Mereological Nihilism and Puzzles about Material Objects

Bradley Rettler[1] forthcoming in *Pacific Philosophical Quarterly*

1 Introduction

Mereological nihilism is the view that no objects have any proper parts.[2] Most people think that at any given time, they're surrounded by counterexamples to mereological nihilism – tables, chairs, hats, themselves…Mereological nihilism says that those things don't exist, or they don't have any proper parts. But most people think it's obvious that such things do exist, and it's also obvious that they have proper parts.

One might wonder, then, why anyone would accept mereological nihilism. A main motivation has been that mereological nihilism solves a number of puzzles in the metaphysics of material objects;[3] it's been thought to be a solution to coincidence puzzles, the Sorites paradox, the problem of overdetermination, the problem of arbitrariness, the problem of indeterminate identity (better known as the Ship of Theseus), the problem of the many, and the problem of vagueness, in particular.[4] Mereological nihilism has been thought to be a solution to these puzzles because it denies the existence of the kind of entity whose existence all these arguments *seem* to presuppose.

[1]In writing this paper, I greatly benefitted from conversations with Andrew Bailey, Ross Inman, Dan Korman, and Phillip Swenson, and written comments from Robin Dembroff, Peter Finocchiaro, Dan Korman, Mike Rea, Daniel Rubio, Nat Tabris, and referees for this journal. Versions of this paper were presented at the UNF Metaphysics and Epistemology Workshop, the Baylor Philosophy of Religion conference, and the Pacific APA; thanks to those in attendance and my APA commentator Cian Dorr for comments and objections. Special thanks to Andrew Brenner for reading and corresponding about multiple drafts of the paper. Significant work on this paper was done while I was supported by a grant from Templeton Religion Trust; the opinions expressed in this paper are my own and do not necessarily reflect the views of Templeton Religion Trust.

[2]*x* is a *proper part* of *y* iff *x* is a part of *y* and *x* is not identical to *y*. Nihilism allows for objects to have improper parts—themselves.

[3]See Unger (1979), Bennett (2009), Heller (1990), Horgan and Potrc (2008), Merricks (2001), van Inwagen (1990), and Liggins (2008) – not all of them are nihilists, but all of them cite these puzzles as the chief motivation for nihilism. Horgan and Potrc are partly motivated by parsimony, but it is ontological; they see it as an advantage of their view that there are no *things with parts*, not that there is no such thing as *parthood*.

[4]For more on the puzzles and the nihilist's solution, see Contessa (2014), Markosian (2008) §4, and Markosian (1998a).

2 The Method

In this paper, I show that for every puzzle that mereological nihilism has been taken to solve, there is a similar puzzle that mereological nihilism does not solve. The puzzles are similar in that every solution to each new puzzle *except for mereological nihilism* is also a solution to the corresponding original puzzle. Because the original puzzles are not about parts (although they seem to be), I formulate each of them using mereologically simple objects. Mereological nihilism does not solve the new puzzles, so the mereological nihilist must give a new solution to these puzzles. Since every other solution to the new puzzles applies just as well to the old puzzles, the old puzzles don't provide any motivation to be a mereological nihilist.

A word on the nature of motivation in metaphysical theorizing. I take it that something like the following is true: a view V is unmotivated by metaphysical puzzles if, for every puzzle P to which V is a solution, there is a puzzle P* such that (i) V is not a solution to P*, (ii) any solution to P* is also a solution to P, and (iii) no solutions to P* obviously or analytically entail V.[5] In order to show that mereological nihilism is unmotivated, one would need to show that for any puzzle to which mereological nihilism is a solution (i) there is a new puzzle such that mereological nihilism is not a solution to the new puzzle, (ii) any solution to the new puzzle is also a solution to the original puzzle, and (iii) no solutions to the new puzzle entail mereological nihilism. So, in each section I will try to establish (i)-(iii). Most of my efforts will be on establishing (i) – offering a new puzzle that mereological nihilism doesn't solve. Usually (ii) and (iii) are obvious; that is, usually it's obvious that all the other solutions to the old puzzle work for the new puzzle and it's obvious that none of them entail mereological nihilism. When I don't think they're obvious, I will argue for them.

There are, no doubt, considerations other than puzzle-solving that motivate philosophical views in general and mereological nihilism in particular. But most other considerations that motivate views – fit with common sense, fit with other theories, fit with science – aren't enjoyed by mereological nihilism. Recently some have argued that mereological nihilism is more parsimonious than its denial; but even they think that nihilism is made more plausible by the fact that it answers all the puzzles.[6] If I'm right, it doesn't.

I turn my attention now to the puzzles that mereological nihilism seems to solve. For each puzzle, I will identify the feature of the puzzle that gives rise to the seeming contradiction. Since in none of the puzzles is that feature parthood or composition, I construct a puzzle with that feature that doesn't involve things with parts. Mereological nihilism doesn't solve the new puzzles, but, crucially, *each of the other original solutions do*. The mereological nihilist will need to solve these new puzzles another way. Since whatever they invoke to solve the new puzzles will thereby solve the original puzzles as well, the puzzles shouldn't motivate us to accept

[5] Thanks to Jason Turner for suggesting (iii).

[6] See Brenner (2015), Dorr (2002) and Sider (2013), though see also (Sider, 2009, 285).

mereological nihilism.

3 The Sorites Paradox

Here is a version of the Sorites paradox that has been taken to support mereological nihilism.[7]

> Sorites Paradox:
>
> 1. Every stone is composed of a finite number of atoms.
> 2. For any number n, if it is impossible for an object composed of n atoms to be a stone, then it is impossible for an object composed of n+1 atoms to be a stone.
> 3. It is impossible for something composed of fewer than two atoms to be a stone.
> 4. For any number n, it is impossible for something composed of n atoms to be a stone. (from 2, 3)
> 5. So, there are no stones. (from 1, 4)[8]

There are a number of solutions to Sorites Paradox. Epistemicists deny (2); they say that there is a certain number of atoms above which something is a stone (so long as it meets other conditions too, I suppose), and below which it is not.[9] This line is in principle impossible for us to know, and indeed may be in principle unknowable, but it exists. So one atom does indeed make the difference between there being a stone and not being a stone.

Supervaluationists think that there are some statements which are neither true nor false, since they contain vague terms and are such that on some precisifications they are true and on some they are false.[10] One example of such a sentence is "There is a stone composed of 734 trillion atoms". There are borderline cases of stones, because "stone" admits of many precisifications; on some of them "There is a stone composed of 734 trillion atoms" is true, and on some it is not. Any sentence which has admissible precisifications that are false is not true. So, supervaluationists also reject (2).

Mereological nihilists deny that there are any stones composed of atoms, and so there are no stones at all. This is because they think there are only mereological simples; if stones exist, then they are are composed of atoms, and are not mereological simples. So the mereological nihilist accepts the surprising conclusion of Sorites Paradox.

[7] See, e.g., Merricks (2001), pp 32-38.
[8] This is taken from the Stanford Encyclopedia of Philosophy – Korman (2016).
[9] See Williamson (1994).
[10] See McGee and McLaughlin (2000), Lewis (1986), and Fine (1975).

But the fact that stones (if there are any) are composed of atoms isn't what makes Sorites Paradox a puzzle; Sorites Paradox is not a puzzle about parts, or about composite objects. It's a puzzle about predicates with imprecise application or satisfaction conditions – in this case, 'is a stone'. Many such predicates apply to composite objects, because most objects we encounter seem to be composite. But it's not hard to imagine a Sorites paradox that applies to a mereologically simple object. Consider the following Sorites paradox that concerns the price of a mereological simple.

