argument being made here is that an infinite grounding regress is only vicious when there is *no source* for it. It is not the infinite length of the grounding chain which poses a problem, but that certain infinite chains of ground preclude there being a source which violates the well-foundedness of grounding. Providing there is a source for the being of all the derivative entities, it does not matter whether the grounding chain between each derivative entity and the fundamental entities is infinitely long. In grounding structures of this sort then, “being is infinitely deferred but nevertheless achieved (Rabin & Rabern 2016, 363).”

I cannot see why such a regress is benign though. It seems to me that if one requires there to be a source of being, then there must be some intelligible explanation of how each thing is grounded by that source. And it does not seem intelligible to me at all how something can be grounded by a fundamental entity if we cannot trace its being back to the source in a finite number of steps. That this is a problem can be shown by considering causal chains which have a similar structure (i.e. stretch infinitely back to their initial source) and which are not metaphysically possible. Suppose that God created the universe at some first moment of time, but that there is an infinite number of years between that first cause and *any* other event in the universe’s history. But if so, how can the universe have a beginning, yet there not be a first year after the creation (Cotnoir 2013b, 70)? Suppose a time traveler decides that she will visit the creation point, and for every second that elapses on her ship she goes back a certain amount of years in time. Will she ever reach the creation? No, and it *doesn’t matter how fast she travels*. The very nature of the chain precludes her from ever getting to the creation. But how can we make sense of the universe being created in

some first moment of time, if it is impossible to ever trace the causal chain back to that first moment? Rather, if the universe is infinitely old it looks more as if it has no creation at all.

I do not think then that such a causal chain is metaphysically possible; I can make no sense of there being a causal chain which is both infinitely long, yet has a beginning. Similarly, I can make no sense of there being a grounding chain which stretches infinitely back yet nevertheless terminates at some fundamental entity. The problem in both the causal and grounding cases here is that the source of the chains is *inaccessible*. Just as it is impossible for the time traveler to access the creation as it were, one can never access the source of any derivative entity's being by tracing it back via an infinitely long grounding chain. If we require there to be a source of a causal chain, it is inexplicable how a causal chain ever got going if we cannot trace an event in the chain back to its source.²¹ Similarly, it is inexplicable how a grounding chain ever got going, if we cannot trace any derivative entity back to its source via the chain itself. I therefore think that a grounding regress of this sort is vicious, and weak junk therefore poses a considerable problem for monism.

Before I move onto the following section, I think it's worth considering an objection the monist might make to the argument above. That is, they might object that if our notion of grounding being well-founded requires us to rule out there being infinitely long grounding chains, we might be ruling out ontologies we should be open to. Cameron (2008, 4-5) gives the example of a mathematical ontology on which zero, 0 , is the only number which is a fundamental entity, and it being the case that (i) for any two positive real numbers x and y , x grounds y iff x is smaller than y and (ii) for any two negative real numbers x and y , x grounds iff y is smaller than x . Consider then 0 and 1 . 1 will be mediately grounded in 0 , as there is a number smaller than 1 (i.e. 0.5) which grounds 1 and is grounded in 0 . But that number will also only be mediately grounded in 0 , for there will be some smaller number (i.e. 0.25) which grounds it and which is also grounded in 0 .

²¹To be clear here, I am not claiming in this sentence that all causal chains require a source; I am open to the idea that the universe is infinitely old, for instance, providing it has *no temporal first cause*. Unlike grounding, I do not think causal chains necessarily have to terminate at some initial source.

And so on *ad infinitum*. Given the density of the number line, there will be an infinite number of grounds between each number and the fundamental number, 0 . Even if we aren't personally sympathetic towards such an ontology, the monist could argue that it should not be ruled out by one's notion of grounding being well-founded. Similarly, such a notion of well-foundedness would preclude parthood being dense (at least in certain worlds),²² and we should be at least open to the notion that it is dense.

I do not think the above case though is analogous to weak junk. That there an infinite number of grounds between each derivative entity and the *fundamentalia* arose there because the grounding chain was dense, but the reason why I think weak junk is a problem for the monist has nothing to do with whether the chain is dense. Consider again the case of God creating the universe at some first moment of time, despite the universe also being infinitely old. Suppose someone were to argue that we could make sense of that case because we do not think Zeno's Dichotomy is a severe metaphysical problem. Those who think that space-time might be continuous clearly do not believe that Achilles cannot make his run to the end of the racetrack, even though there is no immediate point he reaches after making his run. But just because this is so takes away none of my unease about the created infinite universe case. The difference is that the space-time region that Achilles' made his run from is not *inaccessible* in the way the creation of the infinitely old universe is for the time traveler. If we are told how much distance Achilles can make per second, we can work out how quickly he will make the end of the racecourse. By contrast, regardless how fast the time traveler's ship may be, she will still never reach the creation point. Whether it be one hundred thousand or one hundred million years per second the ship can travel, the ship will never reach the creation. That these cases are different can be supported by the fact that those think that space-

²² Suppose that space-time is continuous and objects have parts in every space time region they pervade. Then in such a world parthood will be dense, as between any object, x , and of one of its proper parts, y , there will be an object, z , which is a proper part of x and has y as a proper part. However, if the substructure of space-time is contingent (as I argued in chapter three), then there might be worlds in which parthood is not dense (i.e. worlds where space-time is discrete, perhaps) and worlds in which it is dense. So, it might be a contingent metaphysical truth as to whether parthood is dense or not.

time is continuous generally dismiss the Dichotomy as being a problem, whereas you will never find a theist who thinks the universe was created at *some moment of time* yet is infinitely old.²³

I think this lesson can similarly be applied to grounding. Dense grounding chains are not necessarily vicious, just as dense causal chains are not necessarily vicious. But grounding chains whose source are inaccessible are vicious. Even though then the number line is dense it does not seem problematic as to how each number is grounded in 0 . One way to make this clear is to concentrate on Kit Fine's (2012, 50-51) definition of immediate ground: that it is a ground which *need not* be mediated, rather than *not* mediated. Some entity then can immediately ground another entity even if they also mediate ground it; it is not built into the definition of immediate ground that it cannot be a mediate ground of the entity if it also immediately grounds it. The role of an immediate ground is that it can provide a complete metaphysical explanation of an entity it grounds *without having to* reference some other entity it grounds. Consider the case of Socrates, his parts and his singleton, that we looked at in chapter one. To explain how Socrates' singleton is grounded in his parts, one is going to need to reference Socrates. One cannot explain how the parts ground the singleton without including the fact that they mediate ground the singleton via Socrates. By contrast, we do not need to reference any other ground in explaining how Socrates grounds his singleton. Perhaps there then can be grounds which while strictly are not immediate grounds, can nevertheless provide a complete metaphysical explanation of an entity it grounds without having to reference some other entity it grounds (even if it *only* mediate ground the original thing it grounds via that entity).

Let us call such a ground a *quasi-immediate* ground: where x is an quasi-immediate ground of y just in case x 'need not be mediated' by some other ground z to *provide a complete metaphysical*

²³ Either they will think it was created a finite number of years ago (i.e. Craig 1979) or that God is the *sustaining cause* of the universe even though it did not have a beginning point. Leibniz (1989a), for instance, thought that even if the world was eternal, there would still need to be a cause for it which was *outside the temporal series*. As we shall see, (WPM) will be somewhat similar to this latter conception of God's relationship to the world. Just as God is needed as a sustaining cause for an infinitely old universe for the theist, I will argue that the Cosmos can still ground its parts immediately even though there are also infinitely long non-maximal grounding chains in the world.

explanation for why y obtains (even if x is *only* a mediate ground for y). All immediate grounds are quasi-immediate, but not all quasi-immediate grounds are immediate. The distinction comes down to the fact that some quasi-immediate grounds are *only mediate grounds* yet need not be mediated by another ground to *provide a satisfactory metaphysical explanation* for the entity it grounds. Most mediate grounds will not be quasi-immediate for any particular entity they ground; but if there are dense grounding chains then I think there are going to be plausible quasi-immediate grounds which are not immediate grounds.

Consider then the number line case presented by Cameron, and suppose we want to know how 10 is grounded in θ ; that is, how do we trace 10's being back to θ via the number line? The obvious way it seems to me that you'd go about doing this is by referencing θ and the series of *natural numbers* and say that (θ and) each natural number grounds the next largest natural number in the series. 10 would be quasi-immediately grounded in 9, 9 in 8, 8 in 7 and so on till we reached θ . And we wouldn't have to refer to any of the non-natural numbers (i.e. 0.25) to understand how each natural number was grounded in θ , even though no number will be immediately grounded in any other number. The role which ordinarily seems to be played by entities which are immediate grounds is being satisfied by the natural numbers here, even though none of them are immediate grounds for one another. Hence though this is strictly speaking an infinitely long grounding chain, this is a *finite chain of metaphysical explanation*.²⁴ By contrast, in the case of weak junk it is impossible to characterize how each object is grounded in a finite number of explanatory steps from an infinitely extended object. Regardless of what object we think is the immediate or quasi-

²⁴ One concern might be that it might be a vague matter at times what counts as a quasi-immediate ground for another entity. For instance, if 1 is quasi-immediately grounded in θ , does that mean it is quasi-immediately grounded in θ ? If we are unsure about this, it might well cast the whole notion of a quasi-immediate ground into doubt. My solution is that we take a supervaluationist approach and hold that something should be counted as a quasi-immediate ground if it is true on some admissible precisification it is a quasi-immediate ground for another entity. For instance, if we wanted to rule out that 10 is quasi-immediately grounded in θ , for instance, we'd have to restrict the range of admissible precisification (by restricting the admissible succession function accordingly) so that it'd be true on no precisification (i.e. it is super-false) that θ is a quasi-immediate ground for 10 . Whether this can be done in the case of natural number successions is to be proved. By contrast, *whatever* quasi-immediate grounds we choose for each object in the weak junk case, one will never be able to terminate the grounding chain at the Cosmos.

immediate ground for another object, the explanation for each entity in the chain will never terminate at the Cosmos. This is because an infinitely extended object is an inaccessible source of the grounding chain, in a way that θ is not. Hence, the possibility of dense grounding chains does not undermine the severity of the problem of weak junk.

5.4. Priority Monism and fully pedestalled grounding chains

I've argued that weak junk, though compatible with there being a maximal concrete object, is still troubling for monism, in that it would entail there were infinitely ascending grounding chains which never terminated at that object. I do, however, think this problem can be solved by the monist, though they will need to amend their answer to the Grounding Question in weak junky worlds. If we hold that the Cosmos grounds all its proper parts because wholes ground their parts, such an answer to the (GQ) will not suffice in weak junky worlds. In explaining that each proper part is grounded in some bigger and bigger whole, chains of parthood/grounding will never terminate at the Cosmos. Hence, it is unclear how anything could be grounded by the Cosmos in a weak junky world. My suggestion is that monists should instead answer the grounding question as follows: the Cosmos can ground its proper parts because it grounds all of them *immediately*.²⁵

In weak junky worlds, the resultant grounding structure would be an example of what T.S. Dixon (2016, 447-452) calls a *fully pedestalled grounding chain*. Fully pedestalled chains are grounding structures in which the grounded entities are part of some infinite chain of full ground which does not terminate, but each is nonetheless fully grounded in some fundamental entity via some maximal²⁶ grounding chain. Here is one such example of a grounding chain of this sort mentioned by Dixon (2016, 449-450). Consider the international prototype kilogram (IPK), which acts as the standard for the kilogram and is thus exactly 1 kg. Now within the interval [0 kg, 2 kg] there are

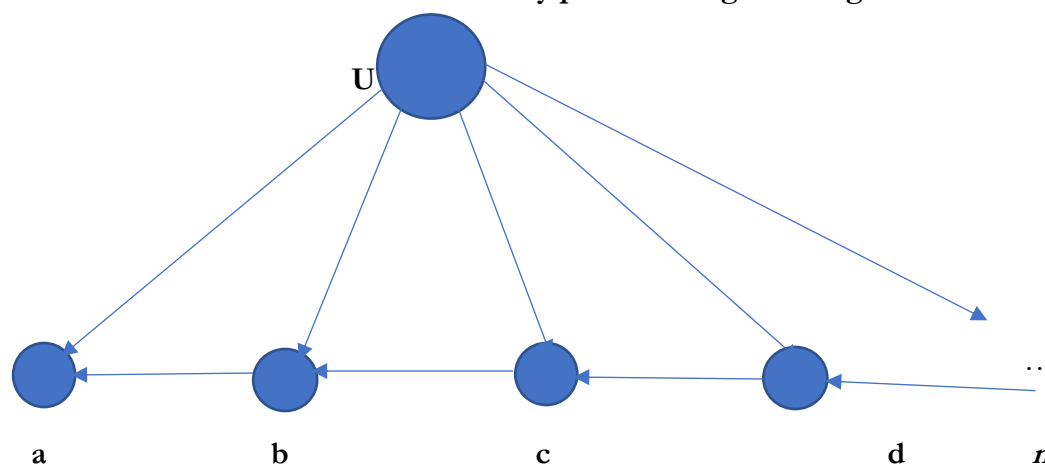
²⁵ This however doesn't rule out that the Cosmos, in non-weak junky worlds, also grounds its parts via each whole that it is a proper part of it.

²⁶ Recall that I take a maximal grounding chain to be one which terminates at some ungrounded entities. By contrast, non-maximal grounding chains are those (whether finite or infinite in length) which do not terminate at some ungrounded entities (Dixon 2016b, 453).

infinite number of closed intervals, each of which includes 1 kg. This means there are an infinite number of facts of the form [the IPK is between 0.5 and 1.5 kg] and [the IPK is between 0.75 and 1.25 kg]. Now it is plausible that each of these facts about the closed intervals are grounded in more determinate facts about closed intervals within those closed intervals (i.e. [the IPK is between 0.5 kg and 1.5 kg] is fully grounded in [the IPK is between 0.75 kg and 1.25 kg]). Subsequently there will be a non-maximal infinite chain of grounding which contains all such facts of this form. It is also plausible, however, that each of these facts is also fully grounded in the IPK being exactly 1 kg in mass, its maximally determinate mass. Supposing that this fact is fundamental, this structure is a fully pedestalled grounding chain.²⁷

If a world is weak junky then, I hold that the Cosmos will ground each of its proper parts as follows:

Fig 3: The Cosmos as the fundamentalia in a ‘fully pedestalled grounding chain’



Suppose the arrows depict full chains of ground and that *a* is some arbitrary proper part of the Cosmos. In that case there is some infinite non-maximal grounding chain that *a* is among which does not terminate at any *fundamentalia* (i.e. the horizontal one). Yet *a*, *b* and any other member

²⁷ However, this example may be controversial, as some philosophers are *comparativists* about mass; that is, they hold that the mass of objects is grounded in their mass relationships to one another (e.g. Dasgupta 2013). Comparativists then will undoubtedly deny, for instance, that [the IPK is between 0.5 and 1.5 kg] is grounded in the IPK’s maximally determinate mass. Dixon (2016b, 448-449) considers another example of a grounding structure of this sort, which involves infinite disjunctions (though that too may also be controversial).

of that chain will still be fully grounded in something fundamental: the Cosmos, U . And each derivative entity therefore will be both immediately and mediately grounded in the Cosmos. Consider a again. It is immediately grounded in U as it is part of a maximal grounding chain (U immediately grounding a) which directly connects it to it. It is also, however, mediately grounded in U as it is part of some maximal grounding chain (i.e. U mediately grounding a via it immediately grounding b) in which it is indirectly connected to U . It may be thought that a grounding structure of this sort may be worrisome in that there is an overdetermination of grounds, as each derivative entity is fully grounded by the same entity (i.e. the Cosmos) via distinct grounding chains. However, cases of grounding overdetermination of this sort are easy to find in the literature,²⁸ and thus do not pose a problem for a monist of this sort.

The real trouble for the monist is to explain how the Cosmos can immediately ground all its proper parts. In initially supposing that proper parts are grounded in their wholes (i.e. their initial answer to the (GQ)), it was easy to see how the Cosmos grounded its parts. The being of each proper part could be traced back to the Cosmos via each bigger and bigger whole it was part of. But it is difficult to see what it is about the nature of the Cosmos, such that it is somehow capable of immediately grounding all its proper parts.

At this point, a strong priority monist might retort that there is no such difficulty, given that they are potentially open to proper parts grounding wholes (Schaffer 2010a, 44-45); which would require there to be immediate grounding relations between objects which are not immediate proper parts²⁹ of either one another. Suppose that a heap of stones is grounded in each of the individual

²⁸ One obvious example of this being the case is that of the IPK considered previously, in which every fact within the closed interval [0 kg, 2 kg] is both immediately and mediately grounded by the fact that IPK is exactly 1 kg. Another example is the disjunction 'A V 'A V A' being both immediately and mediately grounded in A (Fine 2012, 51). An important thing to remember I think is that derivative entities are an ontological free lunch, which receive their being from the fundamental entities. The same amount of being is being imparted upon the derivative entities in a fully pedestalled chain, but just through different grounding chains. The fundamentalia are doing the same amount of work but just in different ways. Now if grounding overdetermination were a problem at all, I think it would be a problem because the overdetermination was a result of two or more *distinct* fundamental entities. But this is not the case in a fully pedestalled grounding chain, where the overdetermination is a result of just a single fundamental entity.

²⁹ x is an immediate proper part of z iff there is no y such that y is a proper part of z and has x as a proper part. That is, x is an immediate proper part of z when z is a *least upper bound* for x .

stones. Then for the stones to be grounded in the Cosmos, there will need to be an immediate grounding relation which holds between the stones and either the Cosmos or one of its parts (which has the heap as a proper part). The thought then is that if monism is compatible with part-to-whole grounding, and part-to-whole grounding involves there being immediate grounding relations between objects which are not immediate proper parts of either one another, then the monist can help herself to immediate grounding relations between the Cosmos and all its proper parts.

My response to this is as follows. Given accepting part-to-whole grounding involves there being immediate grounding relations of the sort described above, then the monist cannot accept part-to-whole grounding without *explaining* why the Cosmos (or any of its parts) can immediately ground any non-immediate proper part of it. That is, rather than taking the part-to-whole grounding argument as a *modus ponens* for the strong priority monist to help herself to the needed immediate grounding relations, I take it as a *modus tollens* against the compatibility of part-to-whole grounding and (SPM). I can readily understand how an immediate proper part of an object is immediately grounded in that object. If all parts are grounded in the wholes they compose, then it is obvious that an immediate proper part of an object will be immediately grounded in that object. We understand this immediate grounding relation because *we understand what it means to be an immediate proper part*. The small-g grounding relation (i.e. composition, in this case) underwrites what it is to be an immediate grounding relation in this case.

But this is not so if we suppose the Cosmos immediately grounds a non-immediate proper part of it. The relation of immediate ground will not be underwritten by the nature of what is to be an immediate proper part, and therefore that this immediate ground holds needs an explanation. If we think that objects can immediately ground one another which is distinct from how we ordinarily understand them to, this sort of grounding is going to need an explanation. In providing an answer to the (GQ), the monist should aim to give an answer which they can offer an explanation for, and not just assert it as a primitive feature of their view. Arguing then that the possibility of part-to-

whole grounding suggests there are such immediate grounding relations of this sort does nothing to answer this worry; in fact, it itself needs to be explained.³⁰

Part-to-whole grounding might however be incompatible with Priority Monism in any case. Alex Steinberg (2015) has shown that if one is a grounding necessitarian then one cannot be a monist and accept part-to-whole grounding. Suppose that in the actual world an object is grounded in a certain arrangement of mereological simples. Now suppose there is a world *w* in which all that exists is this object and the simples which ground it. This object however will be the Cosmos (as it will be the universal fusion of all objects in that world) and therefore cannot be grounded in its parts.³¹ But this violates grounding necessitarianism, given that it is the thesis the same grounds always ground the same entities in every possible world. *Ergo*, if grounding necessitarianism is true then monists cannot accept part-to-whole grounding.³² Given that I have supposed that grounding necessitarianism is true in this dissertation, the strong priority monist cannot accept that part-to-whole grounding is metaphysically possible.

Therefore, I do not think a priority monist can solve the problem of weak junk unless she is willing to change her view a bit. To explain how the Cosmos can immediately ground all its proper parts, the monist needs to show that it has some structural feature via which it can ground all its parts in such a way. And what I'm going to ultimately suggest is that they hold that the Cosmos is *identical* to the collective plurality of all its proper parts and is thus able to immediately ground them because of what exactly we are supposing it now is. It is the universal plurality (as well as being a concrete

³⁰ The relation of immediate grounding here would be what some in the literature refer to as a *bare grounding* relation: a grounding relation not underwritten by any corresponding small-g grounding relation (i.e. composition, set membership etc.). One such example of such a bare grounding relation might be the claim that 'the Magic Mountain exists because certain facts about Thomas Mann obtain'; if grounding involves constitutive explanation in some way, then it is unclear what the corresponding small-g relation might be given that "the novel is not constructed from the man (Wilsch 2015, 3297)." Asserting a bare grounding relation however needs justification, particularly if one holds that it relates two entities which we usually suppose are related by a certain small-g relation (i.e. composition in this case). My concern above is that the strong priority monist is unable to offer any such justification.

³¹ Steinberg (2015, 2026) is of course supposing here that one's answer to the (FMQ) must be a metaphysically necessary truth.

³² Steinberg's argument, however, is actually a bit more ambitious than this, in that he thinks he can show that grounding/ontological dependence being an *internal* relation precludes a monist from accepting part-to-whole grounding. However, this is a bit a more controversial.

object), and in taking such a plurality to be fundamental we are taking all objects in that collective plurality as being ontologically on par.³³ The plurality *just* is every object taken *collectively*. The universal plurality is not at the top or bottom of some mereological hierarchy and thus need not ground all its members through chains of parthood. Given what the universal plurality is, there is no problem in supposing then that it can ground all its subpluralities *distributively* and immediately, given it is the plurality of all those things *collectively*. Per the transitivity of identity, if the Cosmos (a concrete object) is identical to such a plurality, then we have a satisfying explanation of how it can immediately ground all its proper parts. It can immediately ground them all individually because *it is the plurality of all objects*, as well as being a concrete object.

Such a view involves supposing that Composition as Identity (CAI) is true, as the Cosmos will need to be identical to the collective plurality of all objects; and it also involves supposing that Collective Allism is correct: the view that all objects *taken collectively* are fundamental (Saucedo MS). The conjunction of these views is of course Weak Priority Monism (WPM), which I referred to chapter two as being the thesis that:

Weak Priority Monism (WPM): The Cosmos is fundamental and is *identical to the collective plurality of all its proper parts*

The rest of this thesis will serve as a defence of (WPM), and of the assumptions (i.e. (CAI)) the weak priority monist will need to make in defending (WPM). I will also show that (WPM) is useful in that it can provide a better solution to the problem of heterogeneity than (SPM) can.

5.5. Conclusion

In this chapter, I showed that a priority monist could overcome the problem of junk by arguing that it is an *illusion* being generated by weak junky worlds. That we can conceive of an infinitely ascending parthood chain gives us no reason to suppose that chain is not contained within an

³³ To be clear here, they are only ontologically on par *in the collective plurality*. Considered distributively as individuals, many of these objects will obviously have grounding relations between one another. But in considering the collective plurality of all objects as fundamental, we are obviously taking all the contents of the plurality as being equally fundamental.

infinitely extended object. But weak junk itself poses a problem for monism, in that it would entail there are infinite grounding chains which never terminated at the Cosmos. Resultantly, I argued that the priority monist needed to hold that the Cosmos immediately grounds all its proper parts, but this could not be achieved via (SPM). A new version of priority monism is therefore needed on which the Cosmos is identical to the collective plurality of its proper parts; and this being so would explain how it can ground each of its individual parts immediately.

In the forthcoming chapters, I will defend (WPM) and demonstrate that it not only provides a solution to the problem of weak junk, but that it provides a better solution to the problem of heterogeneity than (SPM) does. I will also need to consider a number of objections that could be levelled against this new version of priority monism. But before I consider (WPM), I'm going to need show that Composition as Identity (CAI) is not an implausible view about composition. (CAI) is a controversial position, and many philosophers have complained they cannot make sense of how *many* objects can be identical to *one*. *Prima facie*, it perhaps seems that David Lewis (1991, 87) is right in supposing that “[w]hat’s true of the many is not exactly what’s true of the one.” But if I’m going to defend (WPM) then I’m going to have show that this is not so, and that (CAI) is a coherent position on composition. This will be my task in the following chapter.

Chapter Six: Composition as Identity

In this dissertation, I have argued that there must be something fundamental on pain of there being a vicious regress of grounding and have considered what plausible answers there might be to the Fundamental Mereology Question (FMQ). In the third and fourth chapters, I rejected pluralism because it was incompatible with both gunk and emergent properties; which is a severe problem given there is reason to think the actual world is gunky and/or contains emergent properties, let alone both such things being metaphysically possible. In the fifth chapter, I rejected Strong Priority Monism (SPM) because it was incompatible with weak junk and argued that the problem of weak junk could only be overcome if the Cosmos was identical to the plurality of all concrete objects. This version of Priority Monism is what I've called 'Weak Priority Monism' (WPM): that the Cosmos is fundamental and is *identical to the collective plurality of all its proper parts*. Accepting (WPM), however, involves accepting that both Collective Allism and Composition as Identity (CAI) are true. I will look at Collective Allism in the next chapter, but the purpose of this one is to set out (CAI) and defend it as a theory about composition. (CAI) is a controversial theory, but if (WPM) is to be at all tenable, then I'm going to have to show that (CAI) is defensible.

I'm going to begin the chapter by outlining composition as identity as a theory, before sketching out why it does not violate the 'Indiscernibility of Identicals' (II) or lead to any problematic consequences for plural logic. This, however, will involve defending a notion of counting such that the cardinality a thing has is relative to a concept or sortal (a view notably held by Frege (1953)), as well as holding that properties and relations things have are relative to some concept or sortal. Following this, I will then consider two metaphysical objections to (CAI): (i) that it entails mereological essentialism and (ii) it is incompatible with emergent properties. I reject (ii), and as for (i), I'll argue that even if mereological essentialism is true we can show that it does not violate common sense if we are perdurantists who accept counterpart theory. Lastly, I'll argue that

grounding (between wholes and their proper parts) and (CAI) are compatible. It is not the case that (CAI) would violate the irreflexivity of grounding, nor does grounding take away any possible motivation for being a proponent of (CAI). Hence, embracing (CAI) does not make (WPM) an untenable answer to the (FMQ).

6.1. Composition as Identity, the Indiscernibility of Identicals and Collapse

Composition as identity (CAI) is the thesis that the relation of composition is a relation of identity. For some xx to compose some further object, y , is for xx to be identical to y . Taking xx to stand for a plural variable and ‘C’ to stand for the predicate ‘compose’, we can define Composition as Identity follows:

(CAI) $xxCy =_{df} xx=y$ (Bohn 2014, 144)¹

Typically, those who defend (CAI) argue that it is proper parts taken *collectively* (as opposed to *distributively*) which are identical with the whole they compose.² Suppose then that some atoms arranged ‘chair-wise’ compose a chair. According to (CAI), the chair is identical with its atoms taken together rather than *each one* of them taken individually. Otherwise we would have very bad violations of the Indiscernibility of Identicals (II). To see this, let the following (with xx and yy standing for plural variables)³ be a pluralized version of (II):

Indiscernibility of Identicals (II): $\forall xx \forall yy (xx = yy) \rightarrow (\psi(xx) \leftrightarrow \psi(yy))$

¹ Bohn (2014, 144-145) prefers this as a formulation of (CAI) as opposed to the following formulation: **(CAI*)** $xxCy \leftrightarrow xx = y$. Such a formulation is too weak according to him as it could be the case that ‘C’ and ‘=’ express two different relations whose extensions overlap. Formulating (CAI) as a definition, as Bohn notes, means that it cannot be doubted in any way that it expresses that composition is a relation of identity. It should also be noted that the ‘=’ relation between xx and y is that of *numerical hybrid identity*, which can admit both singular and plural arguments in both places (see also Wallace 2011a, 810).

² Einar Bohn (2011, 2014, 2016), Aaron Cotnoir (2013a), Josh Spencer (2017) and Meg Wallace (2011a, 2011b) either explicitly or implicitly defend the view that (CAI) involves parts taken collectively being identical to wholes. Donald Baxter however defends a version of (CAI) in which the parts are both distributively and collectively identical to the wholes they compose (1988a, 1988b, 2014). What allows him to do this is that he rejects (II); or to be more precise, he rejects that (II) holds across different *counts* of a thing/things.

³ Recall that a plural variable can be satisfied by a singular variable, thus this plural version of (II) subsumes a singularized version of (II).

Now if the chair was distributively identical to its atoms, then given (II) it would follow that it had the same mass as each of its atoms. This would obviously be absurd, but fortunately the proponent of (CAI) is not committed to such a claim. A whole can be non-identical to any one of its proper parts, yet still be identical to them taken *collectively*. As we saw in the second chapter, certain plural predicates can only be ascribed to some things collectively. Suppose some Fremen surround the Sardaukar. The predicate surrounds here is collective, as no single Fremen can surround the Sardaukar by herself. Rather, it is all the Fremen taken together who surround the Sardaukar. Once the identity claim proponents of (CAI) make is understood, then certain violations of (II) which are alleged to be entailed by (CAI) (i.e. the mass of the chair being the same as each atom) will not hold.⁴

However, there still seem to be violations of (II) even if (CAI) only entails the whole is collectively identical to its parts. It still seems the case that the parts and the wholes they compose differ in terms of *number*. The whole is one and the parts (even taken collectively) are many, and thus given (II) it looks as if a whole cannot be identical to its parts. This is famously pointed out by David Lewis (1991, 87) in *Parts of Classes*:

“It does matter how you slice it – not to the character of what is described, of course, but to the form of description. What’s true of the many is not exactly what’s true of the one. After all they are many while it is one. The number of the many is six, as it might be, whereas the number of the fusion is one.”

Consequently, Lewis holds that composition is only *analogous* to identity rather than being a form of identity;⁵ a view which has been referred to as ‘weak’ composition as identity.⁶ Weak (CAI)

⁴ See Wallace (2011a, 110-114) for further detail on how proponents of (CAI) can deal with violations of (II) of this sort.

⁵ Einar Bohn (2011) has argued though that it is misreading of Lewis to hold he was a proponent of weak (CAI). Rather, what composition is analogous to (and not is) is *one-one* identity; but that does not mean composition cannot be a relation of *many-one* identity.

⁶ See also Sider (2007b) for a theory of weak (CAI).

though looks to be too weak to be of any use. For instance, proponents of (CAI) have argued that (CAI) explains why mereology is ontologically innocent. If some object is identical to its parts, then accepting the existence of the whole merely is accepting the existence of some things you already believe in (i.e. the parts). But if an object is not identical to its parts, then it does just not seem to be the case you are accepting the existence of something you already believe in. A mere analogy does not provide much support for the innocence of mereology.⁷ Furthermore, weak (CAI) is useless to the weak priority monist, as they need it to be the case that the Cosmos is *identical* to its parts taken collectively. Otherwise, they will not be able to provide an answer to the Grounding Question (GQ) such that it allows them to hold the Cosmos immediately grounds all its proper parts; which as we've seen in the previous chapter, can only be so if the Cosmos is identical to the collective plurality of its parts. A monist who accepts weak (CAI) would just be a strong priority monist.

So, we need something stronger, such that a whole is literally identical to its parts. I will therefore for the duration of this chapter be defending 'strong' composition as identity: that wholes are *numerically* identical to the parts taken collectively. If we are going to defend strong (CAI) however, it needs to be shown how the parts and the whole don't differ in their cardinality; though this looks a difficult task, as it just seems obvious the many are many (and not one) and the one is *only one*.⁸

But Strong (CAI) seems to have further worrisome implications too, as it entails what Ted Sider (2007b, 2014) calls 'Collapse' (with '<<' standing for the 'is-one-of/are among' relation and '≤' (improper) parthood):

Collapse: $\forall xx \forall z (xxCz) \rightarrow \forall y (y \ll xx \leftrightarrow y \leq z)$ (Sider 2007b, 57)

⁷ See Yi (1999, 150-156).

⁸ Though see Spencer (2017, 862-866) for a defence of the claim that some object(s) can have different numerical values simpliciter (rather than relative to a count, as I'll argue in a moment), by attacking Russelian accounts of numerical quantification.

Collapse claims then that if some xx compose an object z , then y is one of the xx iff y is part of z and this can be derived from (CAI) as follows. Assume that y is one of the xx . Given the xx compose z then y must be part of z , proving the left-to-right direction of the bi-conditional. To prove the right-to-left direction, assume that y is part of z . Now z is the fusion of the xx , but it is also the fusion of y and the remainder⁹ of z , w . By (CAI) z will be identical to the xx and also to y and w (taken together), hence the xx are identical to y and w (taken together). Given the substitutivity of identicals, then y being one of y and w entails it is one of the xx : the right-to-left direction of the bi-conditional is proved.¹⁰

Collapse though is an incredible thesis. It entails that anything that is a part of the mereological fusion of some things which are F , will themselves need to be F . For instance, suppose there is a mereological fusion of all the Fremen who surround the Sardaukar. Then that the fusion will be identical to all those Fremen, and anything that is a part of the fusion will need to *be one of the* Fremen. But the fusion seems to have many parts which are not one of the Fremen (i.e. the Fremen's arms, legs, atoms etc...). There cannot then be a plurality which consists only of the Fremen. This, however, constitutes a violation of the plural comprehension axiom (i.e. which states that there is a plurality for every satisfiable predicate), and thus greatly undermines the benefits of plural quantification.¹¹ If strong (CAI) then does entail Collapse, then Strong (CAI) would be untenable as a position.¹²

Nevertheless, I believe both problems can be overcome, and as we'll now see, the solution is to hold that the properties and relations of objects are often *relative to certain concepts or sortals*.

⁹ If x is a proper part of y , then the remainder is the biggest thing in y which has no part in common with x .

¹⁰ A similar argument that strong (CAI) entails the misbehaviour of the 'is-one-of' relation can be found in Yi (1999).

¹¹ For instance, as Sider (2007b, 63-64) points out, we would not be able to interpret the Geach-Kaplan sentence (i.e. 'Some critics only admire one another') into logic via plural quantification. For the success of the plural translation relies on there being some plurality of Critics, and Collapse would entail that *any* part of the fusion of the Critics would be one of things which make up the plurality. There are however many non-Critics which are part of such a fusion and thus there cannot be a plurality of Critics.

¹² Furthermore, Collapse also seems to entail that (CAI) and mereological nihilism would turn out to be equivalent theses. Claudio Calosi (2016) has argued that Collapse entails the Duplication Principle (DP): that if something is a fusion of a given plurality then each member of that plurality is a singular duplicate of that fusion. However, a proper part and a composite object could not be duplicates, so (DP) (and hence (CAI)) entails mereological nihilism.

To begin with, I think it's highly plausible to hold that when we count something, that thing can be counted *in different ways* and that there is never a count *tout court*. To take an example from Bohn (2014, 145) and Wallace (2011a, 820), we can count a deck of cards in different ways. If we are counting by the number of cards, then we will count fifty-two things; if we are counting by the number of suits, we will count four things; and if we are counting the number of decks, then we will count only a single thing. In fact, it seems what number we count something as being seems to depend upon what concept or sortal the count is *relative to*.¹³ Such thoughts can also be found Frege (1953, 59):

“While looking at one and the same external phenomenon, I can say with equal truth both “It is a copse” and “It is five trees”, or both “Here are four companies” and “Here are 500 men”. Now what changes here from one judgement to the other is neither any individual object, nor the whole, the agglomeration of them, but rather my terminology. But that is itself only a sign of that one concept has been substituted for another. This suggests... that the content of the statement of number is an assertion about a concept.”¹⁴

We cannot then, in considering a portion of reality, necessarily count *simpliciter* how many things there are in front of us; many predicates which are true of that portion are relative to how it has been *considered*. If we consider a portion of reality as thirty-seven trillion cells then it is thirty-seven trillion in number, whereas if we consider it as a human then it is one in number. This is not to say there is no correct answer to question “how many things are there in front of us?”, just that this answer will not be a single numerical value and will be dependent upon the concept or sortal we are counting by. Following Bohn, we can hold that numerical properties are relational

¹³ Wallace (2011b) also considers a different strategy in which we can count a portion of reality as either one thing or many things without need of sortals or concepts, which she calls *plural counting*. For lack of space, I will not consider this strategy in detail, but I prefer the *relative counting* strategy because (as we'll see in chapter seven) it will allow me to hold (without violating (II)) that certain ways of counting are *more natural* than others.

¹⁴ Another philosopher sympathetic to relative counting is Jonathan Lowe, who remarks that “an instruction simply to count how many *things* there are in a given room at a certain time is one that cannot be carried out: not because there will be always be too many things to count, but because the instruction does not even make determinate sense in the absence of a specification of the sorts or kinds of things that there are to be counted (2017, 992).”

properties a portion of reality has relative to concepts, and having a property, F , relative to one concept does not mean that the portion of reality in question must have it in respect to another: the formula $F(x_1, x_2, \dots, x_n, c_1) \wedge \neg F(x_1, x_2, \dots, x_n, c_2)$ ¹⁵ involves no contradiction (Bohn 2014, 145-146). Therefore, if we hold that we count relative to a concept or sortal, strong (CAI) does not violate the indiscernibility of identicals. If we count via the concept ‘whole’ the whole/the parts are one in number, while if we count via the concept ‘parts’ they will be more than one in number. Similarly, we can avoid Collapse by holding that the ‘is-one-of’ relation holds relative to a sortal or concept. Like that of the cardinality of a certain portion of reality, we can hold that something being ‘one-of’ some things depends upon which respect the portion of reality is considered. If we consider the portion of reality, for instance, as all the Fremen’s body parts, then an arm of one of the Fremen will be among them. But if we consider the portion just as the Fremen, then arm will not be among them. Different concepts are functioning as the relational unit in the two cases (Bohn 2014, 146-147). Hence, we can deny the right-to-left direction of Collapse’s proof. Therefore, I think strong (CAI)¹⁶ can avoid both Collapse and violating the indiscernibility of identicals.¹⁷

6.2. Metaphysical problems for Composition as Identity: Mereological Essentialism and Emergence

6.2.1. Mereological essentialism and (CAI)

¹⁵ Where c_1 and c_2 stand for different concepts.

¹⁶ From now on, whenever I refer to (CAI) I should be taken to be referring to strong (CAI) as opposed to weak or moderate variants.

¹⁷ Before moving onto the next section, it’s worth mentioning that there is a version of (CAI) which is stronger than weak (CAI), but weaker than Strong (CAI). Following Cotnoir (2014b, 9), we can call this moderate (CAI): that wholes are *non-numerically* identical to the parts which compose them. Such a version of (CAI) is defended by Baxter (1988a, 1988b, 2014), Cotnoir (2013a) and Bricker (2016). These authors reject that composition is numerical identity and instead hold it is rather a relation of a broader form of identity which subsumes numerical identity. Both Baxter and Bricker reject (II), but Cotnoir holds that a generalized version of (II) is compatible with his version of (CAI). I will not defend moderate (CAI) in this thesis, but if the weak priority monist is attracted by it she can utilise it instead of strong (CAI). Providing the Cosmos and the plurality of its parts are in *some sense* identical, one can be a weak priority monist.

Even if (CAI) can avoid the problems considered in the previous section, there might be other problems which ultimately render it untenable as a theory. For one, Trenton Merricks (1999) has argued that (CAI) entails mereological essentialism on pain of violating (II) and the absoluteness of identity. Suppose that in some world w and at a certain time t , Socrates is identical to some collection of parts, xx . And suppose in world w' and at time t' , Socrates is identical to xx^{-1} (i.e. all his parts minus one of the xx). But then given the transitivity of identity it would follow that $xx = xx^{-1}$. But this is impossible, as all of Socrates' parts in w' are not all the parts Socrates has in w , as he has one more part in w . So, unless we subscribe to relative identity (Geach 1967) and abandon (II)¹⁸, Socrates at t in w cannot be identical to Socrates at t' in w' .

But if (CAI) is committed to mereological essentialism then it is certainly a troubling commitment, as it would entail a whole could never lose, gain or change any of its parts. It seems to go deeply against our intuition, for instance, that we would not go out of existence even if we lose a single atom. Yet this is what (CAI) seems to be committed to, as by the absoluteness of identity and (II), if a person and their simples are identical then they must be so in every possible world. (CAI) is committed to mereological essentialism.

Now while it might be viable to deny that (II) always holds across time given our intuitions about persistence,¹⁹ accepting relative identity seems too much of a price to pay. I think then the best way to deal with the above problem is to bite the bullet and accept mereological essentialism is true, but to try and show that it is not actually in conflict with common sense. So, I'm going to take the advice of Meg Wallace (2011a, 822-824) and embrace perdurantism²⁰ and counterpart theory. In accepting perdurantism, one will hold that ordinary objects are not 'wholly present' at

¹⁸ As Socrates will have differing properties in the two worlds.

¹⁹ See for instance, Baxter (1988a, 1988b).

²⁰ I will be defending worm-theoretic perdurantism here (i.e. Lewis (1976, 1986) and Hudson (2001)), as opposed to stage-theoretic perdurantism (i.e. Sider (2001) and Hawley (2001)). This is because (i) I think when we refer to persons and ordinary objects, we are referring to objects which have a greater temporal extent than an instantaneous stage, and (ii) I think it is metaphysically possible that time is gunky, which would rule out there being *instantaneous* temporal parts in every possible world (Stuchlik 2003). Nevertheless, if a weak priority monist wishes she could be a stage-theoretic perdurantist and try to deal with mereological essentialism by accepting modal and *temporal* counterpart theory.

each moment of time, but rather are four-dimensional objects which are composed out of temporal parts (for every sub-interval of time of the interval of time they persist). To say then that I was once a boy but am no longer a boy, is to say that my ‘present’ temporal part is not a boy and the part of me which is a boy is in the past. For the perdurantist, what change consists is in having temporal parts which are qualitatively distinct from other temporal parts; therefore, to say I have lost or gained a spatial part is to say that a certain temporal part of me has a proper part which one of my other temporal parts lacks. Change over time for the perdurantist is like change over a spatial region. Just as part of a castle (i.e. one of its towers) is qualitatively different from another part of it (i.e. the dungeon), a person changes in that their temporal parts do not have the same properties as their other temporal parts. In which case, even if mereological essentialism is true, I can still gain and lose parts, in that my temporal parts will lack proper parts which other temporal parts of me will have. All that perdurantist (CAI) requires is that an object is identical to its trans-temporal fusion, and that does not prevent it from changing in the way perdurantists think ordinary objects change.

Still, it seems like (CAI) conflicts with the notion that an object *could* have had different parts than it *actually* has. This is where counterpart theory comes in. On counterpart theory, to say that an object could have had different parts than it has, is to hold that it has a counterpart in some other possible world which has different parts. To say that Socrates in w could have been identical to xx^{-1} , is to hold that he has a counterpart (i.e. Socrates in w) which is identical to xx^{-1} . That Socrates has such a counterpart grounds the truth of the modal claim that he could have been identical to xx^{-1} . Now admittedly counterpart theory is controversial,²¹ but if you are inclined to perdurantism then you will likely need it if you favour perdurantism’s solution to the paradoxes of coincidence. One of the main benefits of perdurantism is that it can explain how two (or more) objects can be

²¹ For instance, Kripke’s (1980) famous Humphrey Objection. For a response, see Lewis (1986, 196). Another reason for scepticism about counterpart theory is that one might think it commits one to Lewisian modal realism. But this does not follow; one can be an ersatzist about possible worlds and accept counterpart theory (i.e. Wang (2015) and Woodward (2017)).

co-located at the same place at the same time, without violating the extensionality of mereology. According to the perdurantist, objects can coincide by sharing temporal parts, yet still differ mereologically in having other distinct temporal parts. And this is as unobjectionable as believing two distinct roads can overlap, for instance, at a crossroads. However, take Allan Gibbard's (1975, 190-191) case of Goliath (a statue) and Lumpl (a clay lump), in which both objects are brought into existence and go out of existence at the same time. Goliath and Lumpl will share all the same temporal parts, but the two still seem distinct as it seems that Goliath *could* have ceased to exist even if Lumpl continued to exist (i.e. by changing Lumpl's shape). But because the two objects have all the same temporal parts, the perdurantist it appears has no choice but to deny the intuitive *de re* modal claim. Perdurantism it seems has a problem.

Counterpart theory, however, enables a perdurantist to uphold the above *de re* truths, while being able to keep their solution to the paradoxes of coincidence. Goliath and Lumpl are the same object, yet that object bears *different counterpart relations* to distinct objects which account for the possibility that Goliath could have been destroyed. One counterpart relation holds in virtue of Goliath/Lumpl being a statue, while another holds in virtue of it being a lump. The former relates Goliath/Lumpl to statue counterparts, while the latter relates Goliath/Lumpl to lump counterparts. So, to say that Goliath could have ceased to be while Lumpl survived is to hold that it has statue counterparts which go out of existence before its lump counterparts (Sider 2001, 113). Therefore, it does seem as if a commitment to counterpart theory is something the perdurantist will need to accept irrespective of whether composition is identity.²²

²² Alternatively, a perdurantist who thinks that individuals are not world-bound could argue that not only do ordinary objects possess temporal parts, but also possess *modal* parts. So, Goliath and Lumpl are distinct because they are trans-world individuals which do not have all the same modal parts yet are located in the spacetime regions in the actual world because they share a modal part (which is the fusion of all their spatial and temporal parts in the actual world). This is a solution which has been defended by Meg Wallace (2014), who argues that it can be embraced by the (CAI) theorist as an alternative to counterpart theory. To hold, then, that Socrates could have been identical to xx^{-1} is to hold that Socrates has a modal part which is identical to xx^{-1} , with Socrates being a trans-world fusion composed out of modal parts. If she wishes, the weak priority monist, could go down this route, but it will mean that she will have to defend the view that the what is fundamental is the mereological sum of all possible worlds, and that might be something that might be a bit too incredible to believe for some. It might also be objected that this would commit

Consequently, in accepting both perdurantism and counterpart theory, the proponent of (WPM) is going to hold that the Cosmos is a world-bound individual which is the trans-temporal fusion of all its temporal and spatial parts. The Cosmos will ground not just all its spatial proper parts, but also all its temporal proper parts as well. It might be objected however that (WPM) is at a disadvantage to (SPM), in that (SPM) is compatible with endurantism and denying counterpart theory, while (WPM) is not. However, if the strong priority monist favours (like Schaffer (2009b)) supersubstantialism, then they too will also be committed to perdurantism and (hence) counterpart theory.²³ Perdurantism is also not exactly an unpopular view; having many advocates in contemporary metaphysics²⁴ and a wide variety of arguments in its favour.²⁵ Furthermore, if we think that time travel is metaphysically possible, then accepting endurantism might entail that there are violations of grounding as a strict partial order relation.²⁶ If we are open to time travel being at least metaphysically possible, we may then need to be a perdurantist to hold that grounding is a strict partial order relation. I do not think then that either perdurantism and counterpart are unsustainable commitments for the weak priority monist.²⁷

one to Lewisian modal realism; however, Wallace argues that one could be an ersatzist about possible worlds and hold that the modal parts (other than the ones in the actual world) are abstract.

²³ Spacetime regions perdure as every extended region of spacetime is composed out of some proper subregion of spacetime. In identifying objects with spacetime regions, it follows that objects perdure. And given space-time regions have their size and temporal duration *essentially*, it follows that ordinary objects have their size and temporal duration essentially, and hence we will need counterpart theory to make sense of ordinary modal claims (Sider 2001, 110-113).

²⁴ Which include Lewis (1976, 1986), Hawley (2001), Hudson (2001), Sider (2001) and Schaffer (2009b).

²⁵ These include its solution to the problem of temporary intrinsics (Lewis 1986, 203-204), the argument from vagueness (Sider 2001, 120-139) and its solution (i.e. though what the solution is depends on whether one is a worm-theoretic or stage-theoretic perdurantist) to the paradoxes of coincidence.

²⁶ See Kleinschmidt (2015). Here's a (simplified version of the) case she considers: suppose that there is a statue, Clifford, which has a some smaller statue inside him, Odie, as a proper part. It turns out, however, that Odie is a future version of Clifford; Clifford shrunk to a smaller size over time and then was sent back in time, before being moulded inside its earlier self. Clifford then will ground itself, violating grounding's irreflexivity. But if we are perdurantists it will not be the case that Clifford is a proper part of himself. Rather, an earlier temporal part of Clifford will have as a proper part a later temporal part of Clifford, and this will not involve a violation of grounding's irreflexivity.

²⁷ To avoid trivializing the debate between grounding contingentists and necessitarians, then we'll need to formulate grounding necessitarianism in such a way that it isn't merely a trivial truth because of perdurantism and counterpart theory. I suggest we formulate counterpart-theoretic grounding necessitarianism as follows: for any interval of time and any world, if the ψ are grounded in φ at some interval of time t at some world w , then if the φ have some counterparts at some interval of time t' in a world w' , then the ψ have some counterparts at t' in w' which are grounded in the counterparts of φ . Ψ and φ are plural variables here, given that I have supposed that (in the first chapter) grounding should be regimented as being plural in both locutions.

6.2.2. Emergence and (CAI)

Another metaphysical problem (CAI) faces is the possibility of there being emergent properties. In the fourth chapter, I argued that emergent properties are metaphysically possible (if not actual): where some property F is emergent iff it is an intrinsic property instantiated by a composite object and which does not supervene on the intrinsic properties and spatiotemporal relations had by the object's proper parts. As we saw in chapter four, if emergent properties are possible then pluralism seems to be in deep trouble, given there would be composite objects whose intrinsic nature would not supervene on the intrinsic properties of the mereological simples and the spatiotemporal relations between them. On the other hand, monists face no such worry as by fixing the whole we determine what intrinsic properties and spatiotemporal relations its parts will have (Schaffer 2010a, 56). But, as Kris McDaniel (2008) has argued, (CAI) also appears to be in trouble if emergent properties are possible. For if some object, x , instantiates some emergent property F , then it has a property which its proper parts, yy , lack. But given (II), it would then follow that x is not identical to yy , despite being composed out of yy . (CAI) then is false if emergent properties are metaphysically possible.²⁸

This problem however can be solved by the proponent of (CAI) by supposing that the parts can *collectively instantiate* emergent properties. Recall that in chapter four, I argued that the pluralist could try to deal with emergent properties by supposing that they are not just monadic properties instantiated by wholes, but are also *fundamental*, plural collective properties which can be instantiated by the parts (of the wholes) *taken together*. Such properties would be like ordinary collective predicates such as 'surrounds', in that they only apply to some plurality of things taken collectively and not distributively. Each Fremmen cannot surround the Sardaukar by themselves, but

²⁸ McDaniel though formulates the objection a bit differently than this; utilising what he calls the 'Plural Duplication Principle' (PDP): for any xx , w , and z , if the xx compose w , then z is a duplicate of w iff there are some yy that are plural duplicates of the xx and compose z (2008, 129). McDaniel argues that (PDP) should be accepted by proponents of (CAI) and holds that if there are emergent properties then (PDP) would be false, as xx and yy could be plural duplicates even if w and z are not duplicates (i.e. if w has an emergent property, which z lacks).

only together as a collective. What makes fundamental collective properties different from such predicates is that they *are fundamental*. While the predicate ‘surrounds’ will only apply to the Fremmen as a collective, it will supervene on each of the Fremmen’s intrinsic properties and the spatiotemporal relations between them. It is each of the Fremmen who determine that there is some Fremmen whom surround the Sardaukar, even though it is only true of them as a group that they surround the Sardaukar. By contrast, fundamental collective properties will not supervene on each of the things which instantiate them. The instantiation of the property will not be grounded in the properties and relations of each thing which instantiates it; its instantiation will be fundamental.

Einar Bohn (2012) has argued that by supposing emergent properties are fundamental collective properties, the (CAI) theorist can solve the problem of emergence. Suppose the yy instantiate some fundamental, collective plural property, F^* . And suppose that $F^* = F$ (i.e. the emergent property). It follows then from the transitivity of identity that yy instantiate F , and thus there is no property which x has which yy (taken collectively) do not have. Given (CAI) is the thesis that wholes are identical to their parts *collectively*, it does not then matter if the whole has some property which does not hold *in-virtue-of each* of the parts. By embracing fundamental collective properties, (CAI) does not face a problem from the possibility of emergent properties.²⁹

Nevertheless, in embracing this strategy it might be thought that the weak priority monist has a considerable problem. For in accepting the parts have fundamental collective properties, the monist cannot argue that wholes can have properties which do not supervene on the properties of their parts. That a whole has the emergent property F will supervene on its parts having the collective property F^* . A monist then cannot argue emergent properties entail there is an ‘asymmetry of supervenience’ between parts and wholes, and thus in going down this route they would seem to lose the argument from emergence for monism. Given the argument from

²⁹ In responding to McDaniel’s objection involving (PDP) then, the (CAI) theorist will hold that xx and yy are not plural duplicates, as xx will instantiate a fundamental collective property F^* , which yy lack.

emergence is one of the most famous arguments given for Priority Monism, this seems like a steep price to pay. However, I do not think this is so. In the fourth chapter, I argued that a pluralist could not successfully utilise fundamental collective properties to overcome the problem of emergence; and I think my reasons for holding the pluralist cannot make use of this strategy will not undermine a proponent of (CAI) utilising fundamental collective properties to overcome their own problem with emergence. In the eighth chapter, I'm going to show that embracing fundamental, plural collective properties does not undermine the argument from emergence, and hence does not undermine (WPM). This will be because even if (CAI) is true and wholes are identical to their parts taken collectively, there will still be an asymmetry of supervenience between wholes and *each of their individual parts taken distributively* if there are emergent properties. It will not be the case that the whole has some emergent property, *F*, in-virtue-of each of its proper parts. For now, I think I've done enough to show that (CAI) and emergent properties are not incompatible.

6.3. Grounding and (CAI)

6.3.1. *The irreflexivity of grounding and (CAI)*

It has been claimed that (CAI) is incompatible with grounding, as the former is reflexive while the latter is irreflexive. Most grounding theorists hold that grounding is a strict partial order relation, but Andrew Bailey (2011) has argued the irreflexivity of grounding would be violated if grounding holds between distinct objects and composition is identity. For suppose that some *yy* are grounded in *x* and *yy* are identical to *x*. Then given the transitivity of identity, *x* will ground itself. (CAI) then seems in conflict with the irreflexivity of grounding.

I don't think this is the case, though. Composition as identity is the thesis that the parts taken *collectively* are identical to the whole and *not* distributively. The question is, when one holds that an object grounds its proper parts, is one claiming that it grounds *each* of those parts or that it grounds them *all taken together*? I think a monist would certainly want to claim that the former is

true; that each part depends on the object for its existence and intrinsic nature.³⁰ *Each* sub-cosmic object exists in-virtue-of the entire Cosmos. Thus, the monist will certainly claim the following (where ‘C’ stands for ‘composes’ and ‘←’ denotes full ground):

(Distributive Ground): $\forall yy \forall x (yyCx) \rightarrow ((y1 \leftarrow x) \wedge (y2 \leftarrow x) \dots \wedge (yn \leftarrow x))$

Which states that if *yy* compose some *x* then each *y* is fully grounded in *x*. If *x* is identical to *yy* collectively, it does not follow that *x* grounds itself as *x* is not identical to each of the *yy* (i.e. it is not identical to them distributively). As we saw in the first section of this chapter, some object being identical to some things collectively does not mean one can infer that it is identical to them distributively. That is, one cannot validly infer from ‘Distributive Ground’ the following (where ‘*yy*’ is a collective term):

(Collective Ground): $\forall yy \forall x (yyCx) \rightarrow ((yy) \leftarrow x)$

Which combined with (CAI) would entail that *x* would ground itself (and also that *yy* would be grounded in themselves). But I can’t see any reason as to why the (CAI) theorist should accept ‘Collective Ground’. *x* can ground each *y* without it having to ground them collectively, after all.³¹ Now, I think ‘Collective Ground’ would be true if (CAI) is false, for otherwise the collective nature of *yy* would not be ‘accounted’ for by anything. If *yy* are not identical to any object and are not grounded in anything, then that would imply *yy* are collectively fundamental; and the priority monist (who rejects (CAI)) would surely not want to hold that parts of the Cosmos taken collectively are fundamental. The collective facts about *yy* would seem to be *ontologically independent* of anything else. But if (CAI) is true, the problem dissipates. If *x* is grounded, then *yy* will also be grounded and thus accounted for. Now if *x* is the Cosmos (i.e. *U*) and is thus (given

³⁰ And obviously pluralists will want to claim that each part is a (partial) ground for the whole it composes.

³¹ Similar thoughts have been independently expressed by Roberto Loss (2016), though he argues that one needs to hold that facts (which he takes to be true propositions) are the *relata* of grounding. I do not think this is the case, and it seems to me that his solution (which involves what he calls ‘collective’ and ‘scattered’ pluralities) can be carried over to the cross-categorical view of grounding.

monism) fundamental, then yy being fundamental would be ‘the right result’; if U and yy are identical, then of course yy will be fundamental!³² Either way, the monist is not committed to anything which would go against their view. Hence, I do not see any reason as to why any (CAI) theorist should accept ‘Collective Ground’.³³

Perhaps though someone might object that even though there is no violation of the irreflexivity of full ground, there is still a violation of the irreflexivity of *partial* ground. That if x grounds *each thing* amongst yy , then given each y is one of yy , if x is identical to yy (taken collectively) each proper part of x will be a partial ground for themselves. That is, if $x = yy$, then yy will ground each y . And given that each y is one of yy , each y will partially ground itself.³⁴ I cannot however see why each y being one of yy entails that each y will partially ground itself. That yy taken collectively ground each of themselves distributively does not entail that each of those parts are fully or only partially grounded in themselves. That my claim here is coherent can be supported by Shamik Dasgupta’s (2014) contention that some entities³⁵ can be collectively grounded even though *each* of those entities is not grounded by the things which their collective plurality is grounded in.³⁶ Dasgupta, for instance, defends qualitativism: the position that all facts about individuals are grounded in qualitative facts. But Dasgupta does not think that each individualistic fact has some qualitative fact as a ground. Rather, he thinks that all the individualistic facts in the world are collectively grounded in the collective plurality of all the qualitative facts in the world, even though when *taken by themselves* each of those individualistic facts (i.e. that Donald Trump is President) are not grounded in that plurality. The qualitative facts ground all the individualistic facts, but do

³² Somebody might object that if the Cosmos is identical to some parts collectively, then this is not a genuine version of monism as more than one thing will be fundamental (i.e. the parts taken collectively). I will deal with this worry in the next chapter.

³³ The pluralist can also avoid Bailey’s objection for the same reasons; if $yy=x$, then each y can ground x without it entailing that the yy taken together ground x (which would violate irreflexivity). The point is that we can show that Bailey’s objection is false by disambiguating the sense in which the parts and whole are identical and how one grounds the other.

³⁴ This objection was raised to me by an anonymous referee.

³⁵ It should be noted that in the original paper, Dasgupta holds that grounding is a sentential operator (2014, 4).

³⁶ Litland (2016) and (2018) also takes seriously the idea that grounding can be irreducibly collective in both locutions and tries to develop logics of ground which can accommodate the notion.

not ground any one of those facts distributively. I hold that if Dasgupta's contention that some entities can be grounded collectively in some ψ even though each of them is not grounded in ψ is coherent, then we can coherently suppose that the converse is true: we can hold that each entity amongst some φ can be distributively grounded in some collective plurality of entities, μ , even though the φ collectively are not grounded in those entities. And from this we can infer that if the φ happen to be collectively identical to μ , it does not follow that if φ as a collective ground each thing amongst φ , then each thing amongst φ *must* partially ground anything; and thus, it does not follow that each thing amongst φ partially grounds itself. I conclude therefore that there is no convincing reason to think (CAI) violates the irreflexivity of grounding.

6.3.2. Does grounding make (CAI) redundant?

While it may be the case that grounding and (CAI) are not strictly incompatible, it might be that much of the metaphysical work done by grounding makes (CAI) redundant. Consider some of the benefits that (CAI) is said to bring. For example, (CAI) can purportedly explain why a whole is always located where its parts are; if the whole is its parts, then you are always located where your parts because *you are them*. It can explain why mereology is ontologically innocent; given that the whole is its parts, a whole is nothing over and above its parts because it is them. Counting the whole when you already have the parts would be counting the same thing twice over (Wallace 2011a, 804-805). However, it seems that grounding can also do the exact same work, at a cheaper price. Recall that in the first chapter, that supposing that grounding is a super-internal relation would also explain these mereological truths. Why are you always located where your parts are? Because the locational properties you have obtain in-virtue-of the locational properties of your parts. Why is mereology ontologically innocent? Because the existence of the whole/parts (i.e. whatever does the grounding) *ensures* that the parts/whole exist and have the nature they have, for the latter are grounded in the former. Derivative entities are no extra cost beyond the fundamental entities they are ultimately grounded in. What's more, is that supposing grounding is

super-internal does not commit one to mereological essentialism. In accepting that grounds necessitate what they ground, one can still hold that grounded entities can continue to persist even if their previous full grounds no longer obtain. Suppose for a moment that wholes are grounded in their proper parts. Then I can continue to persist even if I lose one of my mereological simples, providing most of my simples continue to remain in existence and are arranged ‘me-wise’. Grounding then can do all the work that (CAI) can, minus the undesirable commitment to mereological essentialism (Cameron 2014). In which case, (CAI) seems redundant given grounding.

How might the (CAI) theorist respond to this objection? Well firstly, I think it needs to be acknowledged that conceiving grounding as a super-internal relation still might make the relationship between wholes and parts too modally strong. Grounding contingentists have claimed that there are cases where the existence of a ground for some entities at a certain world and time, does not necessitate the existence of the grounded entities. Indeed, Alexander Skiles (2015) has argued there are plausible cases (i.e. scenarios of rearrangement) where the existence of some parts/whole does not necessitate the existence of some whole/parts they ground. So, it might be that grounding being super-internal might (like (CAI)) have modal difficulties too.³⁷ Nevertheless, it can be argued that (CAI) is inferior to grounding in that the latter notion not only explains why mereology is ontologically innocent, but does in a way that avoids an ontological ‘flatworld’ metaphysics. For if (CAI) theorists deny that wholes ground their proper parts or vice versa, they would have to hold that the two *relata* are as fundamental as one another; which seems difficult to believe. A whole is surely not as fundamental as *each* of its parts distributively. Reality, as we saw in chapter one, very much does seem to be hierarchically structured by “Big-g” grounding. (CAI)

³⁷ One way to respond to Skiles’ rearrangement scenarios is by accepting perdurantism. Skiles however, thinks there are still scenarios of rearrangement which can be levelled against the perdurantist (2015, 722-723), though I disagree, as I do not think temporal parts can be rearranged in the same way spatial parts can be. I will not get bogged down about this here though, and will just say that if grounding necessitarians are committed to perdurantism, then it can be questioned whether (CAI) really is committed to much more than it, after all (given both need temporal parts to overcome their respective worries).

theorists then arguably need grounding to have a hierarchically structured reality (Loss 2016, 7-8); but if so, why would need (CAI) if grounding can explain what work it allegedly could do anyway?