Simple Sorites Paradox:

1. Every simple costs a finite amount of money.[11]
2. For any number n, if it is impossible for a simple that costs $n to be expensive, then it is impossible for a simple that costs $(n+0.01) to be expensive.
3. It is impossible for something that costs less than $0.01 to be expensive.
4. For any number n, it is impossible for something that costs $n to be expensive. (from 2, 3)
5. So, nothing is expensive. (from 1, 4)

There doesn't seem to be anything special about the fact that the mereological simple doesn't have parts in Simple Sorites Paradox that makes any of the premises less plausible than in Sorites Paradox. The mereological simple still starts off inexpensive, and increasing in price by $0.01 still doesn't make a difference between being inexpensive and being expensive.

In both puzzles, the epistemicist and the supervaluationist deny (2). But what of the mereological nihilist? She accepted the conclusion of Sorites Paradox, and she gave a principled reason for accepting something that seemed bizarre—there are no composite objects. But in Simple Sorites Paradox, there are no composite objects. So denying the existence of composite objects does not help.

The mereological nihilist, then, needs to give an answer to Simple Sorites Paradox. If she accepts epistemicism or supervaluationism, then Sorites Paradox provides no motivation for mereological nihilism, because epistemicism and supervaluationism are responses to Sorites Paradox as well. If she doesn't adopt one of the aforementioned answers to Simple Sorites Paradox, she must give a new one, which will presumably also solve Sorites Paradox. The answer that she gives to Sorites Paradox – mereological nihilism – will not solve Simple Sorites Paradox. So, Sorites Paradox is not a motivation for mereological nihilism.

[11] I'm considering 0 to be a finite number.

4 Coincidence Puzzles

Here is a coincidence puzzle that seems to be solved by mereological nihilism:

> Coincidence Puzzle: Suppose at a time t_1 you have a lump of clay, Lump. At some time t_2, you form Lump into a statue, which you cleverly name 'Statue'. Of course, you haven't destroyed Lump, so Lump still exists after t_2. Statue and Lump are not identical; after all, Statue came into existence later than Lump, and Statue could not survive being squashed while Lump could. But Statue and Lump exactly occupy the same region of space at the same time, and two distinct things cannot exactly occupy the same region of space at the same time. So, Statue and Lump are identical. And they are not. Contradiction.[12]

In response to Coincidence Puzzle, *co-locationists* say that two distinct things *can* in fact exactly overlap.[13] *Dominant-kind theorists* say that Lump goes out of existence when Statue is created, because 'statue' and 'lump' refer to kinds, and a member of a kind ceases to exist when its matter makes up something that is a member of a metaphysically more interesting kind.[14] *Phase-sortalists* say that "statue" and "lump" are sortals, and, since objects fall under many sortals at the same time, an object can fall under different sortals at the same time while still being the same object; so Statue and Lump are identical.[15] And "statue" is a *phase sortal*, which applies (or at least could apply) to an object for only a little while, like "kitten" or "teenager"; an adult in 2016 is identical to a baby in 1982 and a teenager in 1997, even though the adult isn't a baby or teenager. *Perdurantists* say that Statue and Lump are distinct, because they are distinct cross-time fusions of temporal parts.[16] *Stage theorists*, also known as *exdurantists*, say that the objects we ordinarily talk about are instantaneous, and they bear counterpart relations to objects at other times. The statue and lump are identical, but referring to it with 'statue' invokes a different counterpart relation than using 'lump'.[17] *Kind eliminativists* say that there aren't any statues or lumps, because there aren't any things that are members of ordinary kinds.[18]

Mereological nihilists also say that there aren't any statues or lumps.[19] They say

[12] This is a version of a puzzle originally offered in Gibbard (1975).

[13] See Baker (1997).

[14] See Burke (1994) and Rea (2000).

[15] I've presented sortals as semantic categories, but some think they are metaphysical categories. For more, see Wallace (1965) and Feldman (1973).

[16] See Quine (1950), Lewis (1976), and Sider (2001a).

[17] See Sider (1996) and Hawley (2001).

[18] See Unger (1979) and Van Cleve (2008).

[19] At least, those who use mereological nihilism to respond to puzzles that seem to be about composition say this. Other mereological nihilists accept that there are statues and lumps, but say that they are identical to their parts taken together; see, e.g. Calosi (Forthcoming)). Or that "there are statues" is true (when spoken in ordinary contexts) when there are atoms arranged statuewise (see, e.g., van Inwagen (1990) and Contessa (2014).

this because they don't believe that there are any composite objects at all.[20] And if there are (or were) statues or lumps, they are (or would be) composite. So, there are no statues or lumps, nor could there be.

But Coincidence Puzzle isn't, at bottom, about parts. It's a puzzle about two distinct things in the same place at the same time that have different histories, or modal profiles, or what have you.[21] Neither of those things need to have parts.

So though mereological nihilism is a solution to Coincidence Puzzle, it is not a solution that gets at the heart of the puzzle, and so it doesn't solve other versions of the puzzle. For example:

> Simple Coincidence Puzzle: Suppose at a time t_1 you have a simple, Simple. At some time t_2, you decide that Simple is worthy of admiration, and you frame him and place him in your art gallery. You call your new artwork, "Simply". You haven't destroyed Simple by framing it, so Simple still exists after t_1. But Simple and Simply aren't identical, because Simply came into existence later than Simple, and Simply would go out of existence if you were to take it out of the gallery and out of the frame. But Simple and Simply exactly overlap each other, and two distinct things cannot exactly overlap each other. So, Simple and Simply are identical. And they are not. Contradiction.[22]

Coincidence Puzzle and Simple Coincidence Puzzle are the same, save for the fact that Simple and Simply are mereologically simple, whereas Lump and Statue are not.[23] But there doesn't seem to be anything special about that particular feature of Simple Coincidence Puzzle that makes any of the premises less plausible.

Both puzzles can be put the following way (where A is the lump/simple, and B is the statue/Simply):

1. Before t_2, A exists; after t_2, B exists.
2. A continues to exist after t_2.
3. B doesn't exist before t_2.
4. After t_2, A and B have different properties – among others, A existed before t_2, and B did not. (from 1,2,3)

[20] Quasi-nihilists like Merricks (2001) and van Inwagen (1990) make exceptions, the former for objects with non-redundant causal powers and the latter for organisms; but neither accept that there are statues or lumps.

[21] For more on what's really at issue in the puzzle, see Saenz (2015). Saenz uses examples that are composite, but it's easy to see how the features of the puzzle he considers apply to mereologically simple objects.

[22] When presenting this paper, Simple Puzzle involved a simple that was sculpted into a statue, which more closely mirrors the original puzzle. But I encountered significant resistance to the idea of a partless thing being sculpted; so, I use framing. Thanks to Cian Dorr for suggesting it.

[23] Strictly speaking, Coincidence Puzzle doesn't say that the statue and lump are composite; but mereological nihilism is a solution to Coincidence Puzzle only if they are composite.

5. For any x and y, if x and y have different properties at the same time, then $x \neq y$.
6. A $\neq$ B. (from 4,5)
7. A and B exactly spatially overlap each other.
8. For any x and y, if x and y exactly spatially overlap each other, then $x = y$.
9. A = B. (from 7,8)
10. A = B AND A $\neq$ B. (from 6,9)

Almost all of the views can respond the same way to both puzzles: the co-locationist denies (8), the dominant-kind theorist denies (2), the phase-sortalist denies (4), the perdurantist denies (7), the stage theorist denies (4), and the kind eliminativist denies at least (1) and (3), and maybe (2) as well.[24] Each can deny the analogous premise or premises in Simple Coincidence Puzzle as she denied in Coincidence Puzzle, and give the same reason for her denial.

But what of the mereological nihilist? In response to Coincidence Puzzle, she denied (1) and (2) and (3), by denying both that Statue exists and that Lump exists. She gave a principled reason for such a denial—there are no composite objects. But in Simple Coincidence Puzzle, there are no composite objects. So denying the existence of composite objects does not help.

The mereological nihilist, then, needs to give a different answer to Simple Coincidence Puzzle. She can give one of the five other answers to Simple Coincidence Puzzle that also solve Coincidence Puzzle. Or she can give a new answer to Simple Coincidence Puzzle, which will (almost certainly) be a response to Coincidence Puzzle as well. So, mereological nihilism is not needed to solve either puzzle. So, Coincidence Puzzle doesn't motivate mereological nihilism.