I have two responses to the ‘redundancy’ objection. Firstly, there is still other sort of work that (CAI) could do, which grounding cannot. (CAI) can, for one, produce an answer to Peter Van Inwagen’s (1990) ‘General Composition Question’ (GCQ): what are the necessary and jointly sufficient conditions any xx and any y must satisfy in order for it to be true that xx compose that y ? That is, the (GCQ) asks for an analysis of *what composition is*. Van Inwagen is sceptical that the (GCQ) can be answered, for he does not think the question can be answered without a mereological term featuring in the analysis. But (CAI) can provide such an analysis: the xx compose y iff the xx are identical to y (Spencer 2013, 1178). (CAI) also provides an answer to Ned Markosian’s (1998a) ‘Simples Question’ (SQ): what are the necessary and jointly sufficient conditions any x must satisfy in order for it to be true that x is a simple? Again, (CAI) has an answer: x is a simple iff all the things it is identical to are one in number (Spencer 2013, 1181).³⁸ And (CAI) can explain why it is that mereology is extensional; that is, why it is that that objects which share all the same parts are identical. Take the case of Goliath and Lump1, which come into and go out of existence at the same time and share all the same parts, the xx . Now given (CAI), Goliath is identical to the xx and Lump1 is identical to the xx , and hence (by the transitivity of identity) Goliath is identical to Lump1. Grounding on the other hand does not entail extensionality. It is silent on whether an entity can ground two distinct, mereologically indiscernible entities. So, if we are looking for a theory which explains why mereology is extensional, we need (CAI).³⁹

³⁸ To be precise, Spencer (2013, 1181) formulates the answer as follows: Necessarily $(\forall x)$ (x is a simple iff $(\forall yy)$ [if those yy are identical to x , then $(\forall z)$ (if z is among those yy , then z is identical to x)]).

³⁹ Ross Cameron however takes it as an advantage for grounding that it allows coincident objects which share all the same parts, as it makes it a more flexible theory than (CAI). Grounding is compatible with both coincidence and mereological extensionality, whereas (CAI) is committed to extensionality (2014, 104). I agree with Cameron that it is advantage for grounding that this is so, as it allows a grounding theorist not to be forced to take a stance on the issue while it is clear they can still explain mereological innocence, co-location of parts and wholes etc... However, many metaphysicians are troubled by co-location between objects which are in the exact same spatiotemporal regions, because they think it is subject to the grounding problem: what accounts for the modal differences between, for instance, Lump1 and Goliath, given they have all the same proper parts, history etc... (Bennett 2004)? The fact that grounding does not rule out such co-location might be seen as problematic for those who think the grounding problem

Secondly, If I am right that (WPM) is the only answer to the (FMQ) which can avoid some serious problem (i.e. gunk, weak junk etc...) rendering its competitors false (see chapters three, four and five), then we would not be able to suppose that grounding can explain the innocence of mereology, the co-location between parts and wholes etc... This is because, as we've seen, grounding being a super-internal relation entails that it is a well-founded relation, and hence there must be some fundamental entities. The point is that grounding can only deliver the benefits it can do if there are some fundamental entities; and if Weak Priority Monism is the only plausible theory of what is fundamental, then the grounding theorist is going to need to accept (CAI) in accepting (WPM). Therefore, I do not think that being a grounding theorist undercuts every motivation one might have for being (CAI); and one might be a (CAI) theorist precisely because one is a grounding theorist given the failure of other answers to the (FMQ) than (WPM).

6.4. Conclusion

In this chapter I have argued that Composition as Identity is a tenable metaphysical thesis. The main objections which have been levelled against it can be dealt with and it can do useful metaphysical work, which does not put it into conflict with grounding. In fact, if grounding must be well-founded to do much of the theoretical work we want it to do, we may actually need it to be the case that composition is a relation of identity. Thus, I do not think that being committed to (CAI) makes Weak Priority Monism an untenable answer to the (FMQ). And with (CAI) outlined and defended, I am now ready to outline and defend (WPM) as a theory. In the next chapter, I will set out Collective Allism as an answer to the (FMQ). I will then argue that it is insufficient by itself to be a plausible answer to the (FMQ), and that we must suppose the plurality of all objects is identical to an object to get such an answer. And this answer will be Weak Priority Monism.

is a serious problem. Ultimately then, I think both theories work well together because together they explain why mereology is both extensional and ontologically innocent.

Chapter Seven: From Collective Allism to (Weak) Priority Monism

In the previous chapter, I set out to show that Composition as Identity (CAI) could overcome many of the objections its critics have levelled against it and that it was not incompatible with grounding between parts and wholes. In this chapter, I will show that a combination of (CAI) and Collective Allism yields a version of Priority Monism which can meet the problem of weak junk. To meet that problem, we need a view that explains how it is that the *fundamentalia* immediately ground all the derivative entities, thus avoiding the problem that grounded entities would obtain their being via infinite chains of grounding relations which never terminated at those *fundamentalia*. Collective Allism can explain how the *fundamentalia* are capable of this, for it maintains that everything taken collectively is what is fundamental (Saucedo MS). In which case, I'll argue that it is easy to see how each thing can be immediately grounded in such a plurality. But it does not seem that a *mere* plurality of things could ground anything at all, for mere pluralities look to be derivative upon their members. That is, mere pluralities seem dependent upon their members for their *identity* (Lowe 1998, 147), and thus seem to be grounded in their members. The plurality of all things must then be an *integrated whole*; something which is integrated in such a way that it is capable of acting as one thing. Such a collective, then, would need to be identical to an integrated whole: which would be the Cosmos. The combination, then, of Collective Allism and (CAI) gives us a variety of Priority Monism which can successfully overcome the problem of weak junk.

I will begin this chapter by outlining Collective Allism before arguing that it can deal with the problem of weak junk.¹ It can do so because it does not postulate that the *fundamentalia* are at the top or bottom of chains of parthood and do not mediate ground the derivative entities via other

¹ It can also deal with the stronger variant of junk which is incompatible with there being a universal object. But as I've already argued in the fifth chapter, I do not think that mereological junk is metaphysically possible.

derivative entities in such chains. I then will argue that Collective Allism is false because a mere plurality cannot be fundamental as it would be identity dependent on its members; following which I'll argue that the plurality of all concrete entities taken collectively can only be fundamental if it is identical to the maximal concrete object (i.e. the Cosmos). I hold that despite it both being true that the Cosmos and the plurality of all concrete objects are fundamental, I conclude it is more natural to think the view being postulated is a variant of Priority Monism as opposed to a hybrid view which is distinct from both monism and Collective Allism.

7.1. Collective Allism

In the third chapter I briefly outlined Collective Allism in considering potential answers to the 'Fundamental Mereology Question' (FMQ), but it is in this chapter that I will consider the position in a bit more detail. Collective Allism is the position that all objects taken collectively are what is fundamental, and is both a *collectivist* and *allist* view in regards to fundamentality. It is collectivist because it holds that what is fundamental are things taken *collectively* as opposed to distributively. Rather than *each* of the fundamental entities being themselves fundamental, they are only fundamental taken together as a collective. And it is allist because it holds that *all things* as opposed to some things are the *fundamentalia*. As such, every object that there is will be among the plurality of fundamental entities (Saucedo MS, 4).

The progenitor of Collective Allism, Raul Saucedo (MS), sees much of the debate about fundamentality² as a disagreement “over (i) the *number* of terminal nodes of the structure of grounding or dependence and (ii) the *contents* of such nodes, where fundamentality is predicated of whatever the contents of any single such node might be (MS, 4).” Individualist Priority Pluralists,³ for instance, think there are many terminal nodes, with each node containing a single mereological simple. Priority Monists, on the other hand, think that there is only one terminal

² At least once one brings plural logic into the debate (see the second chapter).

³ Recall that, in chapter two, Individualist Priority Pluralism is the view that more than one (but not all) entity is *each* distributively fundamental.

node which contains only one entity. Collective Allists agree with the monist there is only one terminal node, but rather than containing just a single entity, it will contain all the entities there are in the world. All entities are fundamental but are only so *collectively* and not so distributively; that is, *each* of them will not be fundamental despite them being so when *taken together*. Assuming then that every object there exists is one of the *xx*, then *xx* (taken collectively) are fundamental and will ground each *x* that is amongst them. Collective Allism clearly obeys the (pluralized version of the)⁴Tiling Constraint. Covering is satisfied, since every entity is one of the fundamental entities, the plurality containing the *fundamentalia* will overlap every object there is in the world. Minimality is also satisfied, as given there is only one fundamental plurality (i.e. the plurality containing all objects), there will be no other fundamental plurality it could mereologically overlap with.

It might be thought though that Collective Allism violates the irreflexivity of grounding. If each entity is grounded in the universal plurality of them, then each entity will be part of its own grounds. If each *x* is one of the fundamental *xx*, then each *x* will partially ground itself, given that it is among the *xx*.⁵ But, as I said in the previous chapter, it does not necessarily follow that each *x* being one of the *xx* entails that each of them partially ground themselves. If *xx* is a *collective plurality*, it does not follow that each individual thing in the plurality does any grounding. It does not follow that some things doing something collectively entails that each of them does that thing collectively. If some Fremen surround the Sardaukar, it does not follow that each Fremen surrounds the Sardaukar. While admittedly the claim that some things ground themselves sounds like a violation of grounding's irreflexivity, once we disambiguate what we mean by this, then there is no actual violation of it.⁶

Collective Allism then obeys the Tiling Constraint and does not violate the irreflexivity of grounding, but what are the motivations for taking it as an answer to the (FMQ)? Saucedo argues

⁴ See chapter two, section two.

⁵ We considered this objection in the previous chapter in section three.

⁶ See Saucedo (MS, 41) for a similar response to the irreflexivity worry, plus see my response in the previous chapter to the allegation that (CAI) has problems with the irreflexivity of grounding.

that we should accept Collective Allism as it is a more discerning view than either pluralism or monism: it is compatible with a wider range of metaphysical possibilities than either of the two other rival views. It is compatible with both gunk and junk, and it is compatible with both individual and (what Saucedo calls) *collective* emergence. Pluralists and monists alike cannot accept that all four of these things are metaphysically possible, whereas the collective allist can. I agree with Saucedo that this is so, but as far as I'm concerned there's little reason to accept that either collective emergence (at least in the sense required by Saucedo) or junk are possible. I'll begin with assessing Saucedo's argument from the possibility of emergence for Collective Allism.

Saucedo argues that Collective Allism is compatible with the possible/actual existence of emergent properties of wholes. As discussed in the fourth chapter, the possibility of emergent properties is incompatible with pluralism, as fixing the nature of the mereological simples will not fix the nature of objects which possess any emergent properties: duplicating the simples while preserving the spatiotemporal relations between them will not metaphysically suffice in duplicating their mereological fusions. Duplicating the Cosmos, however, will metaphysically suffice in duplicating all its proper parts, and hence Schaffer argues that monism is compatible with emergent properties. But Collective Allism also is compatible with emergence, for fixing the nature of the universal plurality will fix what entities it contains and their nature. Emergent properties for the collective allist will be fundamental, plural collective properties which are instantiated by the universal plurality collectively. So, for instance, if it turns out that every object in the world is entangled with one another, then the universal plurality will collectively instantiate an emergent property (i.e. which will also be a fundamental collective property).⁷ Physics is neutral as to what exactly the entangled system is (i.e. whether it is an object or just a plurality); hence, there is no reason not to suppose that the universal plurality cannot instantiate the property of being entangled. Saucedo,

⁷ Fundamental, plural collective properties have already been mentioned in chapters four and six (Bohn (2012) also talks about them, as we've already seen).

therefore, holds that Collective Allism is compatible with emergent properties possessed by individuals (i.e. individual emergence).

He, however, also goes onto argue (MS, 35-37) that Collective Allism is compatible with there being emergent properties which are instantiated *only* by the universal plurality (i.e. what he calls collective emergence). Given that the universal plurality would itself contain the Cosmos as one of its subpluralities,⁸ if the former exemplified emergent properties then duplicating the Cosmos would not metaphysically suffice in duplicating all of what existed (i.e. it would fail to duplicate the universal plurality). If this is so, then the possibility of the universal plurality possessing emergent properties would be an argument for Collective Allism.

The problem is, I do not know what an emergent property of the universal plurality could be. What could a property which is exemplified by the universal plurality be, such that it is not also exemplified by the universal concrete object? Saucedo gives no example of any such property but suggests “negative tests of metaphysical possibility such as logical consistency, *prima facie* conceivability, and so on apply to emergent properties of pluralities as much as they apply to emergent properties of individual wholes (MS, 39).” I’m willing to grant him that they are negatively conceivable and logically consistent, but I’m sceptical as to whether they are even *prima facie* conceivable⁹ unless he can provide an example of such a property. What Saucedo needs to do is come up with a case where the universal plurality instantiates a property which the universal concrete object does not. In terms of ordinary emergent properties, we obviously have the case of quantum entanglement; and even if entanglement does not involve the quantum of state of entangled particles being emergent in the actual world, we can conceive of a world where it does

⁸ It follows from the plural comprehension axiom that there will be a plurality which contains both the Cosmos and all its proper parts as proper subpluralities, and it is *this* plurality which would be the universal plurality. As we’ll see later, the idea that the universal plurality would contain the universal object as a plurality might lead to potential trouble for (WPM).

⁹ Recall (from chapter three) that something is *prima facie* conceivable if we can imagine a situation where it is verified on *first appearances*.

involve such entanglement.¹⁰ What collective allists need to come up with is some metaphysically possible property which could *only* be exemplified by the universal plurality and not by the Cosmos.¹¹ They need to come up with some thought experiment where the universal plurality instantiates a property which the universal mereological fusion does not. Negative conceivability and logical consistency are not enough to entail metaphysical possibility. Unless Saucedo can come up with an example of a property only instantiated by the universal plurality, I do not think there is any reason to take this argument seriously.

Saucedo's second argument for Collective Allism is the fact it is compatible both with gunk and junk. Collective Allism is compatible with the possibility of gunk because the lack of mereological simples in a world would not preclude there being a universal plurality. Regardless of whether the world contains any simples or not, there will still be a plurality of all objects. The existence of any bottom level has no bearing on whether there is a universal plurality or not, just as it has no bearing on whether there is a universal concrete object or not. But the collective allist can do better than the monist, as they can accept the possibility of junk. Even if every object is the proper part of another, that does not mean there is no universal plurality which has all those objects as members. The lack of any universal object has no bearing on whether there is a universal plurality or not, just as it has no bearing on whether there any mereological simples or not (MS, 30-32). That it is compatible with both gunk and junk seems a strong argument for Collective Allism.

It could be argued, however, that it's metaphysically possible that there be no universal plurality. The plural comprehension and extensionality principles could be false, such that there is no unique plurality of all things. One reason to doubt the plural comprehension principle would be the

¹⁰ See the second section of chapter four for more details about the conceivability of (ordinary) emergent properties.

¹¹ For one, the collective allist needs to bear in mind that irreducible collective properties would not count as being emergent (as Saucedo himself acknowledges (MS, 37-38)). For example, take the plural predicate "surround Versailles" which holds true of the Revolutionaries surrounding Versailles. This predicate is not possessed by any individual revolutionary, but is instead had by the revolutionaries taken together, but is not emergent as duplicating all the revolutionaries would metaphysically suffice for their plurality to have that predicate (provided the duplicates still surrounded Versailles of course!). Now the universal plurality might well have irreducible collective properties, but possession of them would not mean they were emergent.

metaphysical possibility of plural junk: a world being plurally junky iff each plurality is a proper subplurality of another. Such a world would contain an infinite collection of pluralities such that there was no biggest plurality which contained all the other pluralities. Saucedo (MS, 42-43) argues, though, that it is hard to see how a world could be plurally junky. For one, suppose we have a world which is mereologically junky; in such a world then there would be an infinite chain of bigger and bigger pluralities, but that would not preclude there being a universal plurality which contained all the others (though it would need to obviously be infinite in size!). Plural junk does not seem to be at all conceivable and thus I do not think there is much reason at all to think it is metaphysically possible. But without such reason, there is little argument as to why plural comprehension is false¹² and hence it is metaphysically necessary that there is a universal plurality.¹³

At first glance then, the fact it can deal with the possibility of junk seems like a strong advantage for Collective Allism over Priority Monism. But as we saw in chapter six, I argued that the thought experiments used by proponents of junk do not entail that it is possible. The cases imagined only entail junk if we presuppose that it is possible there is no biggest object and hence the argument for junk begs the question. Junk is an *illusion* generated by weak junky worlds, which are not incompatible with there being a universal concrete object. Though then it's true that Collective Allism is compatible with junk unlike monism, the absence of any reason to think it is possible means this is no real advantage for the collective allist. Neither considerations from either collective emergence or junk provide any reason to prefer Collective Allism over Priority Monism.

¹² There is reason however to doubt the axiom if Collapse is correct (see the previous chapter), for Collapse would entail that there would not be pluralities for every non-empty condition. However, there is only reason to think Collapse is true if (CAI) is true, and we saw in the previous chapter that the (CAI) theorist can block Collapse by arguing the is-one-of relation holds relative to concepts or sortals.

¹³ Josh Spencer (2012) though has argued that even if the plural comprehension and extensionality principles are true, plural quantification may fail to be absolutely unrestricted such that there is no plurality of all things. I am not convinced by Spencer's argument, however, because I reject the second premise of his argument: for any two things, there is a unique thing that corresponds to those things. Now it might seem I need to affirm this in supposing (WPM), as it appears I hold there is a thing which corresponds to the plurality of all objects: the Cosmos. But as we'll see, I reject that the Cosmos is identical to the plurality of all objects, and instead hold that it is identical to the plurality of all *sub-cosmic* objects (i.e. its proper parts).

I do think collective allism does have a real advantage over the priority monist, though; at least over the priority monist who does not think composition is a relation of identity. For, as I argued in fifth chapter, there are non-gunky and non-junky worlds which pose trouble for both pluralism and monism. For monists, this is the possibility of worlds which are weak junky: worlds in which every proper part is the proper part of another proper part. Weak junk is compatible with there being a universal concrete object, but entails that there are infinitely ascending chains of parthood which never ‘top’ out at that object. And this looks like a scenario in which being never terminated at the *fundamentalia*, and as such “[b]eing would be infinitely deferred, never achieved (Schaffer 2010, 62).”

Collective Allism however is compatible both with infinitely descending and ascending chains of parthood. The universal plurality is not at either the bottom or top of some mereological hierarchy, and so does not mediate ground its members either through entities it is part of or has as parts. Rather, each derivative thing is grounded in the universal plurality because that plurality contains everything that exists. The plurality *just is* every entity taken collectively, and every entity taken collectively is ontologically prior to *each* of the entities in the plurality. The idea is that all entities in the universal plurality are *ontologically on par* irrespective of what mereological level each individual entity can be found at. For instance, mereological simples are just as fundamental as medium-sized dry goods in the universal plurality. One does not need to pass through proper subpluralities of the universal plurality to see how each derivative entity gets its being; what proper subpluralities of the universal plurality I am member are irrelevant in terms of how I get my being from the plurality of all things.¹⁴ Given a plurality is nothing more than the things it contains,¹⁵ and that all things in it are (collectively) ontologically on par, it is no mystery at all as to how the

¹⁴ Collective Allism is agnostic about the grounding relationship between proper subpluralities of the universal plurality and the entities they contain (as Saucedo (MS, 3) himself seems to acknowledge); there is nothing in the view which entails that pluralities smaller than the universal plurality cannot be grounded in individual entities.

¹⁵ That is, committing yourself to a plurality of things is no extra ontological commitment beyond those things in the plurality (i.e. this is the thesis that plurals are ontologically innocent).

universal plurality can ground all the entities within it immediately. The collective allist then can avoid the problem posed by the possibility of infinite mereological chains, for what they postulate as the *fundamentalia* is something that does not need to ground the derivative entities through parthood chains.

This seems like a real advantage then for the collective allist over both pluralism and monism; their position is compatible with infinite chains of parthood going either up or down. However, I think we should ultimately reject Collective Allism, for I think a *mere* plurality (i.e. a plurality which is not an also object) is not capable of grounding anything. Instead, I think Collective Allism should be combined with a strong version of (CAI) in order to give us Weak Priority Monism (WPM). On this version of monism, the Cosmos would be identical to the universal plurality, and thus (given the transitivity of identity) it would immediately ground all its proper parts because it is the collective plurality which contains them. The Cosmos would be an *integrated whole* which possessed enough unity to be a fundamental entity as opposed to a mere plurality. And it this version of Priority Monism I will argue for in the next section.

7.2. From Collective Allism to Priority Monism

7.2.1. *Is the Cosmos an integrated whole?*

In arguing for Priority Monism, Jonathan Schaffer (2010a, 47-49) has made the distinction between concrete objects being either *mere aggregates* or *integrated wholes*. Schaffer acknowledges that according to common sense things which are mere aggregates are dependent upon their parts, but holds that common sense endorses that integrated wholes are ontologically prior to their proper parts. An example of a mere aggregate is a heap of sand. The heap seems to be a derivative entity for it is nothing more than an aggregate of the grains which compose it. This does not, however, seem true of integrated wholes. Take, for instance, an organism and its organs; the organism should

be considered prior, as organs are defined by their functional roles within it.¹⁶ Schaffer goes on to argue that the Cosmos is an integrated whole as opposed to a mere aggregate. The Cosmos is more than just a particular arrangement of parts, for unlike things such as the heap of sand, it does not have vague boundaries.¹⁷ Heaps of sand, clouds etc... have fuzzy boundaries (i.e. it is unclear what is and isn't part of them) and appear to be just arbitrary partitions of the Cosmos, which accounts for why we judge them to be grounded in their parts. The Cosmos, however, is not like this at all, as it is the mereological fusion of all other objects; what is part of it is every concrete object, so its boundaries are clear.

Jonathan Lowe (2012) seems to agree with Schaffer that there is a distinction between entities that are mere aggregates and integrated wholes, but he is sceptical as to whether the Cosmos would be an integrated whole. He does, however, agree with Schaffer that mere aggregates could not be fundamental entities as they are not substances. For Lowe, a substance is a particular which is not *identity dependent* upon any other particular which is not identical to it; where for something to be identity dependent upon something else is for the former to have its identity determined by the latter. A set, for instance, is identity dependent upon its members, as it would not be the set it is unless it had the members it had. Given this, according to Lowe, a heap of rocks will not be a substance for the heap is dependent upon its identity upon each of the rocks; the heap would not be the heap it was if it were made up of different rocks. A composite object then can be a substance on Lowe's criteria providing it is not identity dependent on its parts. An organism is not identity dependent upon the parts it has at a given time for they do not determine the identity of the organism, and hence the organism would be a substance. An organism can, after all, survive despite losing one of its parts, and this suggests an organism's identity is not dependent upon its parts at a particular time.¹⁸ Lowe would then support Schaffer's distinction between mere aggregates and

¹⁶ Schaffer takes Aristotle as the inspiration behind this example (Aristotle 1984, 1634).

¹⁷ Consider, for instance, Unger's 'Problem of the Many' (1980).

¹⁸ This is certainly what Lowe (1998, 136-153) would say anyway, as he is not a mereological essentialist. I am however am (see previous chapter), though (given my perdurantism) I would say it's true that an organism can persist in that

integrated wholes.¹⁹ And he would also agree that a mere aggregate would not be something fundamental. What he is sceptical of is whether Schaffer has demonstrated whether the Cosmos is an integrated whole. If we believe that there is a Cosmos because we think there must be a universal mereological fusion (i.e. because composition is unrestricted, for instance), then it seems the Cosmos will just be some very big aggregate “and it is no more plausible to say that it is *prior* to its parts than to say this about a heap of rocks (2012, 97).” What Lowe wants is evidence which could be found through “natural scientific inquiry (2012, 94)”, which would show it to be more than a mere aggregate. To deal with this concern, I’m going to suggest the monist argue that the Cosmos is an integrated whole because it evolves in accordance with the fundamental laws.²⁰

One of Schaffer’s arguments in favour of Priority monism is that the Cosmos is the only thing which evolves by fundamental laws (Schaffer 2013). Fundamental entities must be substances, which are “fundamental and integrated thing[s]”: where something is “fundamental if and only if it depends on nothing further, and a thing is integrated if and only if it is not an arbitrary gerrymander but displays natural unity (Schaffer 2013, 68).” A substance then must be something which acts as one thing, and something is only a substance if it displays this natural unity in evolving in accordance with the world’s fundamental laws; that is, it displays *nomic integration*. Schaffer considers this conception of substance to be Leibnizian:

Leibnizian Substance: Something is a substance iff it evolves by the fundamental laws (2013, 67)

Nomic integration serves as a test of substancehood; we can pick out the entities which evolve in accordance with the fundamental laws as the substances. Indeed, Schaffer finds this conception of

its temporal parts need not be composed out of the same spatial parts at every moment of its existence. In also accepting counterpart theory as well, I can accommodate the notion that an integrated whole can/could have different parts than it has, and thus can hold that their identity is not determined by the *individual* parts which compose them.
¹⁹ See Lowe (1998, 136-153) for a defence of his account of substancehood, which he formulates in terms of identity dependence.

²⁰ Alternatively, one could argue that the Cosmos is an integrated substance because it is identical to space-time (Schaffer 2009b). Jonathan Tallant (2015) has replied to Lowe by appealing to Schaffer’s supersubstantivalism. However, I wish for my response to be independent of whether supersubstantivalism is true or not, as I want (WPM) to be tenable even if supersubstantivalism is false.

a substance plausible in part because it draws upon the idea that substances are integrated wholes. He also finds it plausible because it draws upon the idea that substances are fundamental entities, by connecting the fundamental laws with the fundamental entities. It is the fundamental entities which are the things we should be quantifying over in regimenting the fundamental laws; for just as it is generally held that the fundamental laws govern the fundamental properties, we should also hold that those laws govern the distribution of the fundamental properties over *fundamental things* (2013, 71-72).

What does Schaffer mean however for an entity to evolve in accordance with the fundamental laws? What Schaffer means is that by identifying its particular state at a particular time we can use this (by plugging it into the fundamental laws) to correctly predict its later behaviour as it temporally evolves. If we can predict its behaviour with full accuracy from the combination of its state and the fundamental laws then that entity evolves in accordance with them. If we cannot, then that entity does not evolve in accordance with the fundamental laws and therefore cannot be a substance (2013, 68). Given that he holds that the Cosmos is the only thing whose temporal evolution can be correctly predicted from plugging its state into the fundamental laws, Schaffer argues that the Cosmos is the only substance. To see clearly how his argument works, let me define the following:

State: The state of a thing at a time is its fundamental intrinsic character at the time.

Prediction: The prediction for a state is the temporal evolution that the fundamental laws output on the basis of the state.

Behaviour: The behaviour of a thing is the temporal evolution it actually displays.

Evolving: Something evolves by the fundamental laws iff, for any given time, its prediction at that time matches its behaviour (2013, 69-70)

Now suppose that we have a Newtonian two-particle system (for ease of explanation I will also suppose that this is an endurantist-deterministic world)²¹, with a state at which both particles are at rest. Considering each individually, the predicted behaviour of them will be for both to remain at rest given their state. But such a prediction will not match their actual behaviour; both particles instead will mutually attract one another given the universal law of gravitation. It is only by considering the whole system will the initial prediction match the behaviour. Schaffer argues that no subsystem of the Cosmos is immune from disruption such that we can be certain its prediction will match its behaviour. In fact, as the two-particle case demonstrates, local subsystems are constantly disrupted by external forces. Indeed, in a Newtonian world the state of the cosmos at any given time will determine its state at later times, but this will not be so for any of its subsystems. There are no completely closed systems short of the entire Cosmos, so only it will evolve in accordance with the fundamental laws (2013, 75-77).²²

The pluralist might reject the argument from nomic integration, claiming something can be a substance providing it *along with other substances* co-evolve by the fundamental laws. Basically, the pluralist could insist that ‘Leibnizian Substance’ is too strong and should be replaced by:

Leibnizian Substance, Plural: Some things are substances iff they co-evolve by the fundamental laws (2013, 73).

Schaffer (2013, 73), however, argues that this conception of substance does not fit the idea that they are supposed to be integrated. It is only the plurality that they compose which “acts as one” in the world, while no individual within it displays such unity. It can only be said to be true of the

²¹ I am of course committed to perdurantism given my commitment to (CAI) and wanting to therefore resultantly avoid the more implausible consequences of mereological essentialism; so, it is important that the argument can be made use of in a perdurantist setting. Schaffer suggests that this can be done by replacing talk of an enduring object with a sequence of temporal parts. For instance, we could say the Cosmos evolves in accordance with the fundamental laws, if the state of an earlier temporal part of it allows one to successfully predict the behaviour of a later temporal part of it. He also suggests how the argument can be generalised to space-time and/or an indeterministic world (2013, 71).

²² Schaffer (2013, 77) thinks another reason why this is so is because the conservation laws only apply to the Cosmos as a whole; no subsystem need be conservative providing the system ‘as a whole’ is.

entire system that it evolves by the fundamental laws. The predicted temporal evolution of a mereological simple based on its state will never match its actual temporal evolution. It is only the Cosmos then which is nomically integrated.

Now I am not necessarily committed to the soundness of the above argument. Nevertheless, in considering the argument, there is clearly strong *a posteriori* evidence that the Cosmos is *an integrated whole as opposed to a mere aggregate*. This can be seen by considering a second argument for monism offered by Schaffer in the same paper; the argument from cosmic substantiality. Here (for sake of argument) he allows that there may be other entities than the Cosmos which evolve by the fundamental laws, and he weakens ‘Leibnizian Substance’ to the following:

Leibnizian Substance, Sufficiency: If something evolves by the fundamental laws, then it is a substance (2013, 82).

He argues that given that substances are plausibly fundamental entities, they cannot have other fundamental entities as proper parts.²³ If the Cosmos is a substance then because it evolves by fundamental laws, it is the only substance. Now even if one thinks this argument fails, ‘Leibnizian Substance, Sufficiency’ does look like an appealing account for what it is to be a substance. At the very least, it looks like anything that which evolves in accordance with the fundamental laws is something which displays ‘natural unity’ and is not a mere aggregate. The following condition then seems even more plausible than ‘Leibnizian Substance, Sufficiency’:

Integrated Whole, Sufficiency: If something evolves by the fundamental laws, then it is an integrated whole.

Given that the Cosmos does evolve by the fundamental laws, then it is clearly an integrated whole. Contra Lowe then, there is evidence which can be found through “natural scientific inquiry” that

²³ This is because of the Tiling Constraint (see section two of chapter two of the thesis).

the Cosmos is an integrated whole. An object which evolves in accordance with the fundamental laws of physics is obviously distinct from a mere aggregate such as a heap of rocks. It is the fact that the Cosmos is nomically integrated that makes it an integrated whole.²⁴

7.2.2. *From Collective Allism to Priority Monism*

Following the above, it seems plausible to think that not only fundamental entities need to be integrated wholes, but that the Cosmos is an integrated whole because it evolves in accordance with the fundamental laws. The question is, is the plurality of all things an integrated whole?