5 Arbitrariness

Arguments from arbitrariness are usually proffered against restricted theories of composition. They purport to show that there's no *ontologically significant difference* between ordinary composite objects and extraordinary composite objects.[25] The following is an arbitrariness argument that mereological nihilism seems to solve.

Arbitrariness Argument:

1. Statues exist.

[24] I say "maybe" because the kind eliminativist might think that lumps and simples have precise persistence conditions.

[25] For more on this, see Korman (2010b) and (Korman, 2015, ch 8).

2. There is no ontologically significant difference between statues and gollyswoggles.[26]
3. If there is no ontologically significant difference between *F*s and *G*s, then *F*s exist iff *G*s exist.
4. Statues exist iff gollyswoggles exist. (from 2, 3)
5. So, gollyswoggles exist. (from 1, 4)

A statue is a lump of clay that exists if and only if it has a certain range of shapes and was made with certain intent, and a gollyswoggle is a lump of clay that essentially has a precisely defined shape S. Suppose that on a sculptor's way to molding a lump of clay into a statue, the lump briefly had shape S. So, a gollyswoggle was brought into existence, but it only existed for a moment. (Gollyswoggles can't have any other shape than S, after all.) There is no ontologically significant difference between a gollyswoggle and a statue, and so anyone who posits statues must posit gollyswoggles.

Most people don't want to accept the existence of gollyswoggles, so they must pick a premise to deny. Some deny (2), and attempt to offer an ontologically significant difference between gollyswoggles and statues. Conventionalists say that because nobody intends to create a gollyswoggle, there are no gollyswoggles; indeed, if anyone intended to create a gollyswoggle and formed a lump into shape S, there would be gollyswoggles.[27] Some deny (3), and say that it is just a brute fact that composition occurs in the case of the statue but not the gollyswoggle.[28] Still others deny (3) by saying that it's just a fact about the way we use the English word "exists" that gollyswoggles don't exist.[29]

Mereological nihilists avoid the potential slippery slope by denying (1), since they deny the existence of all composite objects. But, as should be familiar, Arbitrariness Argument isn't a puzzle about parts. It's a puzzle about the difference between ordinary objects and odd, stipulated objects. The fact that composite objects are usually used is a red herring. Consider the following argument:

Simple Arbitrariness Argument:

1. Strings exist.[30]

[26]The genesis of "gollyswoggle" is (van Inwagen, 1990, 126). For objections to van Inwagen's argument, see Moyer (2006), §4. For discussions of arbitrariness arguments, see many of the papers in Hawthorne (2006) – in particular "Plenitude, Convention, and Ontology".

[27]Conventionalists say that we determine which objects there are, and so the significant difference between gollyswoggles and statues is that we take there to be the former and not the latter. See Einheuser (2006).

[28]See Markosian (1998a).

[29]See Hirsch (2010), especially pp 116-119.

[30]If you don't think strings are mereologically simple, feel free to substitute whatever you take the partless things to be.

2. There is no ontologically significant difference between strings and glings.
3. If there is no ontologically significant difference between strings and glings, then strings exist iff glings exist.
4. Strings exist iff glings exist. (from 2, 3)
5. So, glings exist. (from 1, 4)

A string is a simple that exists if and only if it has a certain range of mass, charge, and vibration properties, and a gling (let us say) is a simple that exists if and only if it has a certain mass and a certain charge. There is no ontologically significant difference between the two, and so anyone who posits strings must posit glings.[31]

Clearly Simple Arbitrariness Argument does not give us good reason to be mereological nihilists, because denying the existence of composite objects is totally irrelevant. So, another answer to Simple Arbitrariness Argument is needed. And since that response will probably have nothing to do with the mereological status of the string or gling, there's no reason to think it won't also work as a response to Arbitariness Argument. So, Arbitrariness Argument is not a motivation for mereological nihilism.

6 Interlude: Extended Simples

Most of the new puzzles involve recasting the old puzzles explicitly in terms of extended simples.[32] Before I continue, I want to say something by way of argument for the possibility of extended simples.

And before I do that, it's worth noting that in order to solve the following puzzles by denying extended simples, the mereological nihilist will have to deny not only that extended simples exist, but that they are *possible*. After all, if she denies that there are extended simples but admits that they are possible, then she'll have to give a different answer to the puzzles at worlds in which extended simples exist than she does at the actual world. And that answer will presumably work in the actual world, so nihilism will be left unmotivated again.

The main goal of this paper is to argue that for each puzzle mereological nihilism solves, there is a puzzle (that intuitively ought to have the same solution) that it

[31] One might say that the ontologically significant difference is that strings show up in our best physical theories, and glings don't. A fair point. But this is to go beyond mere mereological nihilism – it gives a theory of what the simples are.

[32] Saying exactly what extended simples are is tricky. The natural thought is that extended simples are material objects that lack proper parts and that occupy non-point-sized regions of space. But of course, point-sized objects occupy non-point-sized regions of space, in the same way I occupy my home — I just don't fill it up. So, extended simples occupy non-point-sized regions of space in the sense that they 'fill them up'. In the terminology of Parsons (2007), extended simples are partless material objects that *pervade* non-point-sized regions. For more on extended simples, see Markosian (1998b), McDaniel (2007), Braddon-Mitchell and Miller (2006), and Simons (2004).

doesn't solve. But you might think the arguments that involve extended simples presuppose something that I need to argue for: extended simples are possible. All papers must presuppose things, and this paper is not a defense of the possibility of extended simples; others have done that, and I don't have much to add. Those who don't think I say enough should see Braddon-Mitchell and Miller (2006), Callender (2011), Markosian (1998b), McDaniel (2007), Saucedo (2011), Sider (2007), Simons (2004), and Tognazzini (2006).

But I will give a brief overview of some reasons for thinking that extended simples are possible. First, denying that extended simples are possible violates two Humean recombination principles. The first one comes from Sider:

> The possibility of extended simples follows from plausible principles about location and possibility; mereology has nothing to do with it. The principle about location is that location is a fundamental relation between objects and points of space. The principle about possibility is a combinatorial principle requiring, roughly, that any pattern of instantiation of a fundamental relation be possible. These principles imply the possibility of the location relation's holding in a one-many pattern between a mereologically simple object and points of space – an extended simple."[33]

And the second from McDaniel: "Given the Humean premise, if an object must have the same mereological structure as the region of space it occupies, then either the mereological structure of the object is not intrinsic, or the mereological structure of the region of space is not intrinsic, or the mereological structure is not accidental."[34] The mereological structure of objects and regions of space are thought by everyone except for mereological essentialists to be accidental. And mereological structure is also thought to be intrinsic, since duplicates have a 1-1 correspondence *between their parts* that preserves perfectly natural properties and relations. So, it's not the case that an object must have the same mereological structure as the region of space it occupies, and so extended simples are possible.

A second reason to accept extended simples is that there are physical things. If mereological nihilism is true, then the only physical objects that exist are mereological simples. If mereological simples are point-sized, then there are an infinite number of them, since it takes an infinite number of point-sized objects to fill up any extended region of space, no matter how small.[35] But there aren't an infinite number of physical objects. So not all mereological simples are point-sized.[36]

[33] Sider (2007), p2.

[34] McDaniel (2007), p 136.

[35] Proof: suppose we have a region of space with volume V, composed of smaller regions of volume v. The number N of regions of volume v we need is V/v. N=V/v. Point-sized regions have no volume. So to fill up any region with volume V, N=V/0. But this is undefined. So, regardless of the value of V — if V has a positive value — we need an infinite number of regions of 0-volume to fill it up.

[36] Thanks to Ed Lochocki for discussion.

Markosian (1998b) gives an argument similar to this. Markosian asks us to imagine a world with just one material object – a spatially continuous homogenous sphere. It seems like we can imagine such a world. But if extended simples are impossible, then we're imagining an impossible world, because any world with one material object contains an infinite number of material objects. It is impossible, if there couldn't be extended simples, for any world containing an extended object to contain only a finite number of physical objects.

A third reason comes from current science. It is often mentioned that our two best scientific theories — quantum mechanics and general relativity — seem inconsistent. Very roughly, quantum theory explains three of the four fundamental forces – electromagnetism, the strong nuclear force, and the weak nuclear force – and general relativity explains the fourth – gravity. But it seems like they can't both be true. There are currently only two promising ways to resolve this seeming inconsistency: string theory (or "M-theory") and loop quantum gravity.

Both theories entail the existence of extended simples.[37] If string theory is true, then there are extended simples, because strings are extended (one-dimensional) simples.[38] If loop quantum gravity is true, then space is discrete; so, its smallest parts are extended.[39] If an extended simple fills up some but not all of an extended region, then there's a part of the region it fills up; and so there are regions smaller than it.[40] But that's impossible. So, if loop quantum gravity is true, the smallest things are also extended.

This point is worth belaboring: there are currently only two physical theories in contention for reconciling general relativity and quantum mechanics, and both of them entail the existence of extended simples. This is scientific evidence that extended simples are not only possible, but actual. And loop quantum gravity and string theory are physical theories – even if they are false, they may very well be *possible*. And if they are possible, then so are extended simples. Thus, the mereological nihilist will need to give different answers to the puzzles for worlds in which loop quantum gravity or string theory is true. But then she may as well give those answers for the actual world, too, since she accepts them and they solve the puzzles; there's no reason to also accept mereological nihilism.

I hope that is enough to convince the reader that the possibility of extended simples ought to be taken seriously, and the mereological nihilist cannot just dismiss

[37] For more on this, see Tognazzini (2006).

[38] See Greene (1999), Callender (2011), and Parsons (2000).

[39] See Smolin (2004).

[40] See Spencer (2010). There are other odd consequences if simples are unextended but the smallest regions of space are extended. First, no simple would exactly occupy a region of space. Second, a simple could move without changing location – from one side of a simple extended region to another. Third, two distinct things could be in the same place at the same time – one simple on one side of a simple extended region and another simple on the other. (Of course, the sides couldn't be parts of the extended simple region.)

their possibility without argument.[41] Those who still aren't convinced can read the conclusion of this paper as a conditional: if extended simples are possible, then mereological nihilism is unmotivated. The conditional is interesting enough itself; if it is true, the motivation for mereological nihilism stands or falls with the implausibility of extended simples. And one might have thought exactly the opposite – that the existence or possibility of extended simples would be good news for mereological nihilism, since it would be nice to be permissive about what simples could be like given that they're the only physical things nihilists think exist. Not so, if I'm right.

If I'm right, the only nihilists for whom the view is at all motivated by being able to solve multiple puzzles are those who accept that all simples are point-sized (though even they have a few puzzles to deal with). So, one could read this paper as an argument for another conditional: if one thinks that only mereological simples exist, one ought to think nothing is extended.

So much for reasons to accept the possibility of extended simples. I turn back now to the puzzles.

7 Overdetermination

The following is an overdetermination argument that has been taken to support mereological nihilism.[42] Consider a stone, and the mereological simples that compose it.

[41] Peter Simons (2004) considers (though does not endorse) an argument against the possibility of extended simples (p372ff.) It starts with what he calls the 'Geometric Correspondence Principle', which has since been called 'Mereological Harmony' by Uzquiano (2011): if x is extended, then x has parts corresponding to the parts of the region it occupies. More precisely: For any object x and region R, if R is occupied by x, then for any occupiable subregion of R R^*, there exists a y such that y occupies R^* and y is a part of x. Any extended simple occupies an extended region of space, overlapping many points. But simples don't have proper parts, so they can't occupy subregions of the regions they occupy by having proper parts at those regions. So, extended simples run afoul of Mereological Harmony. Thus, extended simples are impossible. (Presumably Mereological Harmony is supposed to be a necessary truth; otherwise the conclusion is just that there aren't any extended simples.)

First, note that the argument is invalid, since Mereological Harmony doesn't tell us that objects occupy regions of space by having *proper* parts at those regions. Nor should Mereological Harmony be modified to do so, since every object occupies the region it *exactly* occupies by having an improper part there. So Mereological Harmony must allow for extended objects to have *improper* parts corresponding to regions they (exactly) occupy. One option for the proponent of extended simples, then, is to say that an extended simple occupies the proper subregions of the region it occupies by having an improper part at those regions. Using the terminology of Parsons (MS), extended simples might *entend* the regions they occupy by being wholly located at each proper subregion of the regions they exactly occupy. Second, one might deny that any extended region overlaps many points; rather, space itself might be made up of extended simple regions, as loop quantum gravity requires. (Braddon-Mitchell and Miller (2006) suggest that space might be made up of Planck-cubes.) At the very least, we cannot rule this out *a priori*. So, this argument doesn't force one to deny the existence or possibility of extended simples.

[42] See Merricks (2001)

Overdetermination Argument:

1. If the stone shatters a window, then the mereological simples acting together also shatter the window.
2. If the stone and the mereological simples acting together shatter the window, then the shattering of the window is overdetermined.
3. The shattering of the window is not overdetermined.
4. The stone does not shatter the window. (from 1, 2, 3)
5. If the stone does not shatter the window, then the stone doesn't exist.
6. The stone doesn't exist. (from 4, 5).

The thought behind (1) is that the stone can't shatter the window if the mereological simples don't shatter the window; that is, the stone doesn't have emergent causal powers. The thought behind (2) is that if two distinct things each cause an event, the event is overdetermined. The thought behind (3) is that we should resist widespread, systematic overdetermination, and this is a case of it if ever there is one. And the thought behind (5) is that if a stone doesn't do something like shatter a window, then it doesn't do anything, and so it doesn't exist.

The conclusion of Overdetermination Argument is that stones don't exist, because they don't do the sorts of things that stones would do if they existed, like shattering windows. And it's easy to see how Overdetermination Argument generalizes beyond stones and window-shatterings to any composite objects and any other events. And if composite objects never cause anything, there is little other reason to posit them.

In this case, it seems like even if I propose a new overdetermination argument that mereological nihilism doesn't solve – a case of overdetermination that doesn't involve things with parts – we will still be left with the original argument. (Like showing that too much sun exposure causes cancer doesn't show that smoking cigarettes is any better.) Overdetermination is always bad, and perhaps we'll need to deny many kinds of things in order to avoid it. Not just composite objects, but any other objects that can be used for an overdetermination argument.

However, if we can show that *all* events are overdetermined, then it seems like we shouldn't worry about overdetermination. And I think we can. Consider the relation of *constitution*. Composition is a many-one relation; many things compose one thing. Constitution is a one-one relation; one thing constitutes another. Statues are constituted by lumps, fists are constituted by hands, traffic signs are constituted by pieces of metal, and so on. According to (Baker, 2007, p 32), "all ordinary material objects are constituted by aggregates of subatomic particles", and (Baker, 2009, p 4) says, "when certain things with certain properties are in certain circumstances, new things with new properties come into existence".[43] Since constitution isn't about

[43] See also Baker (2012), where she argues that persons are constituted by their bodies.

parthood, but rather kind-membership, there seems to be no reason to prohibit extended simple objects (if there are any) and unextended simple objects (if there are any), in addition to ordinary extended composite objects, from standing in the constitution relation.