The obvious answer is no. A plurality of things is just those things and is not *some entity* which those things compose or are members of. A plurality of Fremen is/are, for instance, just those Fremen and not some set or mereological fusion. In fact, unless composition is a relation of identity, every plurality which has two members at least will count as being a ‘mere plurality’:

Mere Plurality: A plurality is a mere plurality iff it is a plurality which is not identical to any entity

But by the very definition of a mere plurality, a mere plurality cannot be an integrated whole. It may be that the plurality contains individuals which are integrated wholes, but it does not follow from that the plurality is an integrated whole. Now, I imagine a collective allist will respond by arguing that while the universal plurality is not an integrated whole, it is still something more than a mere aggregate of things. It is the plurality of all objects, which makes it different from some arbitrary plurality or mereological fusion. For instance, we can say that the universal plurality evolves in accordance with the fundamental laws, because the behaviour of the all things there are (taken collectively) in the world at one time will match the prediction made of them at some earlier

²⁴ Importantly, even if one thinks that the argument from nomic integration and cosmic substantiality fail, then the fact the Cosmos would evolve in accordance with the fundamental laws gives us good reason to think it is an integrated whole. What this means is that (WPM) and the other arguments given in favour of Priority Monism (i.e. gunk, emergence etc...) don't necessarily depend on Schaffer's arguments from nomic integration for monism succeeding. Indeed, as we'll see in the next chapter, if island universes are metaphysically possible, then in such worlds one would not be able to *directly* infer that the Cosmos is the *only* object which evolves in accordance with the fundamental laws; the island universes would, too.

time. Perhaps we could call this sort of thing an *integrated plurality*: something which is not a concrete integrated whole, but nevertheless is integrated in the ways other mere pluralities are not.

I do not find this convincing. It seems to me that if some collective plurality is a mere plurality, then it is *identity dependent* upon the things which are its members. Just as sets seem identity dependent upon their members, the identity of a mere plurality seems settled by the things it contains. Suppose that (CAI) is false and take the collective plurality of all the molecules in my body. The identity of such a plurality seems to be determined by each of the things in the plurality; it is the plurality that it is *because* of each of the things that it contains. Plausibly then if the identity of this plurality is dependent upon the things that make it up, then it will be grounded in each of those things that make it up. But if this is so, I think we should hold the same is true of the (mere) universal plurality and all the things it contains. It is the plurality that it is because of each of those things which make it up. The problem is that mere pluralities just seem to be those things we quantify over and nothing more. They are not an entity which belongs to some ontological category and is distinct from the things that make it up. There is nothing ontologically special about pluralities, and thus I struggle to see how *any* mere plurality could be fundamental. Instead, to be fundamental it seems something *needs to be an entity*. And not just any entity, but an entity which is not some disparate arbitrary object: an *integrated whole*.

What I am claiming then is this. If a plurality is fundamental then, as well as just being the things it contains, *it also needs to be entity*.²⁵ In particular, it needs to be an integrated whole. To see why this is plausible, consider again the example of the plurality of my molecules, but suppose (CAI) is true. In which case the collective plurality of those parts will be identical to a person (i.e. me), and persons are plausibly integrated wholes. The identity of a person does not require the existence of some particular arrangement of molecules. Given the transitivity of identity, though, it would

²⁵ This may sound like a violation of the ontological innocence of plurals, but it is not. Recall that (CAI) theorists hold that objects are nothing more than the things which compose them; they are the *same portion of reality* described in different ways.

follow that the plurality of molecules is not identity dependent upon the individual molecules after all. But if this goes for persons and the pluralities they are identical to, then it also seems plausible to suppose that the universal plurality is not identity dependent upon its members, providing it is identical to an integrated whole. The universal plurality must be *identical* to a concrete object which contains every other concrete object as a proper part.²⁶

Not only then does the plausibility of Collective Allism depend upon (CAI) being true, but it also means that Collective Allism collapses into a version of priority monism; for if the universal plurality is fundamental, it will also follow that the Cosmos is fundamental. However, what the Cosmos is, is an integrated whole which is *also* the plurality of all objects. Given it is the universal plurality, we now have an explanation of how the Cosmos grounds all its proper parts immediately: because this would mean (as we saw in section one of this chapter) it is the *collective plurality of all the objects in the world*. And given it is an integrated whole, as opposed to a mere plurality, the Cosmos is unified enough to be a fundamental entity and to ground all the other derivative entities. This version of Priority Monism then enjoys the benefits of both Collective Allism and Strong Priority Monism, while avoiding their main weaknesses.

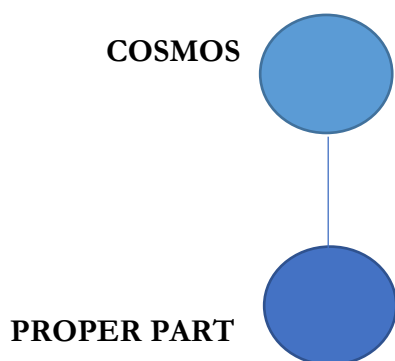
Before I move on, it's worth addressing a concern which might be apparent to any mereologist. The plurality of all objects there are would seem to contain the mereological fusion of all objects as a proper subplurality. But if the plurality of all objects is itself identical to an object (i.e. a mereological fusion of all objects), then the extensionality of mereology would be violated, as the weak supplementation principle (WSP)²⁷ would fail. To see this, let's refer to the universal concrete

²⁶ I've argued here that mere pluralities are plausibly grounded in their constituents, but does this mean I am committed to thinking that objects which are mere aggregates are grounded in the parts which compose them? If so, this might be a problem if grounding necessitarianism is true (which I have supposed is), given as we saw in the previous chapter that the combination of it and Priority Monism entail that parts could never ground the wholes they compose (Steinberg 2015). My response to this is to say that while objects which are mere aggregates are too disparate to be fundamental entities, as they are objects they nevertheless have enough integration and unity to ground their parts (rather than vice versa). An object is still an *entity* after all, whereas a mere plurality is not. The identity of a mere plurality does very compellingly seem to be grounded in its members, whereas at least a mere aggregate is at least an object and thus is a *single thing*.

²⁷ WSP = If x has a proper part y , then x has a proper part, z , which is mereologically disjoint (i.e. shares no parts) from y .

object identical to the universal plurality as the ‘Cosmos’, and the universal concrete object a proper part of it (which will be identical to the plurality of all the sub-cosmic objects, given (CAI)) as ‘Proper Part’. Then everything that is a proper part of the Cosmos will also be a (improper) part of Proper Part, and thus there will no object which is mereologically disjoint from Proper Part. The (WSP) therefore will be violated:

Fig 4: The ‘Cosmos’ and ‘Proper Part’



The (WSP) however is generally considered to capture much of what it is to be a proper part; an object which has a proper part needs other proper parts to *supplement* it in composing that object (Simons 1987, 26-28). Now (WSP) has been questioned by some philosophers²⁸, but denying it would rule out (WPM) given that (CAI) entails mereology extensionality,²⁹ which in turn entails (WSP).³⁰ Weak Priority Monism would already then seem to be in trouble.³¹

²⁸ See Cotnoir (2013c).

²⁹ Proof: Suppose (CAI) and that x and y have the same proper parts zz . Then given $x = zz$ and $y = zz$, it follows from the transitivity of identity that $x = y$. So, if x and y are composed out of the same proper parts, (CAI) entails they are the same object. (CAI) entails mereological extensionality.

³⁰ Proof: Suppose for *reductio*, that x was y 's only proper part. According to the strongest extensionality principle, the Uniqueness of Composition (UC), if two objects are the fusion of some sum of parts, then they are the same thing. But given that y is the fusion of x and x is a fusion of itself, x would be therefore be the same object as y . But x is not identical to y as it is a *proper* part of y . Therefore, y must have a part which is mereologically disjoint from x , and hence (WSP) follows from (UC).

³¹ Furthermore, we would seem to be affirming the second premise of Spencer's (2012) argument against there being a universal plurality (see footnote 13). This is another good reason then not to affirm the Cosmos is identical to the universal plurality.

I think what the monist should do is state that rather than the universal plurality (which contains *all* concrete objects, *including* the Cosmos) is fundamental, it is the plurality of all *sub-cosmic* objects (i.e. everything that is a proper part of the Cosmos) which is what's fundamental. The universal plurality would not be identical to anything and it is the plurality of all *sub-cosmic objects* which is what is identical to the Cosmos.³² As the plurality is identical to the universal concrete object, the position will still meet the Tiling Constraint, for it is the case that the Cosmos overlaps all derivative objects while not overlapping any other plurality of objects. Still, it might be thought that a Russell-Style paradox might arise in going down this route. For given the reflexivity of the is-one-of relation, the Cosmos will be one of itself (i.e. *Cosmos* \ll *Cosmos*). Yet it will not be among the plurality it is identical with (i.e. the plurality of all sub-cosmic objects) as it is not a sub-cosmic object, which would entail the contradiction that the Cosmos is both one of itself and not one of itself. However, the paradox can be avoided providing (like we did in avoiding Collapse in the previous chapter) we remember that the is-one-of relation must be relativized to a sortal or concept. The Cosmos will be one of itself relative, for example, to the concept 'Cosmos', but will not be one of itself relative to the concept 'plurality of all sub-cosmic objects'. Therefore, the paradox is avoided.

7.2.3. *Is this really a version of priority monism?*

It is possible that someone might argue however that (WPM) is not really a version of monism after all but rather a hybrid view shares both features of monism and Collective Allism. This comes from the fact that given (CAI), the Cosmos and the plurality of all sub-cosmic objects are *numerically identical*. They are the same portion of reality considered in different ways; relative to

³² There might be a potential concern that this is an *ad hoc* response, in that I am conveniently supposing that the universal plurality does not compose anything. But in supposing that mereology is extensional, I think it is not an *ad hoc* response, for mereological extensionality constrains what pluralities can compose an object. For instance, suppose there are three mereological simples (*a*, *b* and *c*) and that composition is unrestricted; then how many objects are there? The answer is seven: the three simples themselves, and four (other) mereological fusions (the fusion of *a* and *b*; the fusion of *b* and *c*; the fusion of *a* and *c*; and the fusion of *a*, *b* and *c*). There cannot, though, be a fusion which has *c* and the fusion of *a* and *b* as proper parts, without having the fusion of *b* and *c* and the fusion of *a* and *c* as proper parts. Mereological extensionality then already constrains what pluralities can compose an object, so I do not think it is *ad hoc* for the weak priority monist to hold that the universal plurality does not compose an object.

the concept or sortal “composite object” it is the Cosmos (i.e. one thing), while relative to the concept or sortal “plurality” it is the plurality of all sub-cosmic objects (i.e. many things). But it is not a composite object or plurality *simpliciter*, and *what it is* depends on what concept or sortal applies to it (Bohn 2014; Wallace 2011b, 819-820). But for the version of monism I’m arguing for to be a truly monist position, then it must surely be the case that the portion of reality we are saying is fundamental is the Cosmos *simpliciter*, as opposed to merely being so relative to certain sortals or concepts. It is just as true to say that what is fundamental is the plurality of all sub-cosmic objects as it is to say that the Cosmos itself is. For this position to deserve the name of priority monism, it would at the very least need to provide us some way of making it more correct to describe the portion of reality in question as the Cosmos as opposed to a plurality. And if that were the case, then it would seemingly violate the ‘Indiscernibility of Identicals’ (II), as there would be something true of the Cosmos which was not true of the plurality it is identical with. Therefore, this new position should not be considered a version of priority monism.

I have two responses to this particular worry, though I prefer the second. The first is that the proponent of this new position can bite the bullet and concede that strictly speaking this is not a version of monism. It is instead some hybrid view which is distinct from both Priority Monism and Collective Allism and should be considered an entirely new position in terms of answering the (FMQ). Indeed, just as introducing plural logic into debates surrounding the (FMQ) opens the logical space of possible answers to it, introducing (CAI) further opens up what possible answers there are to it. A proponent of it could alternatively justify calling the position a monistic one on the grounds that we refer to portions of reality as composite objects (which are composite objects relative to a certain concept or sortal) as opposed to pluralities of the objects which compose them. Even if ‘the folk’ were aware of and accepted (CAI), it is overwhelmingly plausible they would continue to always refer to certain portions of reality as being one object as opposed to many. It would then be a matter of psychology or linguistic convention as to why we should think this position deserves being called a monist one, though metaphysically speaking there is no less truth

as describing the portion of reality in question as a plurality as opposed to the Cosmos. The main point, however, is that in biting the bullet here the proponent of this position would not have weakened their arguments for it; in no way are they forced to abandon the view that the portion of reality which is identical to the Cosmos and the plurality of all sub-cosmic objects is fundamental. They would still have a position which avoided the main weaknesses of both Strong Priority Monism and Collective Allism, while retaining their benefits. This is not my preferred option, but I think this would be a more than adequate back up response in the event one did not find my main reply convincing.

The second response is that despite the plurality of all sub-cosmic objects and the Cosmos being numerically identical, that there is some way in which we can say it is more correct to describe the Cosmos as the thing which is fundamental. While then it is true that on pain of violating (II) that *both* the Cosmos and the plurality of all sub-cosmic objects are fundamental, it is *more natural* for it to be described as one object as opposed to many. This is stronger than just saying it is so as a matter of psychology or linguistic convention; what I am suggesting is that this is an *objective* feature of reality. If (CAI) is true, it still remains the case that our intuitions strongly suggest that a composite object is more naturally a composite object than it is a plurality of objects, and in metaphysics it is generally seen as a virtue when a theory vindicates the intuitions we possess. One of the most proponent defenders of composition as identity, Einar Bohn, is open to this idea:

“One might of course also appeal to the idea of some properties being more natural than others ... and hence argue that [the portion of reality] has one of the cardinalities more fundamentally (in some sense or other) than the other. Though I am sympathetic to this idea, I ignore it for present purposes (2016, 415, fn11).”

This too is also considered by Aaron Cotnoir in respect to (CAI) and the ‘Special Composition Question’ (SCQ):³³

“The composition as identity theorist is free to endorse a single way of counting as the correct one, and in doing so would give an answer to the special composition question. And that answer need not be a universalist answer. Other coarser or more fine-grained counts would be merely be ‘loose-talk’. But the composition as identity theorists are also free to claim that *all* ways are equally good... [t]here are also intermediate views according to which some but not all ways of counting are correct (2013a, 317).”

The thought here is that though a single portion of reality can be potentially ‘carved up’ in different ways, there are *privileged ways* of doing so. Some partitions of reality carve nature at its joints better than others. Suppose, for example, that some statue is identical to the clay particles (taken collectively) which compose it. The portion of reality they are then is not a statue or plurality of clay particles *simpliciter* then, but is only them relative to a particular concept or sortal. We can say that the portion of reality is a statue relative to *Concept C** and a plurality of clay particles relative to *Concept C***. However, we can hold that the portion of reality is more naturally the thing denoted by *C** rather than *C*** without violating (II). The portion of reality that is the plurality and the statue is those things, but is more naturally the statue as opposed to the plurality. (II) is not violated because both *C** and *C*** still hold true of the portion of reality in question: it is *both a statue and a plurality of clay particles*, but describing it as a statue better carves at reality’s joints. And this reflects an objective feature of reality and is not merely psychological.

The obvious way of explaining why the portion of reality is more naturally described as the Cosmos is via natural properties (Lewis 1983; 1986, 60-61), which was the thought considered by Bohn previously. The idea then would be that the relational properties relative to certain concepts or

³³ It should be noted here that Cotnoir is defending moderate as opposed to strong (CAI), though his thoughts here are applicable to both versions. The idea simply is that there may be privileged ways of counting a single portion of reality, and this is an idea both the moderate and strong (CAI) proponents can be open to.

sortals can vary in their degrees of naturalness. The portion of reality that is the Cosmos and the plurality of sub-cosmic objects instantiates the relational properties of ‘being the Cosmos’ and ‘being the plurality of sub-cosmic objects’. However, ‘being the Cosmos’ is a more natural property than ‘being a plurality of sub-cosmic objects’. Indeed, ‘being the Cosmos’ would seem to be a perfectly natural property, given it tells us what the fundamental thing exactly is; no other property carves better at the joints in terms of telling us what it is.

I’m not sure, however, that this is sufficient in providing an explanation of why the portion of reality is the more naturally described as the Cosmos, for it is not fully clear as to *why* ‘being the Cosmos’ is a more natural property than ‘being the plurality of sub-cosmic objects’. Naturalness is primitive, and so it is difficult to say why a collective allist could not insist that ‘being the plurality of sub-cosmic objects’ is a more natural property than ‘being the Cosmos’. For example, it is not clear that either properties are more suitable than the other in providing a minimal supervenience base for the world. Nor is it clear that one is a more eligible referent than the other for ensuring we refer to the things we do. As considered earlier, intuition suggests that ‘being the Cosmos’ does seem more natural than ‘being the plurality of sub-cosmic objects’; but this does not give us an explanation of why it is more natural.

My response to this is to argue that ‘being the Cosmos’ is more natural because it is metaphysically possible that the Cosmos could have been the only object that there is. For instance, it is possible that all there might have been is a single mereological simple. The idea here is that Cosmos could exist without any proper parts whatsoever is only entailed by it falling under the concept or sortal ‘Cosmos’, and not under the concept or sortal ‘plurality of sub-cosmic objects’. In fact, it being the ‘plurality of all sub-cosmic objects’ would suggest that the Cosmos could not be the sole object which ever existed, as a world containing only a single thing would have no sub-cosmic objects as proper parts. Of course, given (CAI), the Cosmos could strictly speaking never exist by itself given mereological essentialism; but what would account for the modal possibility is that the Cosmos

would bear a counterpart relation to the isolated simple in respect to the concept or sortal ‘Cosmos’, and would not bear a counterpart relation to it in respect to the concept or sortal ‘plurality of all sub-cosmic objects’. The possibility that the Cosmos then “could have been the only thing which ever existed” holds true because it is the Cosmos, and not because of the fact it is the plurality of all sub-cosmic objects. Recall, that one’s answer to the (FMQ) must be necessary, and therefore it is crucial that one’s *fundamentalia* exist in all possible worlds. The Cosmos exists in all possible worlds, whereas the plurality of all sub-cosmic objects does not. The Cosmos is only the plurality of sub-cosmic objects in worlds in which there is more than one object, but it will not be in worlds where there aren’t any sub-cosmic objects at all. It is the fact that the Cosmos falls under the sortal/concept ‘Cosmos’ which means it bears a counterpart relation to the isolated simple, and thus means its answer to the (FMQ) is necessarily true (as the relevant modal possibility is accounted for by the counterpart relation). Yet there is no violation of the Indiscernibility of Identicals (II), because strictly speaking the Cosmos is a world-bound individual which could never have had any other parts than it has. If then, as I think, there is reason to suppose that a world containing only a single object is metaphysically possible,³⁴ then there is strong reason to suppose that ‘being the Cosmos’ is a more natural property than ‘being the plurality of sub-cosmic objects’.

7.3. Conclusion

In this chapter I have argued that Collective Allism has an explanation of how the *fundamentalia* can immediately ground the derivative entities, avoiding the problem posed by the possibility of weak junk. The plurality of all things can ground all the derivative entities immediately because it is collective plurality of its proper parts. However, such a plurality must be identical to an object, for otherwise it would be a mere aggregate and thus not integrated enough to be what is

³⁴ For instance, it seems conceivable to me that a single-point sized simple could exist isolated by itself in some possible world. Or for that matter, a single extended simple (i.e. providing it occupied an atomic yet extended region of space) could exist isolated by itself. However, someone could argue that as I am perdurantist I could not believe a single thing could exist by itself, as both these sorts of simples would have temporal parts, and hence would not exist by themselves. My response to this is that it is conceivable that both these simples could exist for an *instantaneous* moment, before blinking out of existence. In which case, neither would have any temporal proper parts.

fundamental. Combining (CAI) with Collective Allism leads to a version of priority monism which can avoid the problem of weak junk. And this counts as a genuine version of monism because 'being the Cosmos' is a more natural property than 'being the plurality of sub-cosmic objects'. Hence, (WPM) is a genuine version of Priority Monism which can overcome the problem of weak junk.

Still, I think there are some potential objections which an opponent of (WPM) might level against it, and the job of the next chapter is to consider what these objections might be and respond to them. Then afterwards in the final chapter, I will argue that (WPM) provides a novel solution to the problem of heterogeneity which is faced by priority monists. Ultimately, I will conclude that Weak Priority Monism is a highly plausible answer to the (FMQ), which enjoys some strong benefits over Strong Priority Monism.

Chapter Eight: Objections to Weak Priority Monism

In the previous chapter, I argued that for the Cosmos to be able to immediately ground all its proper parts it needed to be identical to the collective plurality of all sub-cosmic objects. For if the Cosmos is identical to such a plurality, the Cosmos would just be the collective plurality of its proper parts; and there is no difficulty in seeing how there can be a relation of immediate ground between the collective plurality of some things and *each* of those things *distributively* in the plurality. I also argued that this should be thought as being a genuine version of Priority Monism, as opposed to some hybrid view which shares features of monism and Collective Allism, because the property ‘being the Cosmos’ is more natural than the property, ‘being the plurality of all sub-cosmic objects’. Hence, if the Cosmos is identical to the plurality of all sub-cosmic objects, the monist would be able to solve the problem of weak junk. Therefore, I think a priority monist should be a *weak* priority monist: hold that the Cosmos is fundamental and is identical to the collective plurality of all its proper parts.

In this chapter I’m going to consider some potential objections which might be raised against (WPM). A few objections to (WPM) have already been considered in this dissertation. In the previous chapter, I considered the objection that (WPM) violates mereological extensionality, as well as the objection that (WPM) was not a genuine version of Priority Monism. It also might be argued that, in relying on (CAI), (WPM) is subject to worries which have been thought to afflict (CAI) (i.e. being committed to mereological essentialism) and that it might also have a problem with the irreflexivity of grounding. In the last two chapters I dealt with all these objections, but there are other objections which an opponent of (WPM) might raise against the view.

I’m going to begin the chapter by considering a couple of preliminary objections to (WPM), neither of which are particularly troubling for the view. The first objection is that (WPM) is in tension with Irrelevance*: the principle that an immediate ground must be explanatorily relevant to what it grounds. And the second is that there is something problematic in postulating that the sub-

cosmic objects have the *same* immediate ground (i.e. the Cosmos). I will respond to each of these objections in turn, showing they pose no serious threat to (WPM).

Following this, I will look at two, more serious objections for (WPM). The first is that (WPM) undermines the argument from emergence for Priority Monism, given that on (WPM) it is true that the parts of the Cosmos will *collectively instantiate* emergent properties. There would thus be no ‘asymmetry of supervenience’ between parts and wholes which would support monism. However, I argue that there is still an asymmetry of supervenience between the individual parts taken *distributively* and the wholes they compose, and this is enough to get the argument from monism off the ground. I will then consider a recent objection levelled against Priority Monism which arises from the possibility of island universes: spatiotemporally isolated spacetimes which exist within a possible world (Bricker 2001). The objection is that if we think that a fundamental object must be nomically integrated (Schaffer 2013), then the possibility of worlds containing island universes undermines the necessity of monism; for the Cosmos will not be nomically integrated in such worlds and, therefore, would not be an integrated whole (Baron & Tallant 2016).¹ I will argue that this objection is questionable, as the principle of recombination (GPSP) used to motivate strong island universes can be rejected, and (weak) island universes are compatible with the Cosmos being nomically integrated. I will conclude therefore that (WPM) can deal with all the objections which can be levelled against it.

8.1. Two preliminary objections to (WPM)

*8.1.1. The objection from Irrelevance**

In the first chapter of this dissertation I argued that certain counterexamples raised against the transitivity of grounding by Jonathan Schaffer (2012) could be resisted by holding that only

¹ A similar objection, as we shall see, has also been raised by Max Siegel (2016).

immediate grounds need be explanatorily relevant to what they ground. That is, I argued we should accept the following principle:

Irrelevance*: If F is explanatorily irrelevant to G , it is not the case that F helps ground G *immediately*

In accepting Irrelevance* one need not suppose that mediate grounds must be explanatorily relevant to what they ground, but only that immediate grounds must underwrite some metaphysical explanation of the things they ground. It does not matter, then, that in Schaffer's case of the dented sphere the dent plays no role in explaining why the sphere is more-or-less spherical, because the dent is not an immediate ground of the sphere being more-or-less spherical. Irrelevance* preserves grounding's connection with metaphysical explanation while enabling one to deal with Schaffer's counterexamples.

Irrelevance* then seems a plausible principle, but it might be thought that it is incompatible with (WPM). If the Cosmos is the collective plurality of all its proper parts, doesn't that suggest that any object in it plays some kind of role in grounding every sub-cosmic object that exists? That every sub-cosmic object is grounded in an object (i.e. the Cosmos) which consists of things which are mostly explanatorily irrelevant in explaining the existence of the grounded object? For example, if (WPM) is true then I will be immediately grounded in the Cosmos. It follows (given (WPM)) then that I am grounded in the collective plurality of all the Cosmos' proper parts, then some of the things which collectively immediately ground me will include a blade of grass in Tokyo, a mote of dust in the Mojave Desert, and a meteor in the Andromeda Galaxy. I will be immediately grounded then in some things which are overwhelmingly explanatorily irrelevant in explaining my existence and intrinsic nature, and thus we would seem to have a violation of Irrelevance*. But if we think that Irrelevance* is a plausible principle about grounding's connection to metaphysical explanation, then (WPM) appears to be in trouble.

That this is a problem for (WPM) can be supported by Shamik Dasgupta's (2014) contention that it is implausible that, if qualitativism is true, each individualistic fact is grounded in the qualitative facts. Recall (from chapter six), that qualitativism is the position that facts about individuals (i.e. that Joseph Conrad was the author of *Lord Jim*, *this apple is red*, etc...) are grounded in qualitative facts (i.e. that someone wrote a certain novel, some apple is red etc...). Dasgupta holds that each individual fact must be necessitated if the individual facts are to obtain in-virtue-of the qualitative ones, and he thus argues that, for any individual fact, x , to be grounded, there must be some set Q_T of qualitative facts which ground x and whose existence necessitates the existence of x . Dasgupta argues that if Q_T is to necessitate x 's existence, however, then Q_T is going to have to be spatiotemporally very large in terms of the qualitative facts it will contain; in fact Q_T might well contain facts which completely specify the qualitative nature of the entire universe, plus a totality fact which specifies that these are all the qualitative facts there are. Q_T will then contain various facts which are utterly irrelevant to explaining x . Suppose x is the fact that 'Trump has orange hair. Then it seems implausible that 'Trump's hair being orange is immediately partially grounded in the fact that there is some mote of dust in the Mojave Desert; the fact there is some mote of dust in the Mojave does not seem to provide any plausible explanation for why 'Trump's hair is orange. Dasgupta then concludes we should reject that any of the individualistic facts are grounded in the facts in Q_T .

While I agree with Dasgupta's point that it seems implausible that the facts in Q_T ground any of the individualistic facts, the view he is attacking is not analogous to the case of (WPM). What Dasgupta is attacking above is the view that *each* of the qualitative facts ground the individual facts, and actually goes on to defend the view that the qualitative facts *collectively* ground all the individual facts. The point is that it does not matter that many of *each* of the things in a collective plurality are explanatorily irrelevant, because (as we saw in chapter six) it does not follow that each thing in a collective plurality is a partial ground for any entity the plurality grounds. The mistake being made, then, is to think that *each* thing in a collective plurality plays a role in grounding the

things the plurality grounds; but it is not the case that each thing plays a role in grounding those entities; instead, it is only those things as a collective which do any grounding. Since those things collectively are the fundamental entities, then they do seem explanatorily relevant in explaining why each derivative object exists and has the intrinsic nature it does. What I am arguing, then, is that if someone thinks (WPM) violates Irrelevance*, then that is likely because they are still holding onto the fallacy that if some things collectively ground some entity, then each those of things is a partial ground for that entity. As I have said, this should not be accepted.

8.1.2. The objection from every proper part having the same immediate ground

There is, however, a related objection to the above which might still be thought to afflict (WPM). Dasgupta, as we've observed, holds that all the individualistic facts are grounded in the collective plurality of all qualitativistic facts. But he holds that this collective plurality grounds all those individual facts taken together and denies that each individualistic fact is grounded in this collective plurality. Dasgupta's qualitativistic view is therefore admittedly not analogous to (WPM) in respect to how the derivative *relata* are grounded. On (WPM) each derivative entity is grounded in the collective plurality, whereas on Dasgupta's view it is *only* the collective plurality of the individualistic facts (and not each individualistic fact) which is grounded by qualitativistic plurality. Dasgupta denies that each individualistic fact is grounded seemingly not because of anything akin to Irrelevance*,² but rather because he holds that it is implausible that every individualistic fact has *exactly the same ground*: namely, the collective plurality of all the qualitativistic facts. Supposing that each of the individualistic facts about, say Obama and Romney, are grounded in such this collective plurality, Dasgupta (2014, 12) goes on to say:

² Though Dasgupta does state that "Q_T does contain irrelevancies when explaining Obama's existence on its own (2014, 11)." The main thrust of his objection against Q_T grounding each individualist fact, however, rests on his notion that it is implausible that each such fact has the same ground. And it this feature of the objection which I am trying to deal with in this subsection.

“Then we have the absurd conclusion that Obama’s existence and Romney’s existence have *exactly* the same ground! ... My point is just that in the case of Obama and Romney it is almost unbelievable that the explanation of why the one exists is *exactly* the same as the explanation of why the other exists. Surely ... if Obama’s and Romney’s existence each have an explanation, there must be some *differentia*: some facts that play a role in making it the case that Obama exists but no role in making it the case that Romney exists (and vice versa).”

It seems that Dasgupta’s problem is that it seems implausible that two distinct entities have a common full ground. This, however, is incompatible with the notion that two distinct disjunctions can be fully grounded in the same disjunct: $[P \vee Q]$ and $[P \vee R]$ both have the same ground in P , for instance. Now, Dasgupta does state that in the case of disjunctions, it is ‘unsurprising’ that they have same common ground given they share a common constituent; whereas the set of all the qualitative facts is a constituent of neither Obama nor Romney. But even so, this is still too difficult to believe as this would rule out *any* version of Priority Monism *tout court*. The Cosmos, after all, is the common ground of all derivative objects; if postulating a common ground is only justifiable if it is a constituent of the grounds, monism would be ruled out. But monism (as we’ve seen in this dissertation) certainly seems an epistemically live thesis, and it does not seem right for any version of it to be ruled out merely based on an intuition that distinct entities cannot have a common full ground.

A more plausible suggestion as to what the problem here is, is that Dasgupta is objecting to the idea that two distinct entities can share a common *immediate* full ground. This seems to be the case, given his insistence that Obama and Romney must be ‘differentiated’ by some facts which explain one and not the other (and vice versa). There must be at least some immediate partial ground which one of them has and the other lacks, which explains why they are different facts. To this I have two responses. Firstly, this would still potentially conflict with any version of monism, as there are conceivable scenarios where derivative objects would have the same whole as an

immediate ground. Suppose the world is not weak junky, and that the Cosmos has two objects, x and y , as immediate proper parts, which are the fusions of half of Cosmos' proper parts. Then x and y both have the Cosmos as the same immediate ground. If Dasgupta were right then either any version of monism is false, or it is impossible that the Cosmos can have immediate proper parts.³ And this just does not seem plausible. Secondly, just because two entities have the same immediate full ground, it does not mean that one of them cannot have another full ground which is lacked by the other; and it is this immediate full ground which can be utilised to differentiate the two. Recall from chapter five the case of the (IPK) and the facts corresponding to closed intervals which specify it is between x kg and y kg in mass (i.e. [The IPK is between 0.5 and 1.5 kg in mass]). It is plausible that each closed interval fact is grounded in more determinate facts about closed intervals within that closed interval. Every such fact, however, shares the same immediate ground (i.e. [the IPK is 1 kg in mass]), but every such fact will be differentiated from one another as each one will have/lack a ground which the other lacks/has. The fact [the IPK is between 0 and 2 kg in mass] has a ground which the fact [the IPK is between 0.5 and 1.5 kg in mass] lacks: namely the fact that [the IPK is between 0.5 and 1.5 kg in mass] (Dixon 2016b, 449-450). So, even though all these facts share a common immediate ground, they are differentiated by possessing other full grounds which are not shared by each of them.⁴

³ Perhaps if we think parthood is necessarily dense (i.e. that if x is a proper part of z , then there must be some y which has x as a proper part and is a proper part of z) we might believe immediate proper parts are impossible. However, I think it is an open question as to whether parthood is dense or not, and that this may only be a *contingent* truth. For instance, we might suppose parthood is dense because actual spacetime is either continuous or gunky, that every space-time region is occupiable, and we accept the Doctrine of Arbitrary Undetached Parts (DAUP). However, if we think that the nature of space-time is contingent, even if (DAUP) is true there would be worlds where parthood may not be dense (i.e. worlds where space-time is discrete). I defend the contingency of space-time's structure in chapter three of this dissertation.