So, here is another overdetermination argument, involving a mereological simple that constitutes a clay particle.[44]

Simple Overdetermination Argument:

1. If the clay particle makes my eye tear up, then the mereological simple that constitutes it also makes my eye tear up.[45]
2. If the clay particle and the mereological simple that constitutes it make my eye tear up, then the tearing up of my eye is overdetermined.[46]
3. The tearing up of my eye is not overdetermined.
4. The clay particle does not make my eye tear up. (from 1, 2, 3)
5. If the clay particle does not make my eye tear up, then the clay particle doesn't exist.
6. The clay particle doesn't exist. (from 4, 5)

The thought behind (1) is that the clay particle can't cause my eye to tear up if no mereological simple causes my eye to tear up; that is, the clay particle doesn't have emergent causal powers. The thought behind (2) is that if two distinct things each cause an event, the event is overdetermined. The thought behind (3) is that we should resist widespread, systematic overdetermination, and this is a case of it if ever there is one. And the thought behind (5) is that if a clay particle doesn't do something like make my eye tear up, then it doesn't do anything, and so it doesn't exist.

The conclusion of Simple Overdetermination Argument is that clay particles don't ever cause eyes to tear up. And it's easy to see how Simple Overdetermination Argument generalizes to any things that are caused by objects that are constituted by other objects. But clearly this argument does not give us good reason

[44]'Clay particle' is the term for a rock with a radius less than 1/256mm, according to Wentworth (1922). Depending on what the mereological nihilist thinks simples are, she can think of the clay particle as extended or unextended. All this requires is that the simple in question can cause something.

[45]If the reader is thinking of the simple as unextended, and she doesn't think unextended simples can cause eyes to tear up, then substitute something that they can do — presumably they have some causal powers. If they don't have any causal powers, then we can go right to premise 4.

[46]One might say that the clay particle *just is* the simple, and that *just is* should be understood as identity. For reasons that constitution is not identity, see Baker (1997). And of course, one could say this in the original case, too—that would be to accept that composition is identity.(See Cotnoir (2014).) But the clay particle and simple seem to have different modal profiles (for example, the clay particle could have parts whereas the simple could not), so giving this response seems to require a solution to Simple Puzzle. And while mereological nihilism entails that composition is identity (see Calosi (Forthcoming)), it does so only in the trivial sense that the only composition that the nihilist accepts is the degenerate case where an object is composed of itself.

to be mereological nihilists, because denying the existence of composite objects does not allow one to deny a premise, and so the argument still goes through. So, another answer to Simple Overdetermination Argument is needed. And there's no reason to think that answer won't also work as a response to Overdetermination Argument, since the only difference is that the baseball has proper parts, while the clay particle doesn't. So, Overdetermination Argument is not a motivation for mereological nihilism.

One might think there's a very natural answer to Simple Overdetermination Argument that isn't an answer to Overdetermination Argument – deny that anything stands in the constitution relation. Since the nihilist already denies that anything stands in the many-one composition relation, denying that anything stands in the one-one constitution relation might be a natural addition to the view. But it is an addition. And it doesn't solve the original puzzle.

The foregoing puzzles do not require that the objects in question have parts; they don't even require that the objects be spatially extended! The simples involved in the new versions may be point-sized, and the puzzle remains. Clearly mereological nihilism doesn't solve these new puzzles, but the other solutions to the original puzzles do. So far, there is no reason to accept mereological nihilism.

8 The Ship of Theseus

The ship of Theseus causes us question the seemingly obvious thought that objects can gain and lose parts over time, or be made up of different stuff at different times. Here is the puzzle:

> Theseus' Ship: Theseus owned a strong and mighty ship, but it is battle-worn. After his death, it is kept in the harbor for decades. Planks begin to fall off the ship, and as they do, they are replaced with new planks. Eventually, not one plank remains from the time Theseus was alive. The question is whether this is still Theseus' ship. To further complicate matters, it turns out that as each plank falls off, Theseus' nemesis Asterion has his minions collect them and assemble them into a ship in his lake. When the last original plank falls off and is replaced, Asterion's lake has a ship that contains all and only the boards from the ship Theseus purchased. Which ship is Theseus' ship: the one in the harbor, or the one in Asterion's lake?[47]

The argument is that the following things all seem true, but are inconsistent:

Theseus' Ship Argument

[47]The original version of the puzzle doesn't mention Asterion; that was a twist added by Hobbes (1655). For a discussion of the original puzzle, see (Chisholm, 1976, 89).

1. Theseus' ship (the original) had all the same parts that Asterion's ship now has.
2. If any two things share all the same parts, they're identical.
3. Asterion's ship is identical to Theseus' original ship. (from 1, 2)
4. The ship in the harbor resulted from the gradual replacement of parts of Theseus' original ship.
5. Ships survive the gradual replacement of parts.
6. The ship in the harbor is identical to Theseus' original ship. (from 4, 5)
7. Asterion's ship is identical to the ship in the harbor. (from 3, 6)
8. Theseus' original ship is not in two places at the same time.

Mereological essentialists deny (5); nothing can survive the loss of even one part.[48] Temporal parts theorists deny (1); Asterion's ship and the ship in the harbor are both four-dimensional objects which at some times have all the same parts at that time, but at some times they have different parts.[49] The mereological nihilist denies all the premises except (2), since they say that there are no such things as ships.[50] But mereological nihilists must deal with the following similar argument:

> Theseus' Simple Ship: Theseus owned a strong and mighty mereologically simple ship, but it is battle-worn. After his death, it is kept in the harbor for decades. Some of the matter that had made up the ship begins to fall off, and as it does, it's replaced with new matter.[51] Eventually, none of the matter remains from the time Theseus was alive. The question is whether this is still Theseus' ship. To further complicate matters, it turns out that as the matter falls off, Theseus' nemesis Asterion has his minions collect it and assemble it into a ship in his lake. When the last of the original matter has been replaced, Asterion's lake has a ship that contains all and only the matter that once made up the ship Theseus purchased. Which ship is Theseus' ship: the one in the harbor, or the one in Asterion's lake?

The argument is that the following things all seem true, but are inconsistent:

Theseus' Simple Ship Argument

1. Theseus' ship has all the same matter as Asterion's ship.
2. If any two things share all the same matter, they're identical.

[48] See Chisholm (1973).

[49] See Sider (2001a) and Heller (1990).

[50] They accept (2) because the only parts an object has are its improper parts – namely, the object itself.

[51] I'm using "matter" to be the mass term such that '*x*'s matter is *y*' doesn't entail that *y* is a part of *x*. I could also use 'stuff'. For more on this, particularly the inability to reduce matter/stuff to things, see (Markosian, 2004, §2) and Kleinschmidt (2007).

3. Asterion's ship is identical to Theseus' ship. (from 1,2)
4. The ship in the harbor resulted from the gradual replacement of matter from Theseus' ship.
5. Ships can survive the gradual replacement of matter.
6. The ship in the harbor is identical to Theseus' ship. (4,5)
7. Asterion's ship is identical to the ship in the harbor. (from 3, 6)
8. Theseus' ship is not in two places at the same time.

The matter essentialists (if there are any) would deny (5); nothing can survive the loss of even some of its matter. Temporal parts theorists deny (1); Asterion's ship and the ship in the harbor are both four-dimensional objects which at some times overlap, but they are still distinct. Some might now deny (2), saying that two distinct things can have all the same matter. But what about the mereological nihilist? She doesn't, *qua mereological nihilist*, deny that some things are made of matter—after all, mereological simples are material objects, and to be material is just to be matter or to be made of matter. So she can't deny the same premises of Theseus' Simple Ship Argument as she does in Theseus' Ship Argument – at least, not for the same reason.[52] So, another answer to Theseus' Simple Ship Argument is needed. And since that response will probably have nothing to do with the mereological status of either ship, there's no reason to think it won't also work as a response to Theseus' Ship Argument. So, Theseus' Ship Argument is not a motivation for mereological nihilism.[53]

9 The Problem of the Many

The problem of the many was originally put forth by Unger (1980) and Geach (1980). Here's a version of the problem:

> The Coffee Table
>
> This coffee table in front of me looks solid, and as though its boundaries are perfectly precise. But it is not, and they are not. It's made up of a swarm of hydrogen, oxygen, and carbon atoms. Some of the atoms are well within the boundaries of the table, and seem clearly to be parts of it. But some are out on

[52] Of course, if the nihilist gives a theory of what the extended simples are and that theory entails that they can't change their matter, then that would be a good response to Theseus' Simple Ship Argument. She might, for example, say that simples are the smallest bits of matter, so they can't lose any matter. One might respond that extended objects can be conceptually divided into a left half and a right half, and conceivably anything that has a left half and a right half *could in principle* lose one of those halves. For more on this, see Spencer (2010).