⁴ It should be noted however that Dasgupta (2013; 2014) would reject the (IPK) case given that he is a *comparativist* about mass: he holds that masses of things are grounded in how they are related in mass to other things. Dasgupta then would undoubtedly deny the facts corresponding to the closed intervals are grounded in [the IPK is 1 kg in mass]. Dixon (2016b, 448-449) considers another example of a grounding structure of this sort, but which involves infinite disjunctions, though that too may also be controversial. However, the fact we can imagine different cases of grounding structures of this sort (i.e. fully pedestalled grounding chains) should give credence that such structures are metaphysically possible and are not problematic in some way.

Now, it is possible that someone could reply to this by holding that what explains why the (IPK) case is permissible is that we accept that determinables are grounded in their determinates. That is, it is ‘unsurprising’ that each fact corresponding to a closed interval shares a common immediate ground in the [IPK being 1 kg in mass], given that they all are determinables of this maximal determinate mass fact. It is that we have an explanation here that justifies us in supposing that all the derivative facts here share the common immediate ground. But even if this were the case, this would not be a problem for (WPM), because (as we saw in chapters five and seven) it is able to provide an explanation for why the Cosmos is the common immediate ground of all its proper parts: namely that the Cosmos is the plurality of all sub-cosmic objects, and each of those objects is amongst that plurality. And even if two distinct objects, *y* and *z*, are immediately grounded in the Cosmos, we can hold that there is also some object which grounds one which does not ground the other. And this will serve to differentiate the two, if we think there is even the need to differentiate the two via some ground. For example, suppose three particles, *a*, *b* and *c*, are immediately grounded in the Cosmos. Even though *a* and *c* are both immediately grounded in the same thing (i.e. the Cosmos), they can be differentiated, for instance, by *a* being immediately grounded in the mereological fusion of *a* and *b*, which *c* will not be immediately grounded in. The point is that even if the Obama-Romney case is problematic because we lack some ground to differentiate the two, the same does not hold for (WPM), as we can find full grounds which we can use to differentiate any of the Cosmos’ proper parts.⁵ Therefore, I do not then think it is problematic for (WPM) to hold that every sub-cosmic object has the same immediate ground.⁶

8.2. (WPM) and the argument from emergence for monism

⁵ Though, as we’ve seen, this might not hold true in cases where the Cosmos has immediate proper parts; but then, this would also be a problem for strong Priority Monism. This should be enough to show that (WPM) does not have any unique problem here which cannot also be levelled against (SPM).

⁶ Perhaps someone still may object that cases of this sort involve grounding overdetermination, but as we’ve already seen (see footnote 28 in chapter five) such overdetermination is not considered problematic in the grounding literature.

In the sixth chapter, I argued that (CAI) and emergent properties were not incompatible, provided we are willing to hold that as well as being singular monadic properties, emergent properties are *also* collective properties which can be instantiated by some objects *taken together*. Suppose F is an emergent property instantiated by x , and that F^* is a fundamental collective property instantiated by its proper parts, yy . If $F = F^*$, there is no violation of the Indiscernibility of Identicals (II) in supposing that $x = yy$ (taken collectively). And F is still an emergent property, as it will not supervene on the intrinsic properties and spatiotemporal relations of each of the yy ; the instantiation of F does not hold in-virtue-of any monadic properties or relations of each of the proper parts (Bohn 2012, 221-2). And if this is the case, then it follows that (given its commitment to (CAI)) (WPM), too, is compatible with emergent properties. However, it might be thought that in pursuing such a strategy, the weak priority monist has no choice but to abandon the argument from emergence for Priority Monism. For x having F will supervene on yy having the emergent property F^* (i.e. given F and F^* are one and the same property), and thus there will be no ‘asymmetry of supervenience’ between x and yy . Pluralism will not violate the Tiling Constraint, as the mereological simples will be able to serve as a minimal supervenience base for all that exists. Proponents of (WPM), it would then seem, cannot make use of the argument from emergence. Given that the argument from emergence is one of the main arguments given in favour of Priority Monism, though, having to abandon such an argument might be a very detrimental to the plausibility of (WPM).

One response to this might just be to bite the bullet. There is, after all, almost a bucketload of arguments which have been given in favour of Priority Monism (i.e. gunk, nomic integration (Schaffer 2013), that it provides an ontologically parsimonious and explanatorily powerful account of truthmaking (Schaffer 2010c), etc...), and the weak priority monist can still make use any of these to argue in favour of Priority Monism. However, I do not think we need resort to this, and instead I think the problem can be solved once we disambiguate what the pluralist is claiming the *fundamentalia* supposedly are.

To see this, I ask the reader to recall that we have already seen (in chapter four) that a pluralist might try and accommodate emergent properties in the same way (CAI) theorists try to accommodate them;⁷ that is, by supposing the mereological simples collectively instantiate them. But in making such a move the pluralist, then, cannot be an individualist pluralist: that many, but not all, objects are *each* fundamental entities. For being such a pluralist is to hold that everything supervenes on each of the *individual* simples' intrinsic properties and the spatiotemporal relations between them. Fix the nature of each of the simples and you fix the nature of what there is. But if there are emergent properties, then they (by the very nature of what they are) will not supervene on the simples' intrinsic properties and spatiotemporal relations. Individualist Pluralism is thus ruled out if emergent properties are metaphysically possible. What this means is that if such properties are possible then one is going to have to hold that the simples are *collectively fundamental*; that is, only taken together as a plurality in which they are fundamental. So, if the pluralist is going to hold that the simples instantiate emergent properties, they're going to have to hold they do so as a collective. At the very least, pluralists need to hold that simples which instantiate emergent properties are (only) collectively fundamental, even if they don't accept that necessarily the collective plurality of *all* mereological simples is what the *fundamentalia* are.⁸

At this point the pluralist faces a dilemma. Do they hold that the collective pluralities are identical to some concrete object, which they compose? That is, does the pluralist of this sort accept that (CAI) is true or not? Suppose they reject (CAI). In doing so they would have to accept that any such collective plurality of simples is a *mere plurality*. Recall (from chapters four and seven) that a mere plurality is:

Mere Plurality: A plurality is a mere plurality iff it is a plurality which is not identical to any entity.

⁷ See also Bohn (2012).

⁸ That is, this is to be a collective pluralist: that many, but not all, objects are *collectively* fundamental (Saucedo MS).

But then, as I've argued before (in chapters four and seven), mere pluralities seem identity dependent upon *each* thing amongst them. For a mere plurality *to be the plurality it is* it must have certain members. The collective (mere) plurality of my molecules, for instance, seems identity dependent upon each of the molecules which comprise it. It is the plurality that it is *because* of each the things that it contains. Plausibly, if the identity of this plurality is dependent upon the things which that make it up, it is grounded in those things which make it up. The idea is that mere pluralities are nothing more than the things we are quantifying over and are not entities in their own right. And thus, it seems right to say that such pluralities obtain in-virtue-of their constituents. Some things are collectively some way because of how they each distributively are. Mere pluralities of things cannot, then, be fundamental.

It seems, then, as I've argued before (in chapters four and seven), that the only way a plurality can be integrated enough to instantiate *fundamental* collective properties is if it not a mere plurality, but instead is identical to an integrated whole. Such a plurality needs to be an *entity*,⁹ as well as being a plurality of some things. In which case it will be identical to an object; and that object will be more fundamental than *each* of the individual simples out of which it is composed. There is thus an asymmetry of supervenience between the individual simples and the plurality/mereological fusion they compose. And this would suggest that monism is true, because at least some mereological fusions would be ontologically prior to (each) of the parts which compose them. Furthermore, suppose there was an emergent property which was *only* had by *all* the mereological simples collectively. Then given (CAI) and the transitivity of identity, it would follow that the entire Cosmos possessed that property given that it would be identical to the collective plurality of the simples which possessed the emergent property in question. And hence it would *only* be by duplicating the entire Cosmos' intrinsic properties and relations would one duplicate all what there

⁹ Similar thoughts are expressed by John Heil (2012, 48), who argues that bearers of emergent properties must be substances. I do not go as far to hold that anything which instantiates an emergent property is a substance in the sense Heil understands a substance to be, but I do think that anything which instantiates an emergent property is a *particular*. By the very definition of a mere plurality, it cannot be either a substance or a particular.

was in the world. Accepting (CAI) would thus seem to collapse pluralism into Weak Priority Monism.

The only way the pluralist could avoid this conclusion is by denying that there any emergent properties which could *only* be instantiated by the collective plurality of all the mereological simples, and by holding that smaller composite objects (which are identical to the collective pluralities which instantiate the emergent properties) can be included amongst the fundamental supervenience base. Consequently, the collective instantiation strategy would collapse into what I called Priority Pluralism [A V E]:

Priority Pluralism [A V E]: Some *xx* are fundamental iff they have no proper parts or instantiate emergent properties.¹⁰

But even supposing that there couldn't be emergent properties which were *only* instantiated by the Cosmos,¹¹ Priority Pluralism [A V E] is not an attractive thesis. As I argued in chapter four, it looks to be a disjunctive, *ad hoc* treatment of emergence. For one, it seems suspiciously convenient for the pluralist that fundamental mereological simples are never proper parts of fundamental composite objects, and that fundamental composite objects never have fundamental simples as proper parts. By comparison, in postulating that the objects which instantiate emergent properties have a *common source*, the monist gives a much more unified treatment of fundamentality. Given the failure of Priority Pluralism [A V E], I conclude that accepting (CAI) does not undermine the argument from emergence. For it is still the case that duplicating the intrinsic properties and spatiotemporal relations of the mereological simples (*distributively*) is not enough to duplicate all

¹⁰ It should be noted that if some object is fundamental because it has an emergent property, it cannot have any proper parts which are fundamental given the (pluralized) Tiling Constraint: if *x* is fundamental and is a proper part of some fusion *y* which is fundamental, this would violate the Minimality constraint. So, if some fusion is fundamental because it has emergent properties, none of its proper parts can be fundamental.

¹¹ And I argued in chapter four that there are good grounds for thinking that such properties are conceivable, even if there is not sufficient evidence from physics that the Cosmos has such a unique property in the actual world. For instance, it is controversial as to whether Cosmos is entangled to such an extent that its quantum state cannot be separated into *some* partition of its parts (see Calosi 2014, 925-926).

the properties and relations of objects in the world, and this is sufficient to entail the truth of monism. I conclude that in needing fundamental collective properties, (WPM) does not undermine the argument from emergence for Priority Monism.

8.3. The island universe objection to Priority Monism

In the previous chapter, I argued that the Cosmos is an integrated whole because it is nomically integrated: where for something to be nomically integrated is for it to evolve in accordance with the fundamental laws (Schaffer 2013). In order to reject non-(CAI) Collective Allism and accept (WPM) it is crucial, then, that the Cosmos is an integrated whole because it is nomically integrated. There has been, however, a recent objection that there are metaphysically possible worlds where the Cosmos is not nomically integrated: worlds which are *island universes*. The objection is that, given monists hold that what is fundamental is a maximal spatiotemporal object, they cannot allow the metaphysical possibility of there being two or more spatiotemporally disconnected space-times in the same world (i.e. island universe worlds). The possibility of such worlds, as we'll see, has been said to threaten the notion that the Cosmos is necessarily an integrated substance. The objection comes from Sam Baron and Jonathan Tallant (2016) and originates from Phillip Bricker's attack on Lewisian modal realism via the possibility of island universes. According to Lewis (1986, 69-78), possible worlds are maximal spatiotemporally unified regions¹² of logical space; what demarcates worlds is that they are spatiotemporally isolated from one another. It is not then possible that there are parts of worlds which are spatiotemporally isolated. Bricker (2001) however argues that there are good scientific and metaphysical reasons for thinking otherwise, and therefore Lewisian modal realism is too narrow in terms of what it allows to be metaphysically possible.

There are two types of island universes that Bricker discusses:

¹² Or are united by relations which are at least "analogous" to spatiotemporal ones (Lewis 1986, 75-76).

Weak Island Universe: x is a weak island universe iff x fails to be externally unified by any sparse spatiotemporal relation or by any causal, spatial or temporal relation (or any combination thereof).

Strong Island Universe: x is a strong island universe iff x fails to be externally unified by any sparse external relation.

As we shall see in a moment, one crucial difference between weak and strong island universes, is that the former allows for two disconnected spacetimes (in an island universe) to share the relation of having a *common ground*, whereas the latter does not. There is evidence that weak island universes are possible from physics. Bricker (2001, 35-36) points out that one solution to Einstein's field equations for general relativity involves a wormhole which briefly connects two spatiotemporally isolated regions of spacetime. If indeterminism is true, then there is a non-zero objective chance that the wormhole would never have evolved. However, something which has a non-zero objective chance of happening is physically possible. There is reason to think, then, that there is some metaphysically possible world where there are two disconnected space-times, in which a wormhole never evolved that would have otherwise spatiotemporally connected the two. As we shall see in a moment, if we require that the Cosmos be nomically integrated, island universes of this sort would be enough to threaten monism.¹³

Strong island universes, however, threaten Priority Monism even if it didn't require nomic integration. To establish that strong island universes are metaphysically possible, Bricker utilises the following principle of recombination:

Generalized Principle of Solitude for Particulars (GPSP): For any particular (thick, thinned-down, or thin), possibly a duplicate of that particular exists all by itself (Bricker 2001, 39).

¹³ Max Siegel (2016) raises a similar objection to monism which involves a case of two subsystems which become causally isolated from one another after getting propelled away from one another during the hyperexpansion of the universe. However, this sort of island universe case is even weaker than that of a weak island universe, as the subsystems will not be causally isolated from one another at the Big Bang. Much of what I will have to say in response to weak island universes will equally work as a response to Siegel's own thought experiment.

The idea behind (GPSP) is that one can remove (via recombination) more and more of a particular's properties until one removes all its relational properties to other things. (GPSP) is a pretty powerful principle of recombination. Now suppose that in a world w there is a spacetime U which is the Cosmos and that within it there are two individuals, i_1 and i_2 , which do not overlap spatiotemporally, and which are grounded in U . i_1 grounds a range of proper parts $p_1 \dots p_n$ it is a mereological fusion of, and i_2 grounds a range of proper parts $p^*_1 \dots p^*_2$ it is a fusion of. Via (GPSP) we can get a world w^* in which we can 'strip away' the spatiotemporal relations between i_1 and i_2 , as well as any regions other than them. This can be done, because (GPSP) says that a duplicate of an entity can exist all by itself, such that there are no spatiotemporal relations it has to any other entity. Therefore, in w^* , U will not be a single unified spatiotemporal object. However, via (GPSP) we can strip away any sparse external relation that holds between i_1 and i_2 (as well between their distinct sets of parts), and thus we can strip away the relation of them 'having a common ground' (i.e. U) which they had in w . In w^* , i_1 and i_2 will be the fundamental entities. Baron and Tallant (2016, 599-601) argue that if, we accept (GPSP) as a principle of free recombination, then monism cannot be necessarily true (as there are possible worlds in which the Cosmos is not fundamental). Given that the 'Fundamental Mereology Question' (FMQ) requires that any answer to it is necessarily true, Priority Monism would be necessarily false.

I do not think, however, that a monist or anyone who takes the (FMQ) seriously will accept (GPSP), because it is contrary to much of the reason why they came to their answer to the (FMQ) in the first place. Schaffer only believes "that the fundamental actual concrete objects should be *freely recombinable* (Schaffer 2010a, 40)", and argues for monism because he holds that the proper parts of the Cosmos cannot be freely recombined. The fact that sub-cosmic objects cannot be freely recombined is a "modal signature of an interconnected monistic cosmos (Schaffer 2010b, 350)," and Schaffer presents a number of plausible metaphysical views which lead to a failure of

free recombination.¹⁴ Crucially, however, the reason why (GPSP) must be false is due to grounding being a *super-internal* relation.

Recall that a super-internal relation is one in which “the intrinsic nature of only *one* of the *relata* ... guarantees not only that the relation holds, but also that the other *relatum*(a) exists and has the intrinsic nature it does (Bennett 2011, 32).” If U grounds i_1 and i_2 , then U will ground them in any world where it has the same intrinsic nature. Suppose that in a world w^{**} i_1 and i_2 are grounded in U , but that U is not a spatiotemporally unified object, given that i_1 and i_2 are spatiotemporally isolated from one another. Given that grounding is super-internal, there cannot exist a world (i.e. w^*) which has the same constituents as w^{**} and differs from it only in respect to the fact that U does not ground i_1 and i_2 . Unless U 's intrinsic nature is different, it *cannot fail to ground* i_1 and i_2 . One cannot unilaterally strip away from i_1 and i_2 the relation of ‘having a common ground’ without making some intrinsic change to U ; one would also have to strip away from U the property of it ‘grounding i_1 and i_2 ’, for instance. But if one were to strip away such a property, the monist will just maintain that i_1 and i_2 would not exist. Grounds *modally constrain* what they ground. One cannot make any kind of change in the properties and relations of i_1 and i_2 without making one in U . Those who think then that grounding is super-internal should reject (GPSP):¹⁵ there is no world in which i_1 and i_2 exist and are not grounded in the Cosmos.

Now, perhaps Baron and Tallant might object that in rejecting (GPSP) we need to put another recombination principle in its place.¹⁶ I suggest then the following:

¹⁴ See Schaffer (2010b).

¹⁵ Pluralists (who accept grounding is super-internal) will also want to reject (GPSP), as there are scenarios which (GPSP) would allow which they would deny are metaphysically possible. Suppose a , b and c are mereological simples, and that the mereological fusion of a and b and the mereological fusion of b and c are partially grounded in b . Applying (GPSP) to these two fusions would allow us to strip away the relation of ‘having a common ground’ (i.e. b) which holds between them. This would mean there would be a metaphysically possible world where b and these two fusions existed, but where the fusions were not grounded in b . But if the pluralist is an atomistic pluralist, they will not accept that this is possible; any world in which the fusions of a and b , and b and c , exist, both will be partially grounded in b .

¹⁶ Indeed, they argue for (GPSP) as they are sceptical there is any plausible principle of free recombination that does not allow strong island universes (2016, 602-605).

Generalized Principle of Solitude for ‘Fundamental’ Particulars (GPSP)*: For any *fundamental* particular (thick, thinned-down, or thin), possibly a *counterpart* of that particular exists all by itself.

There are two significant respects that (GPSP)* differs from (GPSP). Firstly, it states that only fundamental particulars can exist by themselves, which follows from Schaffer’s supposition that only fundamental entities should be freely recombinable. Secondly, it replaces the notion of a duplicate with the notion of a counterpart. This is because given Lewis’ definition of a duplicate,¹⁷ the ‘actual’ Cosmos could never have an exact duplicate in a different possible world (i.e. given no possible world will be qualitatively identical to any other world). Instead, the monist should hold that the Cosmos has some counterpart which exists all by itself.¹⁸ By applying (GPSP)* to the Cosmos in its full extent, we get a world where the Cosmos is/occupies¹⁹ some extended atomic region of space-time and has no proper parts and pervades no proper subregion of spacetime other than the region it is/exactly occupies. This is the consequence of stripping away every relation which holds between the Cosmos and its proper parts, such that it exists by itself. But (GPSP)* does not allow one to remove the relation of having a common ground from any proper part of the Cosmos, as we cannot apply the recombination principle to any *derivative* entity.

I do not think there is any reason to suppose strong island universes are metaphysically possible. But given that evidence from physics suggests that weak island universes are possible, this itself would be enough to threaten monism if we hold (as I did in the previous chapter) that fundamental entities must be nomically integrated. Baron and Tallant (2016, 594-598) claim that an island universe Cosmos is not an entity which “acts as one”, for it might contain two universes which evolve in accordance with different fundamental laws. The Cosmos would then evolve by two sets

¹⁷ For Lewis (1986, 61) two things are duplicates iff (i) they have the same perfectly natural properties, and (ii) their parts can be put into correspondence in such a way that the corresponding parts have exactly the same perfectly natural properties and stand in the same perfectly natural relations.

¹⁸ Furthermore, as the reader will recall from the previous two chapters, supposing counterpart theory does not necessarily commit one to Lewisian modal realism; one can be an ersatz counterpart theorist.

¹⁹ I’m assuming agnosticism about supersubstantivalism here.

of distinct fundamental laws and be less integrated than the disconnected spacetimes it has as parts. The only single set of laws the Cosmos could evolve by is a law which was the conjunction of the two distinct laws; but it surely being a mere conjunction of two laws is not sufficient for it to be a fundamental law. A mere conjunction of two fundamental laws is not itself a law. It is the two disconnected spacetimes which evolve in accordance with the fundamental laws, not the Cosmos. The Cosmos then cannot be nomically integrated.

Given it is crucial for (WPM) that the Cosmos is nomically integrated, this worry must be addressed. However, I do not think Baron and Tallant have shown the Cosmos cannot be nomically integrated, even if it contains disconnected spacetimes with different laws. Now, it is obvious that in this scenario there are no fundamental laws which universally hold across the possible world. In so far as there are fundamental laws, they only apply to specific regions of space-time and are not exceptionalness regularities. Indeed, it seems that if island universes are a threat to the thesis that the Cosmos is necessarily nomically integrated, then any metaphysical theory about the laws of nature in which there are non-universal laws of this sort would also threaten it.²⁰ But why should the monist accept that the Cosmos must evolve by a *single set* of laws in order for it to be nomically integrated? According to Baron and Tallant (2016, 597):

“Now, Schaffer says that if x and y merely evolve according to distinct laws L_1 and L_2 , then x and y do not act as one. In such a circumstance, x and y would lack sufficient nomic integration to be considered a single substance. We accept this criterion. So x and y (in this case, our distinct spacetimes) must evolve according to some fundamental law, L_3 , in order to act as one and count as a single substance. In the case just described, there is no obvious candidate for playing the role of L_3 and so we have no nomic integration and no monistic substance comprised of disconnected spacetimes.”

²⁰ For instance, the famous Smith’s garden thought experiment raised by Michael Tooley (1977, 686-687), where it is a law of nature applying only to his garden that the only fruit there are apples.

Baron and Tallant seem to think that nomic integration requires that a single entity must evolve in accordance with a *single set* of fundamental laws, but nomic integration does not require this. It is true that if x and y evolve by distinct laws then they are not nomically integrated, as their *individual* states at some time will not allow us to predict with accuracy their subsequent behaviour. But this is not true of the Cosmos in the island universe case. Even though the Cosmos would evolve according to more than one set of fundamental laws, its state at one time would *still allow us* to predict its subsequent temporal evolution, and this is all that is required for something to be nomically integrated. If two distinct spacetimes, i_1 and i_2 , evolve according to distinct sets of fundamental laws, then if we can subsequently predict their behaviour based on their state at some time, we can also predict the behaviour of their mereological fusion (i.e. U).²¹ And if we can successfully predict the behaviour of something based on its state, then that thing is nomically integrated. The point is that nomic integration doesn't disbar something from evolving by more than one set of fundamental laws. What it disbars are two or more distinct individuals evolving by distinct sets of laws; as we will not be able to predict the behaviour of each of those individuals based on their state. The notion of nomic integration that Schaffer (2013) supposes is much thinner than Baron and Tallant believe it to be.²²

²¹ Though, admittedly, we may need to state that these distinct sets of laws *hold relative to* i_1 and i_2 , if we are to successfully predict the Cosmos' temporal evolution. Schaffer, seemed to suggest at a conference in Leeds that the monist should do this to deal with the island universe objection, though this might be odds with what he says in footnote 13, in the (2013) paper, as Jonathan Tallant (personal communication) has pointed out to me. I'll have more to say about the importance of this point in footnote 23.

²² For one, Schaffer states that, "the answer is that a substance must *evolve* by the fundamental laws, by which I mean a substance be such that plugging its state at any given time into the fundamental laws correctly predicts its actual behaviour (2013, 69)." He then later says in respect to the idea that pluralists could hold that some things are substances if they are among a plurality which co-evolves with the fundamental laws that, "[it] does not fit the idea of substances as integrated. From the fact that some things co-evolve by the fundamental laws, one can only infer that this plurality acts as one (2013, 73)." This second quote does not suggest, however, that a thing must evolve in accordance with only a single set of laws to be a substance, but rather that individual things which are part of a plurality which evolves in accordance with the fundamental laws, cannot be substances if they (distributively) do not evolve in accordance with them. The first quote, meanwhile, suggests that anything whose behaviour we can predict based on its state should be considered a substance, and this is true of the Cosmos even if it is a mereological fusion of two disconnected spacetimes (which evolve by distinct sets of laws). We will still be able to predict the Cosmos' behaviour based on its earlier state.

I suspect that Baron and Tallant might reply by arguing that there is no reason to think that U is more fundamental than i_1 and i_2 . Not only nomic integration does not give us reason to think that U is more fundamental than i_1 and i_2 , but the monistic arguments from gunk, emergence and supersubstantivalism do not favour U being fundamental than i_1 and i_2 (in the world in which they are disconnected spacetime regions). I concede that they are probably right on this score. Certainly, *based off nomic integration alone*, there is no reason to think that island universes are less fundamental than U ; the island universes certainly do seem to evolve in accordance with the fundamental laws, and thus should be recognized as integrated wholes. I admit, we cannot infer that the Cosmos is nomically integrated, yet deny that the island universes are not. While then the argument from nomic integration might give us reason to favour monism over atomistic pluralism, it does not give us any reason to favour it over the sort of view in which the island universes would be recognized as fundamental entities.²³

Nevertheless, I think there are other reasons the monist could invoke, in arguing that it is that the Cosmos, and not the island universes which are fundamental (in the island universe world). Firstly, it can be argued that considerations from truthmaking (Schaffer 2010c) and the counterpart theoretic version of the argument from internal relations²⁴ (Schaffer 2010b, 367-370) give us reason to favour U being fundamental as opposed to i_1 and i_2 . For one, if we are attracted to idea that the *fundamentalia* can serve as a truthmaker for negative existentials, we are going to need a *maximal* mereological fusion to make true propositions such as <there are no dragons> in worlds which

²³ Also, as Jonathan Tallant (personal communication) has pointed out to me, there are certain remarks in the (2013) paper by Schaffer which may imply his notion of nomic integration is thicker than I've argued it to be; though, certain remarks Schaffer made at conference in Leeds in 2017 (i.e. that we should relativize each set of laws to an island universe, to successfully predict the Cosmos' temporal evolution), suggested to me that he held to a notion of nomic integration in lines of the one that I have defended. Nonetheless, irrespective of which interpretation of Schaffer is correct, the thinner notion of integration is all I need in arguing for (WPM) over Saucedo's version of Collective Allism; even though, in holding to such a notion of integration, I concede I cannot argue that the Cosmos is more nomically integrated than the island universes envisioned by Baron and Tallant would be.

²⁴ The argument here is that any two or more proper parts of a world will be modally constrained by the internal relation of 'being a worldmate' with one another, as given counterpart theory every individual will be world-bound. I_1 and I_2 then will not be modally free of another, and thus on the assumption there cannot hold an internal relation between *fundamentalia*, this would be enough to get an argument from monism from internal relations (Schaffer 2010b, 367-370). The other two cases involving internal relations that Schaffer considers in depth (i.e. causal essentialism and structuralist supersubstantivalism) will not, however, entail monism over I_1 and I_2 .

contain no dragons. Any proper part or collection of proper parts of the Cosmos will not do, as it/they will not rule out there being a dragon in some spatiotemporal region it/they do not overlap with. Secondly, U might be selected as being fundamental as opposed to i_1 and i_2 on theoretical comparative grounds. Schaffer (2015) has argued that rather than seeking not to multiply entities without necessity in theory choice (i.e. Ockham's Razor), we should instead hold that we should not multiply *fundamental* entities without necessity (i.e. a principle he calls the Laser). He argues that in weighing different theories, we should seek to maximize the 'bang' (i.e. the useful entities derived) for one's buck (i.e. the fundamental entities which are the ontological cost):

Ontological Bang for the Buck: Optimally balance minimization of fundamental entities with maximization of derivative entities (especially useful ones) (Schaffer 2015, 652)

The idea being that derivative entities are pieces of an *ontological free lunch*, which are no extra cost beyond the fundamental entities we posit. Hence, we should only seek to minimize the number of fundamental entities in parsimony considerations, and it is actually an advantage for a theory if its fundamental entities can explain the existence and intrinsic nature of more derivative entities than the *fundamentalia* of some rival theory. If Schaffer is right about this,²⁵ we should select U as being fundamental as opposed to i_1 and i_2 as we get more 'bang for the buck' with the former than the latter. For on the monistic theory only one entity is fundamental as opposed to two (or more), and more derivative entities can be derived on the monistic theory (i.e. all the

²⁵ Schaffer (2015) presents three arguments in favour of the Laser being a preferable comparative principle of theory choice to the Razor, one which involves it being supported by ontological bang for buck, which in turn he supports through an analogy with 'Conceptual Bang for the Buck' (i.e. that we should seek to balance minimization of the primitive concepts we utilise with maximization of concepts defined from them). But Schaffer's suggestion that we utilise the Laser instead of the Razor is controversial, and Baron and Tallant (2018) have put forward a strong case that the Laser is the inferior comparative principle. Nevertheless, even if the Razor is the better comparative principle, that does not necessarily undermine Ontological Bang for the Buck, and Ontological Bang for the Buck is all what the monist needs to argue that monism is preferable to supposing i_1 and i_2 to be fundamental. Or at the very least, the idea that we should aim to minimize the number of fundamental entities *even at the expense* of maximizing the overall number of entities, seems an intuitive principle of theory choice to me. For one, it should be noted that one of the arguments Baron and Tallant (2018, 602-603) raise against the Laser is that there are cases where Bang for the Buck would recommend the Razor over the Laser; hence, rejecting the Laser does not mean one should reject Bang for the Buck. I'll admit there is more here which could be said, but I do not have the space to get tied down into a discussion about comparative theory choice, and hope I've done at least enough to convince the reader that Ontological Bang for the Buck (or a principle similar to it) is plausible.

derivative entities derived from i_1 and i_2 , as well as i_1 and i_2 themselves). Monism, therefore, gives one more bang for one's buck. I conclude then that the monist certainly has some good reasons for supposing U is more fundamental than i_1 and i_2 , and thus the possibility of (weak) island universes is not an unsurmountable problem for monists who think the Cosmos is nomically integrated.

8.4. Conclusion

In this chapter, I've considered some further objections which might be raised against Weak Priority Monism. I began the chapter by considering a couple of preliminary objections to (WPM). The first was the allegation that (WPM) is in tension with Irrelevance*, which (as I argued in the first chapter of this dissertation) is a plausible principle about explanation and grounding. The second was that there was something problematic in supposing that distinct entities can have the same immediate ground. In response, I argued that (WPM) was not in tension with Irrelevance* once we disambiguate the sense the collective plurality of the Cosmos' proper parts grounds each of its members/parts, and that there is good reason to suppose that it is possible two things can have the same immediate ground. I then argued that (WPM) is not incompatible with the argument from emergence for Priority Monism, as there is still an asymmetry of supervenience between the individual parts (distributively) and the Cosmos if emergent properties are metaphysically possible. Duplicating the properties and spatiotemporal relations between the individual parts, will not suffice to duplicate all the properties and relations of all the concrete objects in the world. I then lastly considered the objection that there are metaphysically possible worlds in which the Cosmos is not nomically integrated, which would undermine monism if nomic integration is a requirement to be fundamental/an integrated whole. The worlds in question are island universe worlds, in which the Cosmos has as proper parts two (or more) disconnected spacetimes. However, I argued that even if such worlds are possible, they do not undermine the Cosmos being nomically integrated.