[53] I continue to cast the puzzle in terms of a ship for the sake of symmetry, but if the reader thinks extended simples can't be ship-shaped, she can substitute "Theseus' lump" or "Theseus' simple" for "Theseus' ship". Nothing hangs on what kind of thing it is, as long as Theseus owns it.

> the edge, and some are nearly off the edge. Where, exactly, is the edge? There are many collections of atoms that seem perfectly good candidates for being my coffee table. Yet it seems clear that I only purchased one coffee table, and only one coffee table is in front of me. Which collection of atoms makes it up? There are many answers that seem as good as any other. So we can't arbitrarily pick one. So there is either no coffee table in front of me, or millions.

Some say that *being a coffee table* is a maximal property, so the largest thing in the vicinity is the coffee table.[54] Some say that there are in fact millions of coffee tables, but for convenience we talk as though there's only one.[55] The brutalist says that though there are many sets of atoms, only one set composes anything.[56] Supervaluationists say that it's not always determinate when something is a part of something else; there's just one coffee table, but there are some atoms such that it's indeterminate whether those atoms are part of the table. Epistemicists say that there is exactly one coffee table, and that for every atom there is a fact of the matter about whether or not the atom is a part of the table, but that it is impossible to know which atoms are parts of the table.

The mereological nihilist, of course, denies that there are coffee tables, and denies that anything is composed of many parts. But mereological nihilists must contend with another version of the problem:

> The Simple Coffee Table
>
> This coffee table in front of me looks solid, and as though its boundaries are perfectly precise. But it is not, and they are not. It's made of matter, though it has no proper parts.[57] Some of the matter is well within the boundaries of the table, but some of it is out on the edge, and some nearly off the edge. Where, exactly, is the edge? There are many collections of matter that seem perfectly good candidates for being my coffee table. Yet it seems clear that I only purchased one coffee table, and only one coffee table is in front of me. Which matter makes it up? There are many answers that seem as good as any other. So we can't arbitrarily pick one. So there is either no coffee table in front of me, or millions.

Of course, one could say that the extended simple coffee table does have precise boundaries – wherever the matter making up the simple stops. But one could say the same thing about the original coffee table; it has a precise boundary, which is wherever the matter making up the coffee table stops.[58] But that is not obviously

[54] See Sutton (2014), Sider (2001b), 49, Hawley (2001), 166.

[55] See Lewis (1993) and Williams (2006); see Hudson (2001) for a discussion.

[56] See Markosian (1998a).

[57] This could also be posed in such a way that the coffee table is made of stuff, not matter. See Markosian (2004).

[58] I assume that the parts of the coffee table themselves have parts, which have parts…And that eventually at bottom is simples, which are material.

a reasonable answer (or else The Coffee Table wouldn't seem interesting), and it's no more obviously a reasonable answer in this case. It seems more reasonable in this case only if we presuppose Markosian (1998b)'s MaxCon view of simples: x is a simple iff x is a maximally continuous object. Then we can say that the coffee table stops where there's matter that's not connected to the matter of the coffee table.[59] But that is just one view of simples. Another view is that an object is simple in virtue of being physically indivisible; such objects might have plenty of gaps inside them and near the edges. Same for the metaphysical indivisibility view – x is a simple iff it's impossible to divide x. So for all we know, extended simples give rise to a very similar puzzle as coffee tables. Also, it's worth noting that this response doesn't follow from mereological nihilism; nothing about mereological nihilism entails that The Simple Coffee Table is impossible. So mereological nihilism isn't a solution to this puzzle.

All the original responses except one work just as well to The Simple Coffee Table as to The Coffee Table. The only one that doesn't is mereological nihilism. One cannot deny the existence of composite objects and solve the problem, since the coffee table in the new problem is not a composite object. The mereological nihilist must give some other solution to the problem, and since that response will have nothing to do with the mereological status of either coffee table, there's no reason to think it won't also work as a response to The Simple Coffee Table. So, The Coffee Table is not a motivation for mereological nihilism.

10 Denying Certain Kinds of Extended Simples

To respond to the arguments and to solve the puzzles, one might say, we need not deny the possibility of extended simples *tout court*; we just need to deny that there could be objects that have the features required to give rise to the puzzles. One could do this, but the longer the list gets – the list of features that give rise to the puzzles – the more this response seems unmotivated and *ad hoc*.

Unless, however, one does one of two things. First, one could give a general principle that entails mereological nihilism and that entails that there aren't any objects that have the features that give rise to the puzzles. Perhaps "no non-point-sized things", though that wouldn't solve the coincidence puzzle or the Sorites paradox. One would then need to motivate that principle, though its working as a solution to the puzzles would certainly count in its favor.

Second, one could actually give a theory of what the extended simples are. For example, one might think that string theory is the best hope of reconciling general relativity with quantum mechanics, and so there are strings, and so there are extended simples. Then we'd have to see whether we can come up with similar puzzles to the above using just strings (or whatever kind of simple one's theory posits). But the

[59] Spelling this out without assuming that the coffee table is made of a precise hunk of matter is tricky.

objector needs to offer a theory of simples that does solve the puzzles; until then, mereological nihilism remains unmotivated. And indeed, the mereological nihilist would still have to give solutions to the new puzzles in worlds in which extended simples are different. Or she would have to argue that her theory of what the extended simples *are* is a theory of what they *could be*. That is, she could say that extended simples couldn't be anything other than what her theory says. But arguing for such a view seems a tall order.

11 The Argument from Vagueness

The final puzzle in the metaphysics of material objects I'll discuss is the argument from vagueness. The argument is similar to a Sorites argument, but is directly about composition.

The Argument From Vagueness: Composition

1. What there is can never be vague.
2. If what there is can never be vague, then composition can never be vague.
3. Composition can never be vague. (from 1, 2)
4. If not every class has a fusion, then possibly there are two cases, one in which composition occurs and another in which it does not, such that the two cases are connected by a finite series of cases each of which is extremely similar to the one on either side of it with respect to all composition-relevant factors.
5. If there is a continuous series of cases connecting a case of composition and a case of non-composition, then either composition can be vague or there are two cases that are extremely similar to each other with respect to all composition-relevant factors but are such that in one composition occurs and in the other it does not.
6. There are not two cases that are extremely similar to each other with respect to all composition-relevant factors but are such that in one composition occurs and in the other it does not.
7. There is not a continuous series of cases connecting a case of composition and a case of non-composition. (from 3, 5, 6)
8. Therefore, every class has a fusion. (from 4, 7)[60]

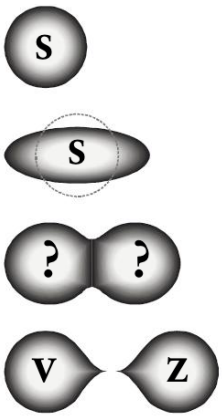
Some deny (1), saying that it can be vague whether propositions of the form $\exists y(y = a)$ are true.[61] Some deny (6), and say that there are sharp cutoffs in composition, such that moving a proton 0.001 nanometers can make the difference

[60] See (Sider, 1997, p. 214-222) and (Lewis, 1986, p. 212-213).
[61] See Barnes (2014) and Korman (2010a), footnote 41.

between composition occurring and composition not occurring.[62] But neither of these solutions are very widely endorsed.

A proponent of any view in which composition sometimes occurs but does not always occur, and who also accepts (1) and (6), has a hard time picking a premise of The Argument From Vagueness: Composition to deny.[63] The mereological universalist accepts the conclusion of the argument; as the argument makes obvious, it is designed to be an argument for mereological universalism. But the mereological nihilist can also solve the puzzle; she denies (4), because she thinks no class has a fusion — there are no cases in which composition occurs.