Ultimately, I think I have shown in this dissertation that (WPM) can overcome all the most troubling objections which can be raised against it. And I have argued that (WPM) should be preferred to Strong Priority Monism (SPM), as it (unlike (SPM)) can solve the problem of weak junk. In the following chapter I'm going to present another reason for which (WPM) should be preferred to (SPM): it can offer a better reply to the problem of heterogeneity. If the Cosmos is identical to the collective plurality of its proper parts, we have an explanation of how the Cosmos has qualitative variation. Furthermore, (WPM) will give us the means to answer Ted Sider's (2007) worry that PM cannot account for the size and structure of the statespace, and means we can (unlike (SPM)) utilise Kelly Trogon's (2009) inter-virtue account of intrinsic properties. These, then, are further good reasons to prefer Weak Priority Monism as answer to the (FMQ).

Chapter Nine: Weak Priority Monism and heterogeneity

In this dissertation, I have argued that, given the metaphysical possibility of weak junk, a different version of Priority Monism is needed. A grounding regress is still vicious even if the metaphysical foundationalist can show that the entities they require as their *fundamentalia* exist as a matter of metaphysical necessity. We do not just require a plausible source for the being of all the derivative entities that there are, but it needs to be *intelligible* how the derivative entities are grounded in that source. Resultantly, in weak junky worlds grounding chains never terminated at the Cosmos on Schaffer's variation of priority monism (i.e. *Strong Priority Monism* (SPM)), and this indicated that a new version of Priority Monism was needed; one in which the Cosmos grounded all its proper parts *immediately*. I dubbed this new version of monism, 'Weak Priority Monism' (WPM): the position that the Cosmos is fundamental and is *identical to the collective plurality of all its proper parts*. Given (WPM)'s compatibility with weak junky worlds and the fact that proponents of it are also able to utilise the main arguments in favour of Schaffer's variety of monism, I argued that a priority monist should be a weak priority monist.

In the previous two chapters I have outlined (WPM) and how it resolves the problem of weak junk, as well as defending the view from a number of potential objections. In this chapter, I'm going to argue that (WPM) has another advantage over (SPM) in that it can better deal with the problem of heterogeneity for monism. This is the problem that if the Cosmos is the single fundamental entity, then it cannot account for the qualitative variation there is in the actual world (Schaffer 2010a, 57-60). It may not seem clear as to how a single entity can account for all the variety of derivative entities there are in the world; by comparison the pluralist can appeal to multiple distinct fundamental entities in accounting for such variation. There are several moves the proponent of (SPM) can make in response to this problem, but I'll argue that the proponent of (WPM) has a simple solution in that it is able to appeal to the Cosmos' proper parts in accounting for the qualitative variation that there is in the world; as it is identical to those parts

taken collectively. (WPM) can also resolve Ted Sider's (2007) worry that the monists cannot explain the size and structure of the statespace, and (unlike (SPM)) can utilise Kelly Trogon's (2009) *in-virtue-of* account of intrinsic properties in explaining how derivative entities have properties that are intrinsic. I'll thus conclude that (WPM) can account much more easily for the world's qualitative variation than (SPM) can; therefore, this is another reason to prefer (WPM).

9.1. Weak Priority Monism and the problem of heterogeneity

The world is heterogeneous. It is not some homogeneous blob, but rather has qualitative variation in that parts of it are distinct and different from one another. This is a fact accepted by everyone who engages in first-order metaphysics and finds it meaningful; excluding incredibly radical sceptics. The world has the appearance of being qualitatively distinct in its different regions,¹ and this appearance seems to be accounted for by the fact it has proper parts. There exist tables, chairs, football stadiums, subatomic particles and a whole host of different sub-cosmic objects, and these all possess a variety of different properties that accounts for the world's heterogeneity. The world is qualitatively varied because it has different proper parts which differ from one another. This is a fact which both priority pluralists and monists find undeniable.

But then, there is a problem for the monist. How do we account for all this qualitative variation in terms of one's *fundamentalia*? This seems very easy for the pluralist to explain. The world is qualitatively varied because the *fundamentalia* are mereological simples² that are distinct from one another, and different combinations of such simples get you distinct composite objects which differ from one another. But for the monist things seem much more difficult. If there is only a single fundamental entity, then it seems difficult to see how the world's qualitative variation could

¹ Even the existence monist will hold that this is true. It's just that they believe this appearance is not made true by the world's parts, but by certain irreducible properties it has (see Schaffer (2007, 179, fn 12) and Cornell (2016)). As we'll see, the same properties invoked to account for the world's heterogeneity by the existence monist will also be utilised by the strong priority monist.

² I am of course supposing here that the pluralist here is an atomistic pluralist, who holds that the mereological simples are what's fundamental.

all obtain in virtue of this entity. The monist cannot, unlike the pluralist, tell a story in terms of combinations of its parts, on pain of violating the irreflexivity of grounding. Given the parts are grounded in the Cosmic whole, the monist cannot appeal to those parts in explaining why the Cosmos is heterogeneous, given grounding's irreflexivity. It would be circular to explain the qualitative nature of the Cosmos in terms of its proper parts, when the monist holds the existence and nature of those parts is explained in terms of facts about the Cosmos. So, it looks initially implausible that the monist can account for the fact the world is heterogeneous. The world is heterogeneous because it has proper parts which are fundamental, but the monist cannot say this when such entities are derivative in their worldview. The problem of heterogeneity then looks to be a serious problem for the priority monist.

The problem for the monist seems similar to the *problem of spatial intrinsics* (Hudson 2006, 108-111) is for proponents of qualitative heterogeneous extended simples. Recall (as mentioned in chapter three) that qualitatively heterogeneous simples are extended simples which display qualitative variation. Imagine, for instance, a ball which has a blue left half and a yellow right half, but (suppose) it has no proper parts. Such an object would then be a qualitative heterogeneous simple; it has internal qualitative variation but no proper parts. A problem emerges as a result. If qualitative heterogeneous simples have no proper parts, then we cannot explain their heterogeneity in terms of them having proper parts. We cannot say, for instance, that the ball's left half is blue in virtue of it having a blue part in that region, if the ball is a mereological simple. But then how do we explain how it is that the ball has a blue left half? The problem for the proponent of qualitative heterogeneous simples here looks to be the same as the problem faced by the monist; neither can appeal to the properties and relations of proper parts in accounting for why their objects have qualitative variation. In the case of those who believe in qualitatively extended simples, it is because mereological simples lack parts, while for the priority monist³ it is because

³ For existence monists, the problem of heterogeneity arises due to the exact same reasons as it arises for qualitatively extended simples, given they think the world is one big extended simple.

the world's parts are derivative entities. Neither can appeal to proper parts in explaining the fact their objects are heterogeneous. So, to escape the problem of heterogeneity, it might be thought that the monist can appeal to solutions which have been used by proponents of qualitative heterogeneous to escape the problem of spatial intrinsics.

Jonathan Schaffer (2010a, 59-60) suggests three solutions to the problem of heterogeneity in this vein, but I will also consider a fourth which a strong priority monist could utilise. The first is to hold that what accounts for the Cosmos' heterogeneity is that it bears distinct relations to different regions of space-time (i.e. *relationalism*). The Cosmos is heterogeneous because, for instance, it bears the redness relation to some spatiotemporal region, bears the polka-dotted relation to some other spatiotemporal region and so on. The second is to hold that the instantiation relation the Cosmos bears to its intrinsic properties is relativized to different spatiotemporal regions (i.e. *adverbialism*).⁴ The Cosmos would be heterogeneous, then, by instantiating R_1 -ly (where R_n is a spatiotemporal region) the property of being red, by instantiating R_2 -ly the property of being polka-dotted and so on.⁵ The third is to hold that the Cosmos instantiates *distributional properties*; properties whose instantiation guarantee a certain qualitative distribution for some object which instantiates them and which are not reducible to non-distributional properties (Parsons 2000, 2004). Imagine then that there is a ball which is a qualitative heterogeneous simple and is polka-dotted. We could say that the simple is polka-dotted (despite having no proper parts) because it instantiates the distributional property of being polka-dotted; having this distributional property guarantees that the ball is this way. Similarly, the monist could hold that the Cosmos is heterogeneous because it instantiates some *global* distributional property,⁶ which guarantees that it has the qualitative variation it possesses.

⁴ See Johnston (1987, 127-129) and Haslanger (1989), though they utilise adverbial properties to solve the problem of *temporary intrinsics* as opposed to spatial intrinsics.

⁵ Alternatively, we could say that the world instantiates being red-here, being polka-dotted there and so on. The idea is that we can express these properties *adverbially*.

⁶ Alternatively, the monist could hold that the Cosmos instantiates multiple distributional properties which account for its heterogeneity. However, perhaps it might be thought to be more in the spirit of monism to hold it only

A fourth possible solution (not discussed by Schaffer) is that the Cosmos possesses *tropes* which are located at different spatiotemporal regions. Kris McDaniel (2009) has suggested that the problem of spatial intrinsics can be resolved by holding that qualitative heterogeneous simples instantiate tropes in their proper subregions. Consider then our proper partless ball, which is blue on its left half and yellow on its right. On McDaniel's proposal, the ball will instantiate a blue trope on its left half and a yellow on its right. Similarly, the monist could hold that the Cosmos instantiates a red trope in some spatiotemporal region, a polka-dotted trope in some other spatiotemporal region and so on, and this will account for its qualitative variation. There are then a few things a priority monist can say in response to the problem of heterogeneity.

There is another response available to the weak priority monist though, not available to her strong priority monist friend. The weak priority monist holds that the Cosmos is *identical* to the plurality of all its parts taken collectively and can thus say that the Cosmos is heterogeneous because *it is many things* as well as being a single thing. The weak priority monist cannot appeal to *each* individual object in the world in accounting for its qualitative variation on pain of violating grounding's irreflexivity, but they can appeal to the *plurality of all them*. The Cosmos, then, is red in some spatiotemporal region because the red object in that region is *one of* the things that *it is*, is polka-dotted in some other spatiotemporal region because the polka-dotted object in that region is one of the things that it is and so on. The Cosmos is heterogeneous because it is not just a concrete object, but also the *collective plurality* of the qualitatively distinct objects that compose it; it is both one thing and many things. And as the reader will recall from chapter six, this does not involve a violation of grounding's irreflexivity, as the Cosmos is the plurality of all its parts *collectively* and not *distributively*. Each part will be grounded in the collective plurality of all the world's proper parts, and this plurality *is* the Cosmos. Unlike the strong priority monist, the weak priority monist *can*, then, appeal to the proper parts of the Cosmos in accounting for its

instantiates a *single* distributional property. The worry that some of these solutions go against monism's spirit is something which will be discussed in this chapter.

heterogeneity. The weak priority monist then has a natural explanation for the world's heterogeneity without needing any controversial properties or relations.

That an explanation for the Cosmos' heterogeneity comes as part of the package in accepting (WPM) is a strong advantage over (SPM). Theoretically, if a metaphysical theory can solve a certain problem that its rival(s) need to posit controversial properties to solve, then that theory certainly looks to have more explanatory power at potentially a cheaper ontological price. The alternative theories considered as solutions to the problem are all controversial and have been subject to criticism. The existence of tropes, adverbial properties, and distributional properties have all been doubted, and that the weak priority monist does not require them is a certainly good thing. Two of these solutions (relationalism and adverbialism) also require one to be a substantialist about space (Cornell 2013b, 185), and thus cannot be utilised by a monist who is a relationalist about space. For instance, the Cosmos bearing in a certain region of spacetime obviously commits one to the existence of spacetime.⁷ Now, I personally am sympathetic towards substantialism; indeed, like Schaffer (2009b), I favour the view that objects are actually identical to their spatiotemporal regions (i.e. *supersubstantialism*). Nevertheless, the fact that (WPM) can solve the problem of heterogeneity in a way which is compatible with relationalism about space, surely is an advantage for the theory. It is certainly desirable if one's solution to a metaphysical problem is not a hostage to fortune on what space is. The wider range of metaphysical scenarios a theory is compossible with, the more attractive it will be as a theory.

I also think that some of these other solutions are not in keeping with the *spirit* of Priority Monism. Priority Monism is the theory that many objects obtain *in-virtue-of* a single object, but on at least two of these solutions (adverbialism and the trope solution) it appears the Cosmos is a certain way

⁷ It might be thought that the trope response is also incompatible with relationalism about space; that the Cosmos having a trope at a certain spatiotemporal region entails that spatiotemporal regions exist. But I don't think this is necessarily so, as the trope theorist could explain the location of tropes in terms of primitive spatiotemporal relations which hold between them. In making such a move though (i.e. explaining the Cosmos' heterogeneity in part due to primitive spatiotemporal relations between tropes), I do worry that we are moving even further away from the spirit of monism than a substantialist trope response (more on this in a moment).

in-virtue-of *many individual things*. Consider the trope view, for example. That the Cosmos is heterogeneous is because there are many individual *particulars*, and that its in-virtue-of these particulars existing at different spatiotemporal regions and having the nature they have that the Cosmos has the qualitative nature it has. It looks as if the Cosmos is grounded *distributively* in the existence of many particulars; and while this not inconsistent with monism *per se*, it does not seem to be much in keeping with the spirit of the view. Surely, if we are priority monists we should want to explain many things in terms of the one fundamental (or basic)⁸ thing, so explaining the latter in terms of many things seems to be in conflict with this motivation. It would also go against the *Things-First* thesis that I have supposed is true in this dissertation: that all derivative entities are either identical to or are fully grounded in concrete objects (Schaffer 2010b, 344, fn3). Holding that the Cosmos is grounded in many properties located at spatiotemporal regions involves denying the Things-First thesis; so, if we want to affirm it then both adverbialism and the trope response need to be rejected.⁹

There is, however, an obvious response the strong priority monist will make to the above argument. Given on my view the Cosmos is identical to its *many parts* taken collectively, my position also is not in keeping with the spirit of monism. After all, I am explaining the Cosmos' heterogeneity in terms of the existence of its parts, so it really does not seem I have any right to attack certain responses to the problem of heterogeneity (compatible with (SPM)) on the grounds they are not in the spirit of monism. I am throwing a stone in a glass house, so to speak. I do not think this is the case, though, because I think these responses are committed to explaining the

⁸ Recall that in chapter two I defined an object as *basic* if is not grounded in any other concrete object. This, however, is compatible with it being grounded in entities belonging to another ontological category.

⁹ What about relationalism? Does that involve rejecting the Things-First thesis? I'm less sure about this. Does saying that the Cosmos bears certain relations to its spatiotemporal regions involve saying that the Cosmos possessing its qualitative nature is grounded in relations to its spatiotemporal regions? I don't know. We might, for example, just say that the Cosmos bearing a certain a relation spatiotemporal region is just part of what the Cosmos is and doesn't involve it being grounded in the holding of such relations. I must admit that I have no real firm intuition here. However, in explaining the Cosmos' qualitative nature in terms of many individual relations it holds to many distinct spatiotemporal regions, this is not still much in keeping with the spirit of monism, even if this doesn't involve the Cosmos being grounded in it bearing those relations to those regions.

Cosmos' qualitative nature and grounding in it terms of the *individual* entities it contains. In these responses, the Cosmos is heterogeneous in-virtue-of it having *some individual property* at some spatiotemporal region, another at some other spatiotemporal region and so on. By contrast, on my view, the Cosmos is heterogeneous because *it is* the plurality of all its qualitatively distinct parts *taken collectively*, but *not individually*. The explanation for the heterogeneity is in terms of a global entity (i.e. a plurality which is also an object) and I am not appealing to each individual entity in explaining it. If we attempt to ground the Cosmos' heterogeneity in individual entities, we go against the spirit of monism in that our explanation looks pluralistic; *many individual entities* are prior to the Cosmos. But this is not the case for (WPM), as our explanation for the Cosmos' heterogeneity remains *global* and we do not have to affirm that it is grounded in many individual entities. My charge then (against the adverbialism and the trope responses) is that on these responses it is the case that the Cosmos is being explained in terms of and is grounded in many individual things; and this is *much more* against the spirit of monism than (WPM).¹⁰

Things get even worse for adverbialism and the trope response if supersubstantialism is true. If supersubstantialism is true, concrete objects are identical to the spatiotemporal regions they occupy. But if so, then on these responses the Cosmos will be grounded in properties which are located *at the Cosmos' proper parts*. For instance, on the trope response, the Cosmos will be heterogeneous in-virtue-of tropes located at its proper parts. In explaining the heterogeneity of the Cosmos, the proponents of these solutions will be invoking the individual parts of the Cosmos in

¹⁰ However, it is possible that a trope theorist could take a leaf out of the weak priority monist's book and insist that the tropes *collectively* rather than each individually ground the Cosmos. What would be fundamental would be the *collective plurality* of all the world's tropes. Now, if we hold that (WPM) is in the spirit of monism, it seems we should also affirm that this particular view would also be in its spirit. I have two responses to make to such a view. Firstly, I still think (WPM)'s solution is preferable as (i) it is ontologically neutral on what properties are or whether there even are any; and (ii) it is compatible with the Things-First thesis, while this view is not. Secondly, I'm not sure that a strong priority monist would be inclined to accept this view. One reason for preferring (SPM) to (WPM) is one cannot make sense of the Cosmos' parts collectively grounding each of themselves distributively; if the Cosmos' parts collectively ground some entities, surely, *each* of them also distributively ground them. But on this view, all the tropes collectively would ground the Cosmos, as well as each of the individual tropes, distributively. No strong priority monist who accepted such a view could complain that (WPM) involves a violation of grounding's irreflexivity nor that it goes against monism's spirit.

their *explanans*. And that seems to be very much against the spirit of monism indeed. It seems then that there is good reason to hold that these solutions are incompatible with supersubstantivalism; but given that priority monists have good motivation to be supersubstantivalists,¹¹ this is a significant problem for both of these responses to the problem of heterogeneity.^{12,13}

I really think, then, that the most promising solution to the problem of heterogeneity compatible with (SPM) is postulating the world instantiates some global distributional property. It is very much in the spirit of monism to say that the world has qualitative variation because it instantiates a *single* distributional property. In fact, this does very much seem more in the spirit of monism than holding the Cosmos has qualitative variation because it is identical to many things collectively. Distributional properties are also compatible with relationalism about space. The Cosmos instantiating some distributional properties does not necessitate the property be located in some spacetime manifold. The instantiation of such properties also does not create any worries for monism if concrete objects are identical to their spatiotemporal regions. I really think, then, that any strong priority monist ought to embrace distributional properties to account for the Cosmos' heterogeneity. But if distributional properties are compatible with relationalism (about space) and supersubstantivalism, and positing them is more in the spirit of monism than my own response,

¹¹ If we are priority monists, then it makes sense that we identify spacetime with the maximal concrete object, wanting to be in keeping with the spirit of monism. Rather than positing two distinct substances, it surely makes sense for the monist to identify them as being a single substance. If one substance can do the job, then why would need to posit two? (Schaffer 2009b, 138)

¹² Is supersubstantivalism also a problem for the relationalist response? I think so, but the extent depends on whether the Cosmos is grounded in those relations obtaining between it and its regions. If it is, the problem is probably even more worrisome than it is for the adverbialist and trope theorist, because we are now saying it is grounded in its relations to its proper parts (as they will be identical to those regions). It almost seems then as if the *parts themselves* are doing some crucial work in grounding the Cosmos' qualitative nature, so this looks to be in tension with grounding's irreflexivity. If no, not so much, but it still seems problematic as the relationalist will still be invoking the Cosmos' parts in the explanans for accounting for its heterogeneity. To explain its heterogeneity, we are still invoking the Cosmos' parts (even if we are denying the Cosmos is grounded in its relation to its parts), and this still looks implausible. If we are monists, the *individual* parts of the Cosmos should not be featured in the *explanans* of its qualitative nature.

¹³ It should be noted, however, that the collective trope response outlined in footnote ten is compatible with supersubstantivalism, as it would be the *tropes collectively* which would be located at the parts. If this is so, then this view would look extremely similar to my view in that the *parts collectively* would be doing some explanatory work. Again, I don't think a strong priority monist is really going to be tempted by a such view.

then why prefer my own response to a strong priority monist who appeals to distributional properties?

Well, as I've already said, that (WPM) has a solution by default to the problem of heterogeneity while the proponent of (SPM) has appeal to a type of property which is controversial,¹⁴ so I think there is good reason to prefer the former solution to the latter. If the solution for the Cosmos' heterogeneity just comes as part of package in accepting (WPM), then we seem to get a better explanation at a cheaper ontological price. But even that aside, I actually do not think that distributional properties can account for the world's qualitative nature (at least them by themselves). In the next two sections, I'll show that only (WPM) can solve two other worries related to the general problem of heterogeneity: Ted Sider's statespace objection and the worry that priority monists cannot provide an account of intrinsic properties. Appealing to distributional properties will not help resolve these worries, and only the solution given by (WPM) can successfully solve them. Worse still, it'll actually turn out that distributional properties really aren't informative at all in explaining why the world is heterogeneous. I do not think, then, that distributional properties can plausibly account for the world's heterogeneity.

9.2. Weak Priority Monism and the statespace

9.2.1 Sider's statespace objection

According to Ted Sider (2007a, 3-4), monists cannot provide a plausible explanation for the size and structure of the statespace of the world (i.e. the set of all physical possibilities obtainable at

¹⁴ See McDaniel (2009, 323-331) and Spencer (2010, 172-175) for criticism of distributional properties. Spencer's criticism is related to Sider's statespace objection to monism, but unlike it I do not really see why Spencer's objection is problematic. Spencer holds that a certain extended simple (i.e. Statue Canton) must be able to potentially instantiate a specific number of distributional properties, yet he argues that any such number would be arbitrary. There is no explanation for why the statue could instantiate this number of distributional properties as opposed to some other. But it seems to me the proponent of distributional properties could respond to his case involving Statue Carton by saying that it can possibly instantiate an *infinite* number of distributional properties as there are an infinite variety of ways Statue Carton can be stained. This seems like a non-arbitrary answer which seems consistent with the fact Statue Carton is a statue shaped extended simple. By contrast, Sider's statespace case involves a specific finite number of properties that the world can instantiate, but that this is so is not given any kind of explanation by the monist. I do not believe these cases are really variations of the same problem.

that world). Sider asks us to imagine a world (i.e. Screenworld) which contains nothing more than a computer screen with 16 pixels arranged in a 4 x 4 grid, and that each pixel can be either on or off. Given that there are sixteen pixels each capable of two possible states, the statespace will have 2^{16} members.¹⁵ Furthermore, there are certain *natural groupings* amongst members of the statespace; for instance, the subset containing all members of the statespace in which only two pixels are lit. These members, as it were, *go together* in a way some random subset of some other members of the statespace do not. But then it needs to be asked what it is that ultimately explains the size and structure (i.e. what natural groupings are possible) if one is a metaphysical foundationalist. How does one's *fundamentalia* explain that the statespace has 2^{16} members and its natural groupings?

Sider (2007a, 3-4) argues that pluralists have a satisfying account for both the size and structure of the statespace. The pluralist can say that there are sixteen pixels, each of which have two available fundamental states, and from this the size of the statespace can be derived *combinatorially* from the pixels and what fundamental states they can be in. The pluralist can also explain why different Screenworlds with a different number of pixels, but the same available fundamental states, always have 2^n members. That the pixels have two potential states (i.e. on or off) and this explains why this *regularity* always holds amongst the Screenworlds. As for the structure, the pluralist can hold if one knows what the available states of the pixels are, one can work out what groupings of pixels go together by what pixels are lit and/or unlit. Pluralists can explain the similarity between all the members of the statespace which have only two pixels lit because they all share the property of (or are exactly similar in respect to) having only two pixels lit in common. Pluralists, then, can explain both the size and structure of the statespace.

¹⁵ Sider (2007a, 3) presumes anti-haecceitism is false here, otherwise the statespace will have fewer members than this. If anti-haecceitism is true though, this will make no real change to Sider's objection here.

Sider (2007a, 3-4) argues the monist has no such explanation available, because she cannot appeal to the individual pixels like the pluralist can. The monist holds the pixels are grounded in the entire Cosmos and thus cannot figure in their explanans for why the statespace has 2^{16} members in Screenworld. Given the pixels will be derivative entities, facts about them cannot be utilised to explain fundamental facts about the Cosmos; we cannot explain the fundamental in terms of facts about entities the fundamental is supposed to ground. Instead, they must hold the fundamental properties are the 2^{16} members of the statespace itself. But then the monist has to take it as a *brute fact* that the statespace has this number of members in Screenworld; nothing explains why the Cosmos has these 2^{16} available states. The monist too must also assume it is a brute fact that there are always 2^n members of the statespace in the Screenworlds, as they cannot appeal to the available states of each of the pixels. And nor too can the monist explain the statespace's structure, because they cannot appeal to the natural groupings amongst the pixels. They "cannot give the obvious answer, that this pattern in the natural groupings is generated by general facts about naturalness and the fact that the single-pixel states are fundamental (Sider 2007, 4)." Monists can neither give a satisfactory explanation of the size or structure of the statespace.

9.2.2 Cornell's response to Sider

David Cornell (2013a, 232-233) has argued that monists¹⁶ can give a satisfactory explanation of the statespace's size and structure. Cornell agrees with Sider that the size of the statespace should be derived by more fundamental facts about how many (fundamental) objects there are and their available fundamental states, but he holds that Sider is wrong in supposing the monist cannot do this. For Cornell, deriving how many members there of a statespace is a matter of deriving how many variables there are in a certain number series and what values they can take. The variables will correspond to the objects posited and their possible values will correspond to what possible

¹⁶ Cornell is an existence, rather than priority monist (Cornell 2013a, 230-231, fn1). But his response to Sider's statespace objection can just as easily be utilised by the priority monist. Nothing he says in explaining the statespace's size and structure precludes there being proper parts of the Cosmos.

states are available to each object. Letting n stand for the number of fundamental objects at a certain Screenworld, and x the number of properties each object can instantiate, we can derive the size of the statespace of any Screenworld with the following formula:

STATESPACE SIZE = x^n (Cornell 2013a, 233)

Cornell holds that this formula vindicates Sider's claim that the statespace's size is derived from facts about how many objects there are and their potential fundamental states. The pluralist will of course state that there are sixteen variables and two possible values they can take, as they hold there are sixteen objects and that each of them have two available fundamental states. The pluralist's statespace size is thus 2^{16} . But Cornell claims that the monist can just as easily make use of this formula to derive the statespace's size. The monist will state that there is one variable (the Cosmos, so $n = 1$) and that it has the 2^{16} possible values it can take (the 2^{16} fundamental states it can be in, so $x = 2^{16}$). Using the above formula, the size of the monist's statespace in Screenworld is:

Monistic Statespace: $(2^{16})^1 = 2^{16}$

There is a suspicion here that Cornell has cheated; that he has provided no actual explanation for why the Cosmos can inhabit these 2^{16} fundamental states. That taking the statespace as having 2^{16} members as a brute fact is *precisely what the problem is* and stating that the Cosmos has 2^{16} potential fundamental states has merely shifted the explanatory problem that has still yet to be explained (i.e. why there are 2^{16} members of the statespace). But Cornell holds that the Cosmos' potential states requires no more an explanation than the fact pluralists posit that there are sixteen pixels which can each inhabit two potential states. This is just as much a brute fact, which has no more an informative explanation than the monist's postulation that the Cosmos has 2^{16} potential states. Both pluralists and monists need some collection of brute facts from which to generate facts about the statespace. For pluralists, this will be that there are sixteen pixels which can inhabit two potential states; while for the monist, this will be that the Cosmos can inhabit 2^{16} potential

states. Instead, “[w]hat is important ... is that when these brute values are inputted into the appropriate formula, the right result is obtained. What I have shown is that with either stock of brute facts ... the right result is arrived at in both cases. So in terms of explanatory power alone, neither view can claim to be superior (Cornell 2013a, 233).”

As for the statespace’s structure, Cornell (2013a, 235-236) argues that the natural groupings of the statespace can be accounted by the monist via global distributional properties. Suppose that in the Screenworld one pixel is lit. Then the monist can say that the Cosmos instantiates a distributional property that describes that pixel being lit. But such distributional properties will themselves have their own features; they will possess *higher-order properties*. So, imagine that world in which one pixel is lit. We can say of that distributional property it distributes *off-ness* more than *on-ness*; that it has a distribution ratio of 15:1 of *off-ness* to *on-ness*. The monist can then account for the fact there is a natural grouping amongst members of the statespace which have one pixel lit, by supposing that they instantiate distributional properties which are all of this 15:1 ratio. And the same move can be used for any other natural grouping of the statespace’s members. Hence, Cornell claims that the monist can account for these natural groupings via its fundamental properties. The fundamental distributional properties it can potentially instantiate, themselves instantiate higher order properties specifying their distribution ratios. In which case, it seems a strong priority monist can overcome Sider’s statespace objection by positing distributional properties. The size and structure of the statespace will resultantly be explained.

9.2.3 Reply to Cornell

I’m willing to grant Cornell that his response to the worry about the statespace’s structure is successful. That the natural groupings amongst the statespace can be explained by higher order properties instantiated by the Cosmos’ distributional properties. But I do not think he has provided a satisfactory explanation for the statespace’s size. Recall, Cornell holds that we do not need to provide an explanation for the fact that the Cosmos has 2^{16} available fundamental states it can be

in. These states, of course, he will take to be distributional properties. What he argues is that we should take it as a brute fact that the Cosmos has 2^{16} distributional properties it can instantiate in Screenworld; and this is not problematic, as the pluralist's positing sixteen pixels which can inhabit two potential states is just as brute an explanation. As long as we can derive the statespace's size from the available states of one's *fundamentalia*, we have a satisfactory explanation for its size and do not need to explain why it is there are an n number of *fundamentalia* and/or why they have so many available states.

Now, I agree with Cornell that all explanation has to stop somewhere and that we do not have to explain why the *fundamentalia* exist to explain why the statespace has a certain size. But I do think one has to give a plausible account of how the statespace *supervenes* on the *intrinsic nature* of one's *fundamentalia*, and Cornell has not done this. This is because it is not just that the statespace's size which requires explaining, but the fact there seems *something about the intrinsic nature* of Screenworld's statespace such that it *explains* what its size actually is. The pluralist's answer is of course is that Screenworld consists of sixteen pixels which have two available potential states; from this we can combinatorially derive that the statespace has 2^{16} members. It is *part of the intrinsic nature* of Screenworld that it *has these parts which have these available states*. But what about the monist? Cornell will hold that is the fact that the Cosmos has 2^{16} fundamental distributional properties it can instantiate, but this is just no answer. It might well be part of the Cosmos' intrinsic nature that it is capable of instantiating this delineation of properties, but that it is capable of doing so seems to be in-virtue-of more fundamental facts *about what the Cosmos is like*. That the Cosmos can instantiate this range of distributional properties is no coincidence, and it seems to be that holds in-virtue-of intrinsic properties which are *actually possessed* by it (and not merely capable of being had). What properties the Cosmos the ultimately has might well be a brute fact, but it really seems what delineation of properties it is capable of possessing *should not be a brute fact*.