But the mereological nihilist must deal with a similar situation.[64] Consider an extended simple, *s*, that has no parts (of course) and that presently occupies a continuous region of space. But, *s* is about to undergo fission. That is, *s* is about to split into two things, *v* and *z*, which occupy regions of space between which there is a region of space not occupied by either *v* or *z*. Here is an illustration.



The transition from the second step to the fourth step of the above fissioning could be a very long process, taking billions of years, *s* stretching and stretching, its middle becoming thinner and thinner, until eventually there's a measurable distance between the resulting two simples *v* and *z*. So it could be that for a long stretch of time, it is

[62] Some say that such cut-offs are just brute facts, like Markosian (1998a), and others say they are grounded, like Merricks (2001) and van Inwagen (1990); Merricks grounds the cut-offs in non-redundant causal powers, and van Inwagen in being caught up in a life, though van Inwagen says sometimes it's vague whether some *x*s are caught up in *y*'s life, so sometimes composition is vague.

[63] Though see Korman (2007), chapter 2.

[64] The following is inspired by some examples in Hawley (2004), which argues that extremism about simplicity is motivated by similar concerns as extremism about composition – in her words, "extremists about composition who base their view on the argument from vagueness should choose between the claim that everything has proper parts and the claim that nothing has proper parts" (392). Thanks to an anonymous referee for bringing this excellent paper to my attention.

vague whether there is any space between them, and thus it is vague whether there's one thing or two things. With this situation in mind, here's another argument from vagueness.

The Argument From Vagueness: Fission

1. What there is can never be vague.

2*. If what there is can never be vague and every object is simple, then fission can never be vague.

3*. Fission can never be vague. (from 1, 2*)

4*. If every object is simple, then possibly there are two cases, one in which fission occurs and another in which it does not, such that the two cases are connected by a finite series of cases each of which is extremely similar to the one on either side of it with respect to all fission-relevant factors.

5*. If there is a continuous series of cases connecting a case of fission and a case of non-fission, then either fission can be vague or there are two cases that are extremely similar to each other with respect to all fission-relevant factors but are such that in one there is fission and in the other there is not.

6*. There are not two cases that are extremely similar to each other with respect to all fission-relevant factors but are such that in one there is fission and in the other there is not.

7* There is not a continuous series of cases connecting a case of fission and a case of non-fission. (from 3*, 5*, 6*)

8*. Therefore, not every object is simple. (from 4*, 7*)

Those who aren't mereological nihilists have a relatively straightforward response. They can say that, if *s* splits, it was never mereologically simple; *v* and *z* were there all along, *v* and *z* were both parts of *s*, and *s* was the fusion of *v* and *z*. Mereological universalists can go a step farther. They can say that *v* and *z* have always existed and that *s* still exists and is the fusion of *v* and *z*. Epistemicists can say that (6*) is false; there are two cases that are extremely similar to each other with respect to all fission-relevant factors but are such that in one there is fission and in the other there is not.

But mereological nihilists don't think that there are any fusions of two things. There are four options for them. Option 1: they can say that neither *v* or *z* is identical to *s*, in which case two new things come into existence as a result of fission. But then it is vague when those new things began to exist, and so there are times at which what there is is vague. This options denies (1). Option 2: they can say that one of *v* or *z* is identical to *s*, in which case one new thing comes into existence as a result of fission. But then it is vague when that thing began to exist, and so there are times at which what there is is vague. This options also denies (1). Option 3: They can say that *v* and *z* are both identical to *s*, and so are identical to each other, in which case nothing

new comes into existence. Rather *s* becomes multiply located or becomes a spanner as a result of fissioning. This option denies (2*). Option 4: fission is impossible. This option denies (4*). Options 3 and 4 are the options that avoid the problem of vague existence. But both come at a cost. To accept Option 3, the nihilist must accept that objects can be multiply located or can span, and this is a matter of considerable debate. To accept Option 4, the nihilist must claim that a positively conceivable state of affairs is in fact impossible. Or the mereological nihilist can adopt epistemicism, which also works as a response to The Argument From Vagueness: Composition.

So, the mereological nihilist can solve The Argument From Vagueness: Composition; she does so by denying (4). But there are five other solutions to the problem of vagueness, and they all seem more intuitive than mereological nihilism. And mereological nihilists have a more difficult time with The Argument From Vagueness: Fission; they cannot, simply by virtue of accepting mereological nihilism, deny (4*). So although nihilism solves The Argument From Vagueness: Composition, given that it doesn't solve The Argument From Vagueness: Fission, or any of the other new puzzles in this paper, it's hard to see why it's the best solution.

12 Conclusion

Mereological nihilism was thought to provide a unified solution to many of the puzzles in material object metaphysics. I have showed how to modify each of these puzzles so that mereological nihilism is not a solution to it. I contend, then, that mereological nihilism doesn't get to the heart of the matter. Denying the existence of composite objects may solve the classic puzzles, but that's not enough. The puzzles aren't *really* about parts, so making clear that the objects in question don't have parts also makes it clear that mereological nihilism is no solution. And whatever solution one adopts for the new puzzles works equally well in the classic puzzles, so there's no reason to also accept mereological nihilism.

The only way that mereological nihilism can remain motivated is for the nihilist to offer a response to each new puzzle that doesn't work as a response to the original puzzle, and then to respond to each original puzzle with mereological nihilism. For example, she could deny that every object constitutes itself (solving Simple Overdetermination Argument), and that extended simples are possible (solving Theseus' Simple Ship Argument and The Simple Coffee Table), and also offer responses to Simple Sorites Paradox, Simple Coincidence Puzzle, and Simple Arbitrariness Argument that don't work as responses to the corresponding original puzzles. But until such responses offered, I maintain that puzzles about material objects don't give anyone a reason to be a mereological nihilist.

Fordham University
Department of Philosophy

References

Baker, Lynne Rudder. 1997. "Why Constitution is Not Identity." *Journal of Philosophy* 94:599–621.

——. 2007. *The Metaphysics of Everyday Life: An Essay in Practical Realism*. Cambridge University Press.

——. 2009. "The Very Idea of Material Constitution." Presented at Australian National University, Research School of Social Sciences.

——. 2012. *Persons and Bodies: A Constitution View*. Cambridge University Press.

Barnes, Elizabeth. 2014. "Fundamental Indeterminacy." *Analytic Philosophy* 55:339–362.

Bennett, Karen. 2009. "Composition, Coincidence, and Metaontology." In David Chalmers, David Manley, and Ryan Wasserman (eds.), *Metametaphysics*. Oxford: Oxford University Press.

Braddon-Mitchell, David and Miller, Kristie. 2006. "The Physics of Extended Simples." *Analysis* 66:222–226.

Brenner, Andrew. 2015. "Mereological Nihilism and Theoretical Unification." *Analytic Philosophy* 56:318–337.

Burke, Michael. 1994. "Preserving the Principle of One Object to a Place: A Novel Account of the Relations Among Objects, Sorts, Sortals, and Persistence Conditions." *Philosophy and Phenomenological Research* 54:591–624.

Callender, Craig. 2011. "Philosophy of Science and Metaphysics." In Steven French and Juha Saatsi (eds.), *Continuum Companion to the Philosophy of Science*, 33–54. Continuum.

Calosi, Claudio. Forthcoming. "Composition is Identity and Mereological Nihilism." *The Philosophical Quarterly* .

Chisholm, Roderick. 1973. "Parts as Essential to Their Wholes." *Review of Metaphysics* 26:581–603.

——. 1976. *Person and Object: A Metaphysical Study*. La Salle, Illinois: Open Court Publishing Co.

Contessa, Gabriele. 2014. "One's a Crowd: Mereological Nihilism without Ordinary-Object Eliminativism." *Analytic Philosophy* 54:199–221.