To be clear here, my criticism here is not that (non-uniform) distributional properties must be reducible or analysable in terms of properties which are uniform in nature. I am not saying, for instance, that the distributional property ‘being polka-dotted’ must be reducible to a collection of uniform properties about each dot. I am not suggesting that the *actual* instantiation of a distributional property needs to be accounted for by the actual instantiation of non-distributional properties. My concern here does not rule out there being distributional properties which are irreducible in the sense espoused by Parsons (2004). My concern is that the potential instantiation of distributional properties requires some kind of metaphysical ground in *properties which actually exist*. Take the property of “being a builder”,¹⁷ for example. It seems I could have instantiated this property, even though I have and probably never will be a builder. The reason that I could have instantiated this property is because I have the *relevant intrinsic properties* such that I could have been a builder.¹⁸ These will presumably involve properties involving the fact I am human, that I have a certain height, that I am strong enough to be a builder and so on. If we are modal realists, that I could have instantiated this property will be of course accounted for by the fact I or some counterpart of me is a builder in some other possible world. But what determines whether I am the builder or a counterpart of him are the intrinsic properties that we both have, so even the modal realist would surely affirm that my possible instantiation of the property “being a builder” is at least in part accounted for by my actual intrinsic properties.

Alternatively, consider David Armstrong’s (2004, 2-3) criticism of Ryle’s behaviouristic account of the mind. On Ryle’s account, mental states are defined in terms of dispositions an agent has. For instance, me being in pain after placing my hand on a hot stove might involve me being disposed to yelp and pull my hand away sharply from the stove. Mental states are characterised by what an agent is disposed to do when the disposition is manifested. Armstrong asks what is the *truthmaker* for such dispositions: what entities in the world make it true that I am disposed to yelp and pull

¹⁷ I am supposing properties are abundant as opposed to sparse for the purpose of this example.

¹⁸ I assume a haecceitist will bring the fact I have a particularly haecceity into the story.

my hand away sharply when I place it on a hot stove? On Ryle's account there is no answer; it is just a *brute fact* that an agent is disposed to behave in such and such a way. Armstrong thus maintains Ryle's account should be rejected, and that there had to be some *inner* mental states these dispositions obtained in-virtue-of. Otherwise, it might well be possible that two intrinsic duplicates could have different dispositions, if dispositions do not supervene on the intrinsic nature of the things they belong to. And a possible world featuring such a scenario seems totally bizarre. Similarly, we then should also be concerned about brutally positing that objects can instantiate a certain delineation of properties. That an object can instantiate a certain range of properties needs a truthmaker in terms of properties it actually possesses.

I think this is then what the statespace objection amounts to. To say that an object x can instantiate a certain delineation of properties requires an *ontological ground* or *truthmaker*. Pluralists can provide such a truthmaker in terms of the sixteen pixels and their available states; it is that the world has this intrinsic nature that makes it true it can instantiate 2^{16} properties (each of which are about a member of the statespace). The monist, however, in holding that the world can instantiate 2^{16} fundamental distributional properties has merely *just restated* that the world has 2^{16} properties it can instantiate about the statespace and provided no truthmaker for this being so. So, fundamental distributional properties by themselves cannot explain the size of the statespace in Screenworld. Some other property or properties are required to explain why the Cosmos can instantiate 2^{16} properties in Screenworld. There is, however, an obvious property which the monist might try and avail themselves to solve this problem. They might suppose that the Cosmos is *disposed* to have 2^{16} *fundamental* distributional properties about the statespace. That is, the Cosmos has some fundamental *dispositional* property which explains why it can instantiate this delineation of properties.

I must admit, I think this proposal actually looks fairly promising at first. If one is a dispositional monist, then one will hold that all fundamental properties of the *fundamentalia* are dispositional.

That an electron has the property of ‘being negatively charged’ is the disposition to behave a certain way in an electrostatic field, such that it repels other particles which are negatively charged and attracts those which have a positive charge according to Coulomb’s Law. To be negatively charged *just is* to be disposed this way. Similarly, if one is a dispositional monist who favours priority monism, one will hold that all the fundamental properties of the Cosmos are dispositional. Such a dispositionalist could hold that the Cosmos instantiating a certain distribution property about which statespace member is instantiated is the manifestation of a *multi-track disposition*¹⁹ that the Cosmos has 2¹⁶ distributional properties it can instantiate in Screenworld. The possession of such an intrinsic disposition would provide the ontological ground for the Cosmos’ statespace size; it would mean the delineation of possible properties the Cosmos could instantiate would not be a brute fact.

There are, however, worries this solution might face. It will not be satisfactory for those who are categorical monists (i.e. those who hold that all properties are categorical in nature), and it actually might require there to be platonic universals depending on one’s views about multi-track dispositions.²⁰ Platonism is a controversial thesis and being committed to it puts one in tension with the Things-First thesis (that particulars and not properties are fundamental). The main worry is whether a disposition such as ‘being disposed to have a certain range of distributional properties’ is an informative enough property to be a fundamental disposition. To be a genuine disposition it seems that disposition needs to be informative in some way; the possession of such a property should increase our understanding of the phenomenon the property has been postulated to explain. Suppose a vase is dropped and smashes. Being told that the vase has a certain molecular

¹⁹ If, like Bird (2007, 21-24), we think that multi-track dispositions are not fundamental, then we can hold that this disposition is a disjunctive disposition which is grounded in multiple single-track dispositions (one for each member of the statespace).

²⁰ Suppose we hold that multi-track dispositions are grounded in single-track dispositions and that the Cosmos only ever manifests one of these dispositions. Given that the identity of dispositions is determined in part by it being directed towards a certain manifestation, that implies these other dispositions require uninstantiated manifestation properties to account for their identity. Hence the Cosmos would need *platonic dispositions* (Tugby 2013) to account for the statespace’s size.

structure such that it is fragile provides an informative explanation of why the vase smashed. If all vases with this molecular structure are disposed to break when enough stress is exerted on them, we can see why it is the vase smashed. In contrast to this, consider the infamous disposition ‘virtus dormitiva’: the dispositional property which disposes someone to fall asleep (Mackie 1977, 367-368). Suppose someone ingests a drug and falls asleep. If we are told they fell asleep because the drug contained the dormitive virtue, this does not seem a very informative explanation; we want to know what it is about the intrinsic nature of the drug which puts people to sleep.

The disposition ‘being disposed to have a certain range of distributional properties’ seems to be of the latter sort; it does not tell us anything new about the fact that the Cosmos can instantiate a certain range of distributional properties. It seems like, again, we are just *restating* that the Cosmos has this certain range (i.e. 2^{16}). The truthmaker being posited here is *ad hoc* and uninformative, which does not provide a good explanation for why it can instantiate this delineation of properties. Such a disposition then looks a lot like the dispositions Ryle utilised in his behaviouristic account of the mind; their postulation needs to be accounted by some properties which are more fundamental. But in the case of the Cosmos, it is impossible to imagine what fundamental properties (whether categorical or dispositional) could underwrite that the Cosmos is disposed to have this particular delineation of properties.

I conclude then that Cornell’s response to the statespace objection is unsuccessful. Distributional properties can explain the structure of the statespace, but the postulation of the potential instantiation of such properties needs an explanation in properties the Cosmos actually has. And given that the monist cannot appeal to dispositional properties to account for this in an informative way, it seems impossible to imagine what categorical properties could ground the potential instantiation of the Cosmos’ 2^{16} distributional properties. But even if Cornell’s contention that the monist can indeed provide satisfactory explanation of the statespace size were correct, it should be noted that he has not explained why there are always 2^n members of the statespace in worlds

with a different number of pixels. Recall that earlier on in this section, Sider questioned whether the monist could give an explanation for the regularity that there are always 2^n members of the statespace in the different Screenworlds, and Cornell's solution still provides no explanation for this. In stating that there are 2^{16} fundamental properties the Cosmos can instantiate, one has still not explained the *regularity* of those properties always being 2^n in different Screenworlds. They cannot give the easy obvious answer that this is because *there are two states the pixels can take*. As a result, I do not think that a strong priority monist has a plausible explanation for the size of Screenworld's statespace if they appeal to distributional properties.

9.2.4 Weak Priority Monism and the statespace

In explaining the size of the statespace I think the weak priority monist has a decisive advantage over the strong priority monist. For unlike the strong priority monist, the weak priority monist can appeal to the pixels of Screenworld and their available states because she will hold that the Cosmos is *identical to those pixels*. The Cosmos is both one object and many objects according to (WPM), and under the sortal 'pixels' it is sixteen things in number in Screenworld.²¹ The statespace also always has 2^n fundamental properties it can instantiate because the pixels the Cosmos is identical to have two available states. And because the Cosmos is identical to the pixels that compose it, we can account for the natural groupings amongst the statespace's members by appealing to which pixels are on and off. The reason the weak priority monist can overcome this objection is because their conception of what the Cosmos is allows them to appeal to its parts in explaining the statespace's size and structure. The Cosmos is the collective plurality of all its parts, so if its parts can inhabit 2^{16} states then so can the Cosmos. But given that the Cosmos is not distributively identical to its proper parts, the weak priority monist is not forced into holding that *each* part is

²¹ I remind the reader of my discussion on the Cosmos' cardinality in chapter seven, as well as my discussion of (CAI) and counting in chapter six. I have argued that we cannot count things simpliciter but only relative to a concept or sortal, though it might be *more natural* to count by certain sortals than others. In the case of the Cosmos I think it is more natural to count it as being a single a thing rather the many things it is identical with, but it nevertheless is still those many things. It is true to say then that in Screenworld the Cosmos is/are *sixteen pixels* when we count by the sortal 'pixels'.

part of the explanans for the Cosmos' size and structure in Screenworld. The parts *collectively*, but not individually, provide an explanation for the statespace's size and structure. But in holding that the Cosmos is 'something over and above' its parts, the strong priority monist cannot do this. If the world is identical collectively to the pixels, we have a simple solution to Sider's statespace objection.

I do, however, think that the strong priority monist can offer a response to the statespace objection. Namely, they could hold that what accounts for the statespace's size and structure are two kinds of tropes (i.e. the on tropes and the off tropes) which are instantiated at the same spatiotemporal locations as the pixels (McDaniel 2009, 331). But as we have already seen, the trope response very much is a problematic solution. Holding that the Cosmos' qualitative nature is grounded in its individual tropes seems to be very much against the spirit of monism and is contrary to the Things-First thesis which I've assumed to be true in this dissertation. Given this, I hold that by far best the response to the statespace objection is that of the weak priority monist's. The Cosmos has the properties about the statespace that it has because it is identical to those pixels which have available two fundamental states (i.e. being on or off).²²

9.3. Weak Priority Monism and intrinsic properties

9.3.1 Monism and Lewis' (and Langton's) accounts of intrinsicity

Another worry for monism that involves heterogeneity, is that monists cannot give an account of what it is to be an intrinsic property; at least, they cannot give one which is compatible with sub-cosmic objects having intrinsic properties. Sider (2007a, 5-6) has pointed out that monists cannot make use of David Lewis' (1983; 1986, 61-62) account of intrinsic properties, which Lewis

²² Sider (2007a, 4-5) also has a second objection involving the statespace, in which he tries to show that monism is incompatible with certain possibilities which would be accepted by a haecceitist. Consider a two-pixel world, where each pixel (i.e. A and B) can be on or off. It seems like there are four members of the statespace here (i.e. both-on, both-off, A-on/B-off, and A-off/B-on), but according to Sider the monist can only recognise three (i.e. both-on, both-off, and one-on-one-off). This is because he claims that fundamental properties of the Cosmos must be purely qualitative and cannot refer to which pixels are on or off. But if we accept (WPM), then we can refer to the pixels because the Cosmos is *identical to those pixels*. So, I think the weak priority monist can avoid this problem easily.

formulates in terms of duplication. Lewis defines an intrinsic property as a property which can never differ between duplicates, where two objects are duplicates “iff (1) they have exactly the same natural properties, and (2) their parts can be put into correspondence in such a way that the corresponding parts have exactly the same perfectly natural properties, and stand in the same perfectly natural relations (1986, 61).” Sider argues that a definition along these lines²³ is the most promising way of defining what an intrinsic property is but is unable to be used by the monist. Given that the perfectly natural properties are just those which are fundamental, the monist will hold that the only object which instantiates such properties is the Cosmos. But if no sub-cosmic objects instantiate perfectly natural properties, then one cannot formulate intrinsic properties as those that never differ between duplicates because Lewis’ account of duplication is formulated on the basis of properties they cannot instantiate. Monism is, therefore, incompatible with Lewis’ account of intrinsicity.

Lewis, though, goes on to offer another account of intrinsicity with Rae Langton (1998), which doesn’t require positing perfectly natural properties. On this account, what it is to be an intrinsic property generally involves being *independent of accompaniment*. A property *P* being independent of accompaniment if it can be possessed or lacked by an accompanied or lonely individual. An accompanied individual is one which co-exists with some contingent individual which it is wholly distinct from and a lonely individual is one which is not accompanied. A property *P* is independent of accompaniment, then, iff these situations are possible for it; a lonely individual has *P*; a lonely individual lacks *P*; an accompanied individual has *P*; and accompanied individual lacks *P*. The idea is that being an intrinsic property has something to do with its possession by an object being independent of other *wholly distinct* things (i.e. things which share no proper parts); an intrinsic property can be had both accompanied and lonely individuals, and that property being possessed should not be dependent on its possessor being either accompanied or lonely. The

²³ See Sider (1996).

notion of independence of accompaniment seems to account for our intuitive notion about what intrinsic properties are.

However, there seem to be some non-intrinsic properties which seem independent of accompaniment and might be therefore misclassified as intrinsic on this account. Consider the disjunctive property 'being a lonely football or being an accompanied football'. It seems this property is compossible with it being had or lacked by an accompanied or lonely individual, but really does not seem to be an intrinsic property at all. Langton and Lewis therefore adjust their account to rule out such properties being counted as intrinsic, defining a *basic intrinsic property* as:

Basic Intrinsic Property: *P* is a basic intrinsic property iff (i) it is independent of accompaniment, and (ii) not a disjunctive property or a negation of a disjunctive property (Langton & Lewis 1998, 336).

The basic intrinsic properties are not all the intrinsic properties however, and there can be conjunctive or disjunctive properties which are intrinsic; these, however, will be need to definable via the basic intrinsic properties and truth-functional compounds of them. As a result, it might seem we have an account of intrinsic properties which is compatible with monism. After all, the Langton-Lewis account makes no reference to perfectly natural properties, and it was these properties which meant the monist couldn't give an account of intrinsic properties on Lewis' original account. The monist then might have an account of instrinsicality which is compatible with their view.

Unfortunately, Kelly Trogdon (2009, 131-136) has argued (successfully, in my opinion) that the Langton-Lewis account is not actually compatible with Priority Monism after all. Suppose the Cosmos instantiates some global distributional property, *D*. Trogdon argues that there is good reason to think that not only is *D* an intrinsic property, but that it is *essentially* fundamental; that it is metaphysically impossible for *D* to be instantiated in-virtue-of any other properties had by the

Cosmos if it is fundamental. If all this is true,²⁴ then if *D* is an intrinsic property it needs to be independent of accompaniment on the Langton-Lewis account. But is it? If our world instantiates *D*, then this property can be had by a lonely individual (i.e. because there is *no other object that is wholly distinct* from the Cosmos); and it seems too as if the world could (or some counterpart of it) could have had a different distributional property, so *D* can also be lacked by a lonely individual. And given all the proper parts of the Cosmos lack *D*, it obviously can be lacked by an accompanied individual. But given that *D* is an essentially fundamental property, it can never be possessed by any of the proper parts of the Cosmos and therefore cannot be had by an accompanied individual. If this is so, then *D* gets classified as being an extrinsic property, which goes against our original supposition that it is an intrinsic property. Trogdon thus concludes that the Langton-Lewis account is actually incompatible with monism after all.

9.3.2. *The In-virtue and Intra-virtue accounts of intrinsicity*

Trogdon does think an account of intrinsicity can be developed which is compatible with both monism and pluralism, though. This account (based off one developed by Witmer, Butchard and Trogdon (2005)), the *in-virtue-of* account, can be stipulated as follows:

Intrinsic Fashion: *x* has *P* in the intrinsic fashion just in case (i) *P* is independent of accompaniment, and (ii) for any individual *y* and property *Q*, if *x* has *P* in-virtue-of *y*'s having *Q*, then *Q* is either fundamental or independent of accompaniment.

Intrinsicity: Property *P* is intrinsic just in case *P* is fundamental or, for a possible individual *x*, if *x* has *P*, *x* has *P* in an intrinsic fashion (Trogdon 2009, 139-140).

²⁴ See Trogdon (2009, 132-135) for a defence of these two claims about *D*. In particular, some philosophers might be sceptical as to whether all fundamental properties are intrinsic, but Trogdon argues that fundamental properties must be so because fundamental properties don't obtain in-virtue-of anything else; if fundamental properties aren't instantiated in-virtue-of other properties, their instantiation does not depend on the instantiation of other properties of wholly distinct objects. Of course, for Trogdon's objection to work here, he only needs it for *D* to plausibly be intrinsic rather than any epistemically possible fundamental property being intrinsic.

The idea here is that intrinsic properties only have to be independent of accompaniment when possessed by *derivative entities*, and thus fundamental properties get clarified as being intrinsic even if they could not be had by accompanied individuals if monism is true. Even though *D* could not be had by an accompanied individual, *D* still seems to be an intrinsic property if the Cosmos is the fundamental entity; *D*'s possession depends on the Cosmos alone and not on any of its proper parts, and therefore should plausibly be counted as being intrinsic because its instantiation does not obtain in-virtue-of any other object instantiating some other property.²⁵ The in-virtue-of account then correctly identifies *D* as being an intrinsic property. It also gets the right judgements on what properties we think should be classified as non-intrinsic. Consider again the disjunctive property 'being a lonely football or being an accompanied football'. The property is independent of accompaniment, but might be grounded in an object having the property 'being a lonely football', which is not. To me this seems like an extremely promising account of intrinsic properties, in that (i) it delivers the right results on what properties we judge to be intrinsic and extrinsic, and (ii) that what properties are intrinsic are ultimately grounded in the fundamental properties. In terms of the latter point, it does seem true that what intrinsic properties are is determined not only by them being independent of accompaniment, but also by what properties are instantiated by the *fundamentalia*. The property of me 'being human' should be independent of any wholly distinct object in it being classified intrinsic, but its being intrinsic is also determined by the nature of the Cosmos and its properties, which it is ultimately grounded in. I therefore hold that we have strong reason to adopt the in-virtue-of account.

Unfortunately, Trogon does not think monists can accept the in-virtue-of account because they do not have a satisfactory answer to what he calls the *origins of non-intrinsic properties question* (Trogon 2009, 140-141). The monist, Trogon claims, does not have a straightforward

²⁵ Again, as noted in footnote 24, this is claim which some might be sceptical, but it certainly looks plausible. Fundamental properties shouldn't depend on whether any other properties exist given they don't obtain in-virtue of any other properties. If a property obtains in-virtue-of another property, then it doesn't seem to be fundamental.

explanation for why there are extrinsic properties in the world. In holding that the Cosmos instantiates a single distributional property, *D*, it is not clear that she can explain how a variety of extrinsic properties all originate from the instantiation of such a maximal property. By contrast, the pluralist has an illuminating answer in that she can say that extrinsic properties obtain in-virtue-of “various combinations of intrinsic properties instantiated at the fundamental level of reality (Trogon 2009, 140).” Extrinsic properties exist because they are generated combinations of the intrinsic ones. But the monist cannot tell such a story, since she cannot appeal to derivative entities (i.e. the proper parts) in explaining how it is the world has extrinsic properties. She can only tell a story involving the entire Cosmos, and it is just not very clear how such properties could all come from a single object. The existence of extrinsic properties for her would seem to be a *brute fact*. While the in-virtue-of account is compatible with monism, then, it is not an account that Trogon thinks the monist should accept.

At this point I think it's worth considering why Trogon thinks the Cosmos must instantiate only a single fundamental property. Trogon argues the monist should not utilise the in-virtue-of account because it seems hard to explain the existence of all the extrinsic properties can obtain in-virtue-of a single maximal property. But why think the Cosmos can only instantiate a single distributional property? Trogon just assumes that it does and does not consider that perhaps it instead instantiates multiple distributional properties, adverbial properties, relational properties, or tropes. If the Cosmos instantiated such properties rather than *D*, the monist might be able to utilise the in-virtue-of account. Consider the trope view, for example. If the Cosmos instantiates tropes at all its various spatiotemporal regions, then we could explain the extrinsic properties of sub-cosmic objects combinatorially from the tropes the Cosmos instantiates it. A similar story, it seems, could also be told by the proponent of adverbial properties.²⁶ My assumption is that

²⁶ It might however be that the relational view has problems with explaining the *monadic* intrinsic properties of sub-cosmic objects in terms of *relations*. That I am human is a property which should not be ultimately grounded in a relational property which holds between the Cosmos and my spatiotemporal region. Spatiotemporal relations, after all, are often considered archetypical external relations; it may seem strange to explain the intrinsic properties of things

Trogon very probably has the same worry about these views as I do; that they go against the spirit of monism in that we are explaining the nature of one thing in terms of *many individual things*. In explaining the qualitative nature of the world, the (strong) priority monist should utilise a single, global distributional property. But, as we've seen, the positing of such a property is not informative in answering the origins of non-intrinsic properties question. Thus, the monist cannot make use of the in-virtue-of account.

Trogon, therefore, argues that the monist should accept what he calls the *intra-virtue* account of intrinsic properties. On this account, some property of an object being intrinsic can still be *grounded* in objects instantiating other intrinsic properties; but if this is so, then their being intrinsic will only be grounded by properties which are instantiated at the *same mereological level*. Consider the determinate-determinable relation, for example, and suppose that some ball is scarlet. That the ball is red is grounded in its being scarlet, but the grounding relation does not obtain between properties which are instantiated on different mereological levels (i.e. this is not an *inter-virtue-of* relation). Rather, given that the properties are instantiated by the same object, the grounding relation obtains between properties which occupy the same mereological level. The ball is red *intra-virtue-of* the ball being scarlet.²⁷ Having thusly elucidated this variety of grounding relation, Trogon proposes the following amendment to the 'Intrinsic Fashion' condition:

Intrinsic Fashion: x has P in an intrinsic fashion just in case (i) P is independent of accompaniment, and (ii) for any individual y and property Q , if x has P **intra-virtue-of** y 's having Q , then Q is either fundamental or independent of accompaniment (Trogon 2009, 143).

(especially monadic properties) in terms of such relations, even if they are internal ones in the case of the Cosmos and its spatiotemporal regions.

²⁷ Another example Trogon (2009, 143) considers is Shoemaker-style functionalism. Here some mental property M (where M is a property which is realized by a property playing some causal role R) will be instantiated intra-virtue-of some property P (whose instances play the causal role R) but will be instantiated inter-virtue of whatever the fundamentalia's properties are. That P realizes M is an example of an intra-virtue-of grounding relation, as this relation occurs between things on the same mereological level.

Trogon claims the intra-virtue account not only delivers the right results on what intuitively consider to be intrinsic and non-intrinsic properties, but also provides an answer to the origins of non-intrinsic properties question which can be utilised by both monists and pluralists. The extrinsic properties that objects have are grounded by the intrinsic properties of objects which are on the *same mereological level*. Given that it is objects on the same mereological level as me which determine what intrinsic properties I have, it also makes sense that the extrinsic properties I have are determined by such objects.^{28,29} Trogon therefore advocates that priority monists should utilise the intra-virtue account of intrinsicity.

9.3.3. *Against the Intra-virtue account; for (WPM) and the In-virtue-of account*

I do not think, however, that the intra-virtue account is plausible at all, for precisely the same sort of reasons that Trogon rejects the in-virtue-of account for. Now, Trogon holds that both monists should be able to explain the origin of non-intrinsic properties, and that the explanation of this origin is going to involve them being grounded in intrinsic properties. But then question arises as to what *ultimately* explains why the *intrinsic properties* of derivative entities are intrinsic. As a metaphysical foundationalist, this question needs an answer, and the answer to me seems obvious. The intrinsic properties of the fundamental objects determine what intrinsic properties the derivative objects possess. That my humanity is an intrinsic property of mine should not be determined by the properties of objects which are wholly distinct from me (given that it is an intrinsic property), *but it should be determined* by those things which I am ultimately grounded in. The fundamental entities are supposed to be the ‘ground of all being’ and from which all

²⁸ What determines whether two objects are on the same mereological level? Trogon (2009, 142) doesn’t consider this in much detail, though puts forward the idea that things are on the same mereological level if they are composed out of the same number of mereological simples. This of course assumes the number of mereological simples each thing has is finite number and that there even are such simples in the world, which are two quite huge assumptions. I’m not going to press this too much, however, though if it is impossible to give a precise characterisation of being on the same mereological level this might be a serious worry for the intra-virtue-of account.

²⁹ Trogon (2009, 145) does not offer much explanation for what this answer to the non-intrinsic properties question exactly is, but I assume that it’s going to be that they originate from various combinations of intrinsic properties *at the same mereological level*. Given Trogon thought the explanation offered by the pluralist (in the case of the in-virtue-of account) was a good one, it’s highly plausible to read him here as offering the same explanation for non-intrinsic properties in terms of intrinsic properties on the same mereological level.

metaphysical explanation ultimately derives from; so what intrinsic properties I have should surely be determined by those fundamental entities I exist *inter-virtue-of*. One reason the in-virtue-of account looked very appealing is because according to it what intrinsic properties in the world are is ultimately determined by the intrinsic properties of its *fundamentalia*. This is also why I think Lewis' initial account is appealing. My intrinsic properties are ultimately determined by what the perfectly natural (i.e. fundamental) properties are. If we are metaphysical foundationalists, then any account of intrinsicity we give should be at least compatible with the notion that the intrinsic properties of derivative entities can ultimately be explained by those of the fundamental entities.³⁰ Such accounts then need provide an answer to, what I call, the *origins of intrinsic properties question*.

The problem for the intra-virtue account is that what determines that intrinsic properties of derivative entities are intrinsic has *nothing to do with* the fundamental entities. That I am human is an intrinsic property I possess in-virtue-of intrinsic properties at the same mereological level and nothing to do with the intrinsic properties of the fundamental entities. But this just looks wrong. Surely that I am human is an intrinsic property is determined by what the *fundamentalia* are. The intra-virtue account basically doesn't give an answer to the origins of intrinsic properties question at all, but anyone who takes fundamentality *seriously* surely needs to give an answer to this question. Those of who us favour metaphysical foundationalism need to be able to explain the intrinsic nature of the derivative entities in terms of the intrinsic properties and relations of the *fundamentalia*. To be a foundationalist, after all, is to hold that necessarily everything must be ultimately explained by facts about the fundamental entities.

Resultantly, I'm not even sure the intra-virtue account does give a monist an answer to the origins of non-intrinsic properties question, after all. Even if we can explain how extrinsic properties on

³⁰ So, while then Langton-Lewis account doesn't invoke perfectly natural properties, it is at least compatible with the notion that all intrinsic properties are ultimately explained in them (see Langton & Lewis (1998, 344)).

a certain mereological level originate from intrinsic properties of objects on the *same level*, given the transitivity of grounding, one's explanation here is going to depend on explaining where the intrinsic properties on that level *ultimately originate from* (i.e. the origin of intrinsic properties question). Assume the property of me being the tallest person in the room (i.e. an extrinsic property) obtains partly in-virtue-of my height (i.e. an intrinsic property). Given any plausible answer to the origins of intrinsic properties question will reference the *fundamentalia*, my height being an intrinsic property will be ultimately determined by (presuming Priority Monism is true) *D*, the distributional property instantiated by the Cosmos. But then the problem of explaining the existence of extrinsic properties in terms of this single maximal property returns. One cannot give an account of the origin extrinsic properties if one cannot give an account of the origin of intrinsic properties, for any explanation of the extrinsic properties will hinge on whether there is an explanation of the intrinsic properties from which the former are explained.

I think there are two lessons to be learned from this. Firstly, the intra-virtue account of intrinsic properties does not give the monist an answer to the origins of non-intrinsic properties question; rather, it is an *evasion* of giving any answer at all. If we are going to explain the origin of both extrinsic and intrinsic properties, then any satisfactory explanation is going to mention the properties of the fundamental entities. The fundamental entities are surely the origin of all properties of the derivative entities, given that they are supposed to be the 'ground of all being' and what everything else obtains in-virtue-of. And both monists and pluralists need to provide satisfactory answers to these questions *regardless of what account of intrinsicity they accept*. One must explain how it is that one's *fundamentalia* can determine the existence of both the intrinsic and extrinsic properties in the world.

Which leads to the second lesson; a single distributional property cannot provide an explanation for the existence of intrinsic and extrinsic properties. Monists who posit such a property to explain the world's heterogeneity cannot give a combinatorial explanation for the existence of such

properties via a single distributional property. I grant that it can explain why the world isn't some homogenous lump, but it does not provide any explanation at all for why there are intrinsic or extrinsic properties. That there are such properties then will just have to be taken as a brute fact by the strong priority monist, which puts them at a clear disadvantage to the pluralist in explaining the world's heterogeneity. Now, once again, let me be clear in stating I am not saying that distributional properties are metaphysically impossible. Maybe there can be qualitatively heterogeneous simples, whose instantiation of distributional properties explains why they are qualitatively heterogeneous.³¹ And if the world is gunky, then it is possible it will contain properties that cannot be reduced to a non-distributional property.³² What I am objecting to is that a single global distributional property can explain all the qualitative facts about the world, which include facts about properties are either intrinsic or extrinsic. It cannot, and it is because of this why (SPM) has a problem with giving an account of intrinsicity. One cannot provide a satisfactory explanation for the existence of intrinsic properties if one is a strong priority monist.

But a weak priority monist can. According to (WPM), the Cosmos is identical to the plurality of all its parts, and it is because it is this plurality that it is capable of explaining why objects within it instantiate both intrinsic and extrinsic properties. The Cosmos is the collective plurality of all its parts, and what objects there are in that plurality determine what intrinsic and extrinsic properties each of those objects possess. The collective plurality of all the objects determines what properties *each* of those things has and whether they are either intrinsic or extrinsic. Specify what the plurality contains, and it just follows that each object will have certain intrinsic and extrinsic properties. What is doing the explanatory work here is not each object and its properties, but all of the objects in the plurality *taken together*. Given the Cosmos *is* such a plurality (as well as being a concrete object), not only does the weak priority monist have an explanation of the existence of the world's

³¹ Recall footnote 14, where I argued the proponent of distributional properties can provide a non-arbitrary answer to how many distributional properties Statue Canton can instantiate. A big difference between this and the Cosmos, though, is the latter has proper parts, and that these parts have intrinsic and extrinsic properties which need explaining.

³² See Parsons (2004).

intrinsic and extrinsic properties, but this explanation is compatible with the in-virtue-of account. Weak Priority Monism is therefore compatible with the in-virtue-of account of intrinsic properties (i.e. that intrinsic properties obtain in-virtue-of either fundamental objects or objects which are independent of accompaniment); which as I've noted, seems like a very desirable account of intrinsicality.

9.4. Conclusion

In this chapter, I have argued that (WPM) has another decisive advantage over (SPM) in that it can give a much better explanation of the world's heterogeneity. If one is a strong priority monist, one must appeal to the existence of a variety of controversial properties to account for why the world is not some homogeneous lump. The problem with most of these solutions is that they are not in the spirit of monism and might even be incompatible with certain views about the nature of space-time. The most promising solution to the problem of heterogeneity that could be utilised by the strong priority monist was by appealing to distributional properties; properties which specify the complete qualitative nature of objects which instantiate them. Positing that the world instantiates such a property is consistent with the spirit of monism and is compatible with whatever view we might have about space-time. However, distributional properties are unable to help monists explain the size of the statespace in Screenworld and cannot provide an account of intrinsic properties. Indeed, the failure of the latter is actually due to the fact they cannot provide a plausible account of the origins of intrinsic and extrinsic properties. Resultantly, (SPM) cannot provide a plausible account of the world's heterogeneity.

But as we have seen, (WPM) can. In accepting (WPM), one has an explanation of the world's heterogeneity by default: the world is heterogeneous because it is *many things* as well as being one thing. The Cosmos is identical to the plurality of all its parts taken collectively, and it is because it is this plurality which accounts for its qualitative variation. Furthermore, (WPM) has an explanation of the structure of the statespace in Screenworld, and provides an account of intrinsic

and extrinsic properties which is compatible with the in-virtue-of account of intrinsicality. I conclude therefore, that Weak Priority Monism has a strong explanation for the world's qualitative variation, while Strong Priority Monism does not.

Conclusion

In this PhD dissertation, I have defended the position that the Cosmos is fundamental and is identical to the collective plurality of its proper parts: a position I denoted ‘Weak Priority Monism’ (WPM). The Cosmos is the plurality of its proper parts as well as being a concrete object, and each proper part is grounded in this collective plurality it is among. This does not involve a violation of grounding’s irreflexivity, however, because some things collectively grounding some thing, does not entail that *each* of those things is a partial ground for the grounded entity. Not only then is (WPM) a coherent position, but it can utilise any argument (i.e. gunk, emergence etc...) in favour of ‘Strong Priority Monism’ (SPM), while having two decisive advantages over it. The first of these being that it has a solution to the problem of weak junk: some x being weak junky iff every proper part of x is a proper part of another part of x (which is at least twice the size of the original proper part). In weak junky worlds there will be infinitely ascending chains of parthood, but it will still be the case that every proper part in such worlds will be grounded in the (infinitely extended) Cosmos; for according to (WPM), the Cosmos will immediately ground all its proper parts. And the weak priority monist can assert this because the Cosmos is the collective plurality of its proper parts. The second is that (WPM) has a novel solution to the problem of heterogeneity for monism which is superior to any solution available to strong priority monism. The best solution available to the strong priority monist is to hold the Cosmos instantiates a distributional property, but such a solution is not capable of dealing with Ted Sider’s (2007) objections that monists cannot explain the size of the statespace, and that they cannot give a plausible account of what it is to be an intrinsic property. By contrast, in explaining the world’s heterogeneity by holding that it (i.e. the world) is identical to the collective plurality of its proper parts, the weak priority monist can explain both the size of the statespace and utilise Kelly Trogon’s (2009) *in-virtue of account* of intrinsic properties. The weak priority monist then has a better solution to the problem of heterogeneity than any available to the strong priority monist.

Being a weak priority monist involves accepting both Collective Allism and Composition as Identity (CAI), and these are two controversial theses. However, both of them, I've shown, can be plausibly defended. Providing we are willing to identify the universal plurality with an object, there is reason to suppose that all sub-cosmic objects are collectively fundamental. And composition as identity does not have any problems with the Indiscernibility of Identicals (II) nor plural logic, providing we are willing to relativize the counting of things to sortals or concepts. Nor does (CAI) entail that the irreflexivity of grounding would be violated. Admittedly, because of (CAI)'s commitment to mereological essentialism, this does mean that (WPM) is incompatible with endurantism on the assumption that objects can survive losing/gaining parts. However, perdurantism is hardly an unpopular view, and there are good independent reasons to think objects perdure rather than endure. Furthermore, if we wish to preserve grounding as an irreflexive relation, we may well need to be perdurantists if we think that time travel is metaphysically possible.¹ And of course, if like Schaffer (2009b) one is a supersubstantialism, one will be a perdurantist. If one is tempted by the argument from supersubstantialism for monism, you'll need to be a perdurantist anyway. So, while being necessarily committed to perdurantism is a drawback for (WPM), it does not by any means suggest that (WPM) is not a plausible theory.

The important thing however which has been gained from this thesis though is that I've shown that contrary to what might have been otherwise supposed, collective fundamentality and composition as identity are not only compatible with a distinction between the fundamental and derivative, but they can actually help us develop theories about the fundamental. It is coherent to suppose that some things can be collectively fundamental, yet distributively each be derivative; and to suppose that a whole is identical to its parts collectively, does not mean that *each* of those parts is not more/less fundamental than the whole they compose. Weak priority monists think that both things are true, and that in holding they are true helps develop a novel answer to the (FMQ) which

¹ To see why, see Kleinschmidt (2015) (I got into more detail about this in footnote 26 in chapter six).

can be uniquely motivated. There is good reason to think then that not only is there a single distributively fundamental entity, but also that many things non-distributively are fundamental.

The Cosmos is fundamental. And though it is one thing, it is also many.

Bibliography

Aristotle (1984) 'Metaphysics' in Barnes, J. (ed.) *The Complete Works of Aristotle Vol. 2*
Princeton: Princeton University Press

Armstrong, D.M. (1997) *A World of States of Affairs* Cambridge: Cambridge University Press

Armstrong, D.M. (2004) *Truth and Truthmakers* Cambridge: Cambridge University Press

Audi, P. (2012a) 'A clarification and defence of the notion of grounding' in Correia, F. & Schnieder, B. (eds.) *Metaphysical Grounding: Understanding the Structure of Reality* Cambridge: Cambridge University Press, 101-121

Audi, P. (2012b) 'Grounding: Toward a Theory of the In-Virtue-of-Relation' *Journal of Philosophy* 12, 685-711

Bailey, A. (2011) 'The Incompatibility of Composition as Identity, Priority Pluralism and Irreflexive Grounding' *Analytic Philosophy* 52, 171-174

Barnes, E. (2018) 'Symmetric Dependence' in Bliss, R. & Priest, G. (eds.) *Reality and Its Structure*
Oxford: Oxford University Press, 50-69

Baron, S. & Tallant, J. (2016) 'Monism: The Islands of Plurality' *Philosophy and Phenomenological Research* 93, 583-606

Baron, S. & Tallant, J. (2018) 'Do Not Revise Ockham's Razor Without Necessity' *Philosophy and Phenomenological Research* 96, 596-619

Baxter, D. (1988a) 'Identity in the Loose and Popular Sense' *Mind* 97, 576-582

Baxter, D. (1988b) 'Many-One Identity' *Philosophical Papers* 17, 193-216

- Baxter, D. (2014) 'Identity, Indiscernibility, and Composition' in Cotnoir, A.J. & Baxter, D. (ed.) *Composition as Identity* Oxford: Oxford University Press, 244-253
- Bell, J.S. (1964) 'On the Einstein Podolsky Rosen paradox' *Physics* 1, 195-200
- Bennett, K. (2004) 'Spatio-Temporal Coincidence and the Grounding Problem' *Philosophical Studies* 118, 339-371
- Bennett, K. (2011) 'By Our Bootstraps' *Philosophical Perspectives* 25, 27-41
- Bennett, K. (2017) *Making Things Up* Oxford: Oxford University Press
- Benocci, M. (2017) 'Priority monism and essentiality of fundamentality: A reply to Steinberg' *Philosophical Studies* 174, 1983-1990
- Bernstein, S. (2016) 'Grounding Is Not Causation' *Philosophical Perspectives* 30, 21-38
- Bird, A. (2007) *Nature's Metaphysics: Laws and Properties* Oxford: Oxford University Press
- Bliss, R. (2013) 'Viciousness and the structure of reality' *Philosophical Studies* 166, 399-418
- Bliss, R. (2014) 'Viciousness and circles of ground' *Metaphilosophy* 45, 245-256,
- Bliss, R. (2018) 'Grounding and Reflexivity' in Bliss, R. & Priest, G. (eds.) *Reality and Its Structure* Oxford: Oxford University Press, 70-90
- Bliss, R. (MS) 'Metaphysical Foundationalism and the Principle of Sufficient Reason'
- Bohn, E. (2009a) 'An argument against the necessity of unrestricted composition' *Analysis* 69, 27-31
- Bohn, E. (2009b) 'Must there be a Top Level?' *The Philosophical Quarterly* 59, 193-201
- Bohn, E. (2010) 'The necessity of universalism versus the possibility of junky worlds: a rejoinder' *Analysis* 70, 296-298

- Bohn, E. (2011) 'David Lewis, Parts of Classes' *Humana.Mente Journal of Philosophical Studies* 19, 151-158
- Bohn, E. (2012) 'Monism, Emergence, and Plural Logic' *erkenntnis* 76, 211-223
- Bohn, E. (2014) 'Unrestricted Composition as Identity' in Cotnoir, A.J. & Baxter, D. (eds.) *Composition as Identity* Oxford: Oxford University Press, 143-165
- Bohn, E. (2016) 'Composition as Identity and Plural Cantor's Theorem' *Logic and Logical Philosophy* 25, 411-428
- Boolos, G. (1984) 'To Be Is To Be the Value of a Variable (or to Be Some Values of Some Variables)' *Journal of Philosophy* 81, 430-449
- Braddon-Mitchell, D. & Miller, K. (2006) 'The physics of extended simples' *Analysis* 66, 222-226
- Bricker, P. (2001) 'Island Universes and the Analysis of Modality' in Preyer, G. & Siebelt, F. (eds.) *Reality and Humean Supervenience: Essays on the Philosophy of David Lewis* New York: Rowman and Littlefield, 27-56
- Bricker, P. (2016) 'Composition as a *Kind* of Identity' *Inquiry* 59, 264-294
- Brzozowski, J. (2008) 'On Locating Composite Objects' in Zimmerman, D. (ed.) *Oxford Studies of Metaphysics Volume 4* Oxford: Oxford University Press, 193-222
- Calosi, C. (2014) 'Quantum mechanics and Priority Monism' *Synthese* 191, 915-928
- Calosi, C. (2016) 'Composition Is Identity and Mereological Nihilism' *The Philosophical Quarterly* 66, 219-235
- Cameron, R. (2007) 'The Contingency of Composition' *Philosophical Studies* 136, 99-121
- Cameron, R. (2008) 'Turtles All the Way Down: Regress, Priority and Fundamentality' *The Philosophical Quarterly* 58, 1-14

- Cameron, R. (2012) 'Composition as Identity Doesn't Settle the Special Composition Question' *Philosophy and Phenomenological Research* 84, 531-554
- Cameron, R. (2014) 'Parts Generate the Whole, But They Are Not Identical to It' in Cotnoir, A.J. & Baxter, D. (eds.) *Composition as Identity* Oxford: Oxford University Press, 90-107
- Cameron, R. (2016) *The Moving Spotlight: An Essay on Time and Ontology* Oxford: Oxford University Press
- Cameron, R. (forthcoming) 'Truthmakers' in Glanzberg, M. (ed.) *Oxford Handbook of Truth* Oxford: Oxford University Press
- Carmichael, C. (2016) 'Deep Platonism' *Philosophy and Phenomenological Research* 92, 307-328
- Caves, R. (2018) 'Emergence for Nihilists' *Pacific Philosophical Quarterly* 99, 2-28
- Chalmers, D. (2002) 'Does Conceivability Entail Possibility?' in Gendler, T.S & Hawthorne, J. (eds.) *Conceivability and Possibility* Oxford: Clarendon Press, 145-200
- Contessa, G. (2012) 'The Junk Argument: Safe Disposal Guidelines for Mereological Universalists' *Analysis* 72, 455-457
- Cornell, D. (2013a) 'Monism and statespace: a reply to Sider' *Analysis* 73, 230-236
- Cornell, D. (2013b) *Why there is only one thing: A defence of ontological monism*, PhD thesis,
 URL = <http://theses.whiterose.ac.uk/4939/1/Why%20There%20Is%20Only%20One%20Thing.pdf>
- Cornell, D. (2016) 'Taking monism seriously' *Philosophical Studies* 173, 2397-2415
- Cornell, D. (2017) 'Mereological Nihilism and the Problem of Emergence' *American Philosophical Quarterly* 54, 77-8
- Correia, F. (2010) 'Grounding and Truth-Functions' *Logique et Analyse* 53, 251-279

- Cotnoir, A.J. (2013a) 'Composition as General Identity' in Zimmerman, D. & Bennett, K. (eds.) *Oxford Studies in Metaphysics Volume 8* Oxford: Oxford University Press, 294-322
- Cotnoir, A.J. (2013b) 'Beyond Atomism' *Thought* 2, 67-72
- Cotnoir, A.J. (2013c) 'Strange Parts: The Metaphysics of Non-classical Mereologies' *Philosophy Compass* 8, 834-845
- Cotnoir, A.J. (2014a) 'Universalism and Junk' *Australasian Journal of Philosophy* 92, 649-664
- Cotnoir, A.J. (2014b) 'Composition as Identity: Framing the Debate' in Cotnoir, A.J. & Baxter, D. (eds.) *Composition as Identity* Oxford: Oxford University Press, 3-23
- Craig, W.L. (1979) *The Kalam Cosmological Argument* Eugene: Wipf and Stock Publishers
- Daly, C. (2012) 'Scepticism about grounding' in Correia, F. & Schnieder, B. (eds.) *Metaphysical Grounding: Understanding the Structure of Reality* Cambridge: Cambridge University Press, 81-100
- Darby, G. (2012) 'Relational Holism and Humean Supervenience' *British Journal of the Philosophy of Science* 63, 773-788
- Dasgupta, S. (2013) 'Absolutism vs Comparativism About Quantity' *Oxford Studies in Metaphysics* 8, 105-148
- Dasgupta, S. (2014) 'On the Plurality of Grounds' *Philosophers' Imprint* 14, 1-28
- Dehmelt, H. (1989) 'Triton, ... Electron, ... Cosmon ...: An Infinite Regresson?' *Proceedings of the National Academy of Sciences* 86, 8618-8619
- deRosset, L. (2013) 'Grounding Explanations' *Philosophers' Imprint* 13, 1-26
- Dixon, T.S. (2016a) 'Grounding and Supplementation' *erkenntnis* 81, 375-389

- Dixon, T.S. (2016b) 'What is the Well-Foundedness of Grounding?' *Mind* 125, 439-468
- Dixon, T.S. (2018) 'Upward Grounding' *Philosophy and Phenomenological Research* 97, 1-30
- Einstein, A., Podolsky, B. & Rosen, N. (1935) 'Can quantum-mechanical descriptions of physical reality be considered complete?' *Physical Review* 47, 777-780
- Fine, K. (1994) 'Essence and Modality' *Philosophical Perspectives* 8, 1-16
- Fine, K. (1995) 'Ontological Dependence' *Proceedings of the Aristotelian Society* 95, 269-290
- Fine, K. (2012) 'A Guide to Ground' in Correia, F. & Schnieder, B. (eds.) *Metaphysical Grounding: Understanding the Structure of Reality* Cambridge: Cambridge University Press, 37-80
- Forrest, P. (1995) 'Is space-time discrete or continuous?' *Synthese* 103, 327-354
- Forrest, P. (2004) 'Grit or Gunk' *The Monist* 87, 351-370
- Frege, G. (1953) *The Foundations of Arithmetic* translated by Austin, J.L., New York: Harper and Brothers
- Geach, P. (1967) 'Identity' *Review of Metaphysics* 21, 3-12
- Georgi, H. (1989) 'Effective Quantum Field Theories' in Davies, P. (ed.) *The New Physics* Cambridge: Cambridge University Press, 446-457
- Gibbard, A. (1975) 'Contingent Identity' *Journal of Philosophical Logic* 4, 187-222
- Giberman, D. (2015) 'Junky Non-Worlds' *Erkenntnis* 80, 437-433
- Groeblicher, S., Paterek, T., Kaltenbaek, R., Brukner, C., Zukowski, M., Aspelmeyer, M. & Zeilinger, A. (2007) 'An experimental test of non-local realism' *Nature* 446, 871-875
- Haslanger, S. (1989) 'Endurance and temporary intrinsics' *Analysis* 49, 119-125
- Hawley, K. (2001) *How Things Persist* Oxford: Oxford University Press

- Heil, J. (2012) *The Universe As We Find It* Oxford: Oxford University Press
- Horgan, T. & Potric, M. (2008) *Austere Realism: Contextual Semantics Meets Minimal Ontology* Cambridge, MA: MIT Press
- Hudson, H. (2001) *A Materialist Metaphysics of the Human Person* Ithaca: Cornell University Press
- Hudson, H. (2006) *The Metaphysics of Hyperspace* Oxford: Oxford University Press
- Ismael, J. & Schaffer, J. (forthcoming) 'Quantum holism: nonseparability as common ground' *Synthese* (early view)
- Jenkins, C. (2011) 'Is Metaphysical Dependence Irreflexive?' *The Monist* 94, 267-276
- Johnston, M. (1987) 'Is there a problem about persistence?' *Proceedings of the Aristotelian Society* 61, 107-135
- King, S. (2003) *The Dark Tower I: The Gunslinger* New York: Scribner
- Kitamura, N. (2016) 'Defending Priority Views from the Gunk/Junk Argument' *Philosophia* 44, 155-165
- Kleinschmidt, S. (2015) 'Fundamentality and Time-Travel' *Thought* 4, 46-51
- Koslicki, K. (2015) 'The coarse-grainedness of grounding' in Bennett, K. & Zimmerman, D. (eds.) *Oxford Studies in Metaphysics: Volume 9* Oxford: Oxford University Press, 306-342
- Kroedel, T. & Schulz, M. (2016) 'Grounding mental causation' *Synthese* 193, 1909-1923
- Kripke, S. (1980) *Naming and Necessity* Harvard: Harvard University Press
- Langton, R. & Lewis, D. (1998) 'Defining Intrinsic' *Philosophy and Phenomenological Research* 58, 333-345

- Leibniz, G. (1989a) 'On the Ultimate Origination of Things' in Ariew, R. & Garber, D. (eds.) *Leibniz: Philosophical Essays* Indianapolis: Hackett, 149-155
- Leibniz, G. (1989b) 'On Nature Itself' in Ariew, R. & Garber, D. (eds.) *Leibniz: Philosophical Essays* Indianapolis: Hackett, 155-167
- Leonard, M. (2016) 'What is mereological harmony?' *Synthese* 193, 1949-1965
- Leunenberger, S. (2014) 'Grounding and Necessity' *Inquiry* 57, 151-174
- Lewis, D. (1976) 'Survival and Identity' in Rorty, A. (ed.) *The Identities of Persons* Berkeley: University of California Press, 17-40
- Lewis, D. (1983) 'New work for a theory of universals' *Australasian Journal of Philosophy* 61, 343-377
- Lewis, D. (1986) *On the Plurality of Worlds* Malden: Blackwell Publishing
- Lewis, D. (1991) *Parts of Classes* Oxford: Basil Blackwell
- Litland, Jon Erling (2016) 'Pure Logic of Many-Many Ground' *Journal of Philosophical Logic* 45, 531-577
- Litland, Jon Erling (2018) 'Bicollective Ground: Towards a (Hyper)graphic Account' in Bliss, R. & Priest, G. (eds.) *Reality and Its Structure*, 140-164
- Loss, R. (2016) 'Parts Ground the Whole and Are Identical to It' *Australasian Journal of Philosophy* 94, 489-498
- Lowe, E.J. (1998) *The Possibility of Metaphysics* Oxford: Oxford University Press
- Lowe, E.J. (2012) 'Against Monism' in Goff, P. (ed.) *Spinoza on Monism* London: Palgrave MacMillan, 92-122

- Lowe, E.J. (2017) 'Objects and Criteria of Identity' in Hale, B., Wright, C. & Miller, A. (eds.) *A Companion to the Philosophy of Language (Second Edition)* Hoboken: Wiley-Blackwell
- Mackie, J.L. (1977) 'Dispositions, grounds, and causes' *Synthese* 34, 361-369
- Markosian, N. (1998a) 'Simples' *Australasian Journal of Philosophy* 76, 213-228
- Markosian, N. (1998b) 'Brutal Composition' *Philosophical Studies* 92, 211-249
- Markosian, N. (2015) 'The Right Stuff' *Australasian Journal of Philosophy* 93, 665-687
- Maudlin, T. (2007) 'Part and Whole in Quantum Mechanics' in Lange, M. (ed.) *Philosophy of Science: An Anthology* Oxford: Blackwell
- Maurin, A.S. (2010) 'Trope theory and the Bradley Regress' *Synthese* 175, 311-326
- McDaniel, K. (2006) 'Gunky objects in a simple world' *Philo* 9, 306-315
- McDaniel, K. (2007a) 'Brutal Simples' in Zimmerman, D. (ed.) *Oxford Studies in Metaphysics: Volume 3* Oxford: Oxford University Press, 233-266
- McDaniel (2007b) 'Extended simples' *Philosophical Studies* 133, 131-141
- McDaniel, K. (2008) 'Against Composition as Identity' *Analysis* 68, 128-133
- McDaniel, K. (2009) 'Extended simples and qualitative heterogeneity' *The Philosophical Quarterly* 59, 325-331
- McDaniel, K. (2010) 'Composition as identity does not entail universalism' *erkenntnis* 73, 97-100
- McKenzie, K. & Muller, F.A. (2017) 'Bound States and the Special Composition Question' in Massimi, M., Romeijn, J. & Schurz, G. (eds.) *EPSA15 Selected Papers* Springer, 233-242
- Mellor, D. (1995) *The Facts of Causation* London: Routledge

- Merricks, T. (1999) 'Composition as Identity, Mereological Essentialism, and Counterpart Theory' *Australasian Journal of Philosophy* 77, 192-195
- Morganti, M. (2009) 'Ontological Priority, Fundamentality and Monism' *dialectica* 63, 271-288
- Morganti, M. (2015) 'Dependence, Justification and Explanation: Must Reality Be Well-Founded?' *erkenntnis* 80, 555-572
- Mormann, T. (2014) 'Set Theory, Topology, and the Possibility of Junky Worlds' *Notre Dame Journal of Formal Logic* 55, 79-90
- O'Conaill, D. & Pearson, F. (MS) 'Ontological Dependence and the Fundamental Level'
- Oliver, A. & Smiley, T. (2001) 'Strategies For A Logic of Plurals' *The Philosophical Quarterly* 51, 289-306
- Parsons, J. (2000) 'Must a Four-Dimensionalist Believe in Temporal Parts?' *The Monist* 83, 399-418
- Parsons, J. (2004) 'Distributional Properties' in Jackson, F. & Priest, G. (eds.) *Lewisian Themes: The Philosophy of David K. Lewis*, 173-180 Oxford: Oxford University Press
- Parsons, J. (2007) 'Theories of location' in Zimmerman, D. (ed.) *Oxford Studies in Metaphysics: Volume 3*, 201-232
- Peijnenburg, J. & Atkinson, D. (2013) 'The Emergence of Justification' *The Philosophical Quarterly* 63, 546-564
- Rabin, G. (2018) 'Grounding Orthodoxy and the Layered Conception' in Bliss, R. & Priest, G. (eds.) *Reality and Its Structure* Oxford: Oxford University Press, 37-49
- Rabin, G. & Rabern, B. (2016) 'Well Founding Grounding Grounding' *Journal of Philosophical Logic* 45, 349-379

- Raven, M. (2013) 'Is Ground a Strict Partial Order?' *American Philosophical Quarterly* 50, 192-201
- Rodriguez-Pereya, G. (2015) 'Grounding is not strict order' *Journal of the American Philosophical Association* 1, 517-534
- Rosen, G. (2010) 'Metaphysical Dependence: Grounding and Reduction' in Hale, B. & Hoffmann, A. (eds.) *Modality: Metaphysics, Logic and Epistemology* Oxford: Oxford University Press, 109-135
- Russell, J.S. (2008) 'The Structure of Gunk: Adventures in the Ontology of Space' in Zimmerman, D. (ed.) *Oxford Studies of Metaphysics Volume 4* Oxford: Oxford University Press, 248-274
- Sanson, D. (2016) 'Worlds Enough for Junk' *Res Philosophica* 93, 45-62
- Saucedo, R. (MS) 'Collective Allism'
- Schaffer, J. (2003) 'Is There a Fundamental Level?' *Nous* 37, 498-517
- Schaffer, J. (2007) 'From Nihilism To Monism' *Australasian Journal of Philosophy* 85, 175-191
- Schaffer, J. (2009a) 'On what Grounds What' in D. Chalmers, D. Manley & R. Wasserman (ed.) *Metametaphysics: New essays on the Foundations of Ontology* Oxford: Oxford University Press, 347-383
- Schaffer, J. (2009b) 'Spacetime the one substance' *Philosophical Studies* 145, 131-148
- Schaffer, J. (2010a) 'Monism: The Priority of the Whole' *Philosophical Review* 119, 31-76
- Schaffer, J. (2010b) 'The Internal Relatedness of All Things' *Mind* 119, 341-376
- Schaffer, J. (2010c) 'The Least Discerning and Most Promiscuous Truthmaker' *The Philosophical Quarterly* 60, 307-324

- Schaffer, J. (2012) 'Grounding, Transitivity and Contrastivity' in Correia, F. & Schnieder, B. (eds.) *Metaphysical Grounding: Understanding the Structure of Reality* Cambridge: Cambridge University Press, 122-138
- Schaffer, J. (2013) 'The Action of the Whole' *Proceedings of the Aristotelian Society* 87, 67-87
- Schaffer, J. (2015) 'What Not To Multiply Without Necessity' *Australasian Journal of Philosophy* 93, 644-664
- Schaffer, J. (2016) 'Grounding in the image of causation' *Philosophical Studies* 173, 49-100
- Schaffer, J. (2018) "Monism", *The Stanford Encyclopedia of Philosophy* (Winter 2018 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/win2018/entries/monism/>.
- Sider, T. (1996) 'Intrinsic Properties' *Philosophical Studies* 83, 1-27
- Sider, T. (2001) *Four Dimensionalism: An Ontology of Persistence and Time* Oxford: Oxford University Press
- Sider, T. (2007a) 'Against monism' *Analysis* 67, 1-7
- Sider, T. (2007b) 'Parthood' *Philosophical Review* 116, 51-91
- Sider, T. (2011) *Writing the Book of the World* Oxford: Oxford University Press
- Sider, T. (2014) 'Consequences of Collapse' in Cotnoir, A.J. & Baxter, D. (eds.) *Composition as Identity* Oxford: Oxford University Press, 211-221
- Siegel, M. (2016) 'Priority monism is contingent' *Thought* 5, 23-32
- Simons, P. (1987) 'Parts: A Study In Ontology' *Oxford: Oxford University Press*

- Simons, P. (2004) 'Extended Simples: A Third Way Between Atoms and Gunk' *The Monist* 87, 371-384
- Skiles, A. (2015) 'Against Grounding Necessitarianism' *Erkenntnis* 80, 717-751
- Spencer, J. (2010) 'A Tale of Two Simples' *Philosophical Studies* 148, 167-181
- Spencer, J. (2012) 'All Things Must Pass Away' in Bennett, K. & Zimmerman, D. (eds.) *Oxford Studies of Metaphysics: Volume 7* Oxford: Oxford University Press, 67-92
- Spencer, J. (2013) 'Strong Composition as Identity and Simplicity' *Erkenntnis* 78, 1177-1184
- Spencer, J. (2017) 'Counting on Strong Composition as Identity to Settle the Special Composition Question' *Erkenntnis* 82, 857-872
- Steinberg, A. (2015) 'Priority Monism and part/whole dependence' *Philosophical Studies* 172, 2025-2031
- Strohming, M. & Yli-Vakkuri, J. (2017) 'Recent Work: The Epistemology of Modality' *Analysis* 77, 825-838
- Stuchlik, J. (2003) 'Not All Worlds Are Stages' *Philosophical Studies* 116, 309-321
- Takho, T. (2013) 'Truth-Grounding and Transitivity' *Thought* 2, 332-340
- Takho, T. (2014) 'Boring Infinite Descent' *Metaphilosophy* 45, 257-269
- Tallant, J. (2013) 'Problems of parthood for proponents of priority' *Analysis* 73, 429-438
- Tallant, J. (2015) 'Ontological dependence in a space-time world' *Philosophical Studies* 172, 3101-3118
- Teller, P. (1986) 'Relational Holism and Quantum Mechanics' *British Journal of the Philosophy of Science* 37, 71-81

- Thompson, N. (2016) 'Metaphysical Interdependence' in Jago, M. (ed.) *Reality Making* Oxford: Oxford University Press, 38-55
- Tooley, M. (1977) 'The Nature of Laws' *Canadian Journal of Philosophy* 7, 667-698
- Traynor, M. (2013) 'Actual Time and Possible Change: A Problem for Modal Arguments for Temporal Parts' *Thought* 2, 180-189
- Trogon, K. (2009) 'Monism and Intrinsicity' *Australasian Journal of Philosophy* 87, 127-148
- Trogon, K. (2013) 'An Introduction to Grounding' in Hoeltje, M., Schnieder, B. & Steinberg, A. (eds.) *Varieties of Dependence: Ontological Dependence, Grounding, Supervenience, Response-Dependence* Philosophia: Basic Philosophical Concepts, 97-122
- Trogon, K. (2017) 'Priority monism' *Philosophy Compass* 12, 1-10
- Tugby, M. (2013) 'Platonic Dispositionalism' *Mind* 122, 451-480
- Unger, P. (1980) 'The Problem of the Many' *Midwest Studies in Philosophy* 5, 411-467
- Van Inwagen, P. (1981) 'The doctrine of arbitrary undetached parts' *Pacific Philosophical Quarterly* 62, 123-137
- Van Inwagen, P. (1990) *Material Beings* Ithaca: Cornell University Press
- Van Inwagen, P. (2004) 'A Theory of Properties' in Zimmerman, D. (ed.) *Oxford Studies in Metaphysics: Volume 1* Oxford: Oxford University Press, 107-138
- Varzi, A. (2008) 'The Extensionality of Parthood and Composition' *The Philosophical Quarterly* 58, 108-133
- Wallace, M. (2011a) 'Composition as Identity: Part 1' *The Philosophy Compass* 6, 804-816
- Wallace, M. (2011b) 'Composition as Identity: Part 2' *The Philosophy Compass* 6, 817-827

- Wallace, M. (2014) 'Composition as Identity, Modal Parts, and Mereological Essentialism' in Cotnoir, A.J. & Baxter, D. (eds.) *Composition as Identity* Oxford: Oxford University Press, 111-129
- Wang, J. (2015) 'Actualist Counterpart Theory' *Journal of Philosophy* 112, 417-441
- Watson, D. (2010) 'An argument against an argument against the necessity of unrestricted mereological composition' *Analysis* 70, 78-82
- Williams, J.R.G. (2006) 'Illusions of Gunk' *Philosophical Perspectives* 20, 493-513
- Wilsch, T. (2015) 'The Nomological Account of Ground' *Philosophical Studies* 172, 3293-3312
- Wilson, A. (2013) 'Schaffer on laws of nature' *Philosophical Studies* 164, 653-667
- Wilson, A. (forthcoming) 'Metaphysical Causation' *Nous*, 1-29 (early view)
- Wilson, J. (2014) 'No work for a theory of grounding' *Inquiry* 57, 535-579
- Woodward, R. (2017) 'Ersatz Counterparts' in Bennett, K. & Zimmerman, D. (eds.) *Oxford Studies in Metaphysics: Volume 10*, Oxford: Oxford University Press, 235-260
- Yablo, S. (1993) 'Is Conceivability a Guide to Possibility?' *Philosophy and Phenomenological Research* 53, 1-42
- Yi, B. (1999) 'Is Mereology Ontologically Innocent?' *Philosophical Studies* 93, 141-160
- Zimmerman, D. (1996) 'Could Extended Objects Be Made Out of Simple Parts? An Argument for "Atomless Gunk"' *Philosophy and Phenomenological Research* 56, 1-29