Cotnoir, Aaron J. 2014. "Composition as Identity: Framing the Debate." In Aaron Cotnoir and Donald Baxter (eds.), *Composition as Identity*, 3–23. Oxford University Press.

Dorr, Cian. 2002. *The Simplicity of Everything*. Ph.D. thesis, Princeton University.

Einheuser, Iris. 2006. "Counterconventional Conditionals." *Philosophical Studies*

127:459–482.
Feldman, Fred. 1973. "Sortal predicates." *Noûs* 7:268–282.
Fine, Kit. 1975. "Vagueness, Truth and Logic." *Synthese* 30:265–300.
Geach, P. T. 1980. *Reference and Generality*. Ithaca, NY: Cornell University Press.
Gibbard, Allan. 1975. "Contingent Identity." *Journal of Philosophical Logic* 4:187–221.
Greene, Brian. 1999. *The Elegant Universe*. New York: Vintage Books.
Hawley, Katherine. 2001. *How Things Persist*. Clarendon Press.
——. 2004. "Borderline Simple or Extremely Simple." *The Monist* 87:385–404.
Hawthorne, John. 2006. *Metaphysical Essays*. Oxford: Oxford University Press.
Heller, Mark. 1990. *The Ontology of Physical Objects: Four-dimensional Hunks of Matter*. Cambridge: Cambridge University Press.
Hirsch, Eli. 2010. *Quantifier Variance and Realism: Essays in Metaontology*. Oxford University Press.
Hobbes, Thomas. 1655. *De Corpore*.
Horgan, Terence and Potrc, Matjaz. 2008. *Austere Realism: Contextual Semantics Meets Minimal Ontology*. Cambridge: MIT Press.
Hudson, Hud. 2001. *A Materialist Metaphysics of the Human Person*. Ithaca, NY: Cornell University Press.
Kleinschmidt, Shieva. 2007. "Some Things about Stuff." *Philosophical Studies* 135:407–423.
Korman, Daniel Z. 2007. *The Naive Conception of Material Objects: A Defense*. Ph.D. thesis, University of Texas at Austin.
——. 2010a. "The Argument from Vagueness." *Philosophy Compass* 5:891–901.
——. 2010b. "Strange Kinds, Familiar Kinds, and the Charge of Arbitrariness." *Oxford Studies in Metaphysics* 119–144.
——. 2015. *Objects: Nothing out of the Ordinary*. Oxford University Press.
——. 2016. "Ordinary Objects." In Edward N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy*. https://plato.stanford.edu/archives/spr2016/entries/ordinary-objects/: Metaphysics Research Lab, Stanford University, spring 2016 edition.
Lewis, David. 1976. "Survival and Identity." In Amelie O. Rorty (ed.), *The Identities of Persons*, 17–40. Berkeley: University of California Press.
——. 1986. *On the Plurality of Worlds*. Oxford: Basil Blackwell.
——. 1993. "Many, But Almost One." In John Bacon, Keith Campbell, and Lloyd Reinhardt (eds.), *Ontology, Causality, and Mind: Essays on the Philosophy of D. M. Armstrong*, 23–42. Cambridge: Cambridge University Press.
Liggins, David. 2008. "Nihilism Without Self-Contradiction." *Royal Institute of Philosophy Supplement* 62:177–196.
Markosian, Ned. 1998a. "Brutal Composition." *Philosophical Studies* 92:211–49.

——. 1998b. "Simples." *Australasian Journal of Philosophy* 76:213–26.
——. 2004. "Simples, Stuff, and Simple People." *The Monist* 87:405–428.
——. 2008. "Restricted Composition." In Dean Zimmerman Theodore Sider, John Hawthorne (ed.), *Contemporary Debates in Metaphysics*, 341–363. Blackwell.
McDaniel, Kris. 2007. "Extended Simples." *Philosophical Studies* 133:131–141.
McGee, Vann and McLaughlin, Brian. 2000. "The Lessons of the Many." *Philosophical Topics* 28:129–151.
Merricks, Trenton. 2001. *Objects and Persons*. Oxford: Clarendon.
Moyer, Mark. 2006. "Statues and Lumps: A Strange Coincidence?" *Synthese* 148:401–423.
Parsons, Josh. 2000. "Must a Four-dimensionalist Believe in Temporal Parts?" *The Monist* 83.
——. 2007. "Theories of Location." In Dean W. Zimmerman (ed.), *Oxford Studies in Metaphysics Volume 3*, 201–232. Oxford University Press.
——. MS. "Entension, Or How It Could Happen That an Object Is Wholly Located in Each of Many Places."
Quine, W. V. O. 1950. "Identity, Ostension, and Hypostasis." *Journal of Philosophy* 47:621–33.
Rea, Michael. 2000. "Constitution and Kind Membership." *Philosophical Studies* 97:169–93.
Saenz, Noel B. 2015. "A Grounding Solution to the Grounding Problem." *Philosophical Studies* 172:2193–2214.
Saucedo, Raul. 2011. "Parthood and Location." In Dean W. Zimmerman and Karen Bennett (eds.), *Oxford Studies in Metaphysics*, volume 6. Oxford University Press.
Sider, Theodore. 1996. "All the World's a Stage." *Australasian Journal of Philosophy* 74:433–453.
——. 1997. "Four-Dimensionalism." *Philosophical Review* 106:197–231.
——. 2001a. *Four-Dimensionalism*. Oxford: Clarendon.
——. 2001b. "Maximality and Intrinsic Properties." *Philosophy and Phenomenological Research* 63:357–364.
——. 2007. "Parthood." *The Philosophical Review* 116:51–91.
——. 2009. "Ontological Realism." In David Chalmers, David Manley, and Ryan Wasserman (eds.), *Metametaphysics*. Oxford: Oxford University Press.
——. 2013. "Against Parthood." In Karen Bennett and Dean W. Zimmerman (eds.), *Oxford Studies in Metaphysics Volume 8*. Oxford University Press.
Simons, Peter. 2004. "Extended Simples: A Third Way Between Atoms and Gunk." *The Monist* 87:371–384.
Smolin, Lee. 2004. "Atoms of Space and Time." *Scientific American* 290:66–75.

Spencer, Joshua. 2010. "A Tale of Two Simples." *Philosophical Studies* 148:167–181.

Sutton, C. S. 2014. "The Supervenience Solution to the Too-Many-Thinkers Problem." *Philosophical Quarterly* 64:619–639.

Tognazzini, Neal. 2006. "Simples and the Possibility of Discrete Space." *Australasian Journal of Philosophy* 84:117–128.

Unger, Peter. 1979. "There Are No Ordinary Things." *Synthese* 41:117–154.

——. 1980. "The Problem of the Many." In Peter French, Theodore E. Uehling, Jr., and Howard K. Wettstein (eds.), *Midwest Studies in Philosophy V: Studies in Epistemology*, 411–67. Minneapolis: University of Minnesota Press.

Uzquiano, Gabriel. 2011. "Mereological Harmony." In Dean W. Zimmerman and Karen Bennett (eds.), *Oxford Studies in Metaphysics*, volume 6. Oxford University Press.

Van Cleve, James. 2008. "The Moon and Sixpence: A Defense of Mereological Universalism." In John Hawthorne Theodore Sider and Dean W. Zimmerman (eds.), *Contemporary Debates in Metaphysics*, 321–340. Malden, MA: Blackwell.

van Inwagen, Peter. 1990. *Material Beings*. Ithaca, NY: Cornell University Press.

Wallace, John R. 1965. "Sortal predicates and quantification." *Journal of Philosophy* 62:8–13.

Wentworth, Chester K. 1922. "A Scale of Grade and Class Terms for Clastic Sediments." *The Journal of Geology* 30:377–392.

Williams, J. R. G. 2006. "An Argument for the Many." *Proceedings of the Aristotelian Society* 106:411–417.

Williamson, Timothy. 1994. *Vagueness*. London: Routledge.