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Universalism and Classes

ABSTRACT: Universalism (the thesis that distinct objects always compose a further object) has come under much scrutiny in recent years. What has been largely ignored is its role in the metaphysics of classes. Not only does universalism provide ways to deal with classes in a metaphysically pleasing fashion, its success on these grounds has been offered as a motivation for believing it. This paper argues that such treatments of classes can be achieved *without* universalism, examining theories from Goodman and Quine, Armstrong and Lewis. In the case of each theory, universalism is drafted in to ensure that there are enough material objects to play a particular role. I argue that, for each theory, there's a better theory that ditches universalism and instead uses an alternative principle of composition demanding that unrestricted composition of entities other than material objects (respectively: regions, states of affairs and singletons) to play that role instead. I conclude that (i) non-universalists can consider accepting such theories of classes and (ii) we should ignore any alleged motivation for universalism on the basis of dealing with classes.

1. Introduction

Universalism (the thesis that distinct material objects always compose a further material object) has come under much scrutiny in recent years. What has been largely ignored is its role in the metaphysics of classes. Various theories dealing with classes have been founded upon universalism (of which I shall examine theories by Goodman and Quine, Armstrong and Lewis). This paper argues that, to the contrary, we can have such metaphysical treatments of classes *without* universalism, for where the original theory demands the existence of lots of fusions of material objects (a demand met by endorsing universalism) we can instead use lots of fusions of things from other categories (a demand we can meet by endorsing a principle of unrestricted composition in a category other than material objects). This has two results. First, it undermines a motivation for universalism. Secondly, it opens up such theories to those philosophers who have avoided them because those theories commit one to universalism (e.g. van Inwagen, who refuses to accept Goodman and Quine's theory (*q.v.*) for just such a reason [2008: 138]).

In §2 I introduce a subtle distinction between universalism and unrestricted mereological composition. §3 explains the general motivation for universalism on the grounds of its success in dealing with classes. I then explain how to remove a commitment to universalism from three theories: Goodman and Quine's Constructive Nominalism (§4); Armstrong's theory of classes as states of affairs (§5); and Lewis's argument for the Main Thesis (an argument that Armstrong also relies upon; §6).

Before beginning, a brief note on terminology. I use 'thing' for anything whatsoever, whereas I retain 'object' strictly for those things that are material objects (so no spacetime region is an object; no class is an object etc. but they are all 'things').

2. Unrestricted Mereological Composition (UMC)

2.1 UMC without universalism

This paper distinguishes between unrestricted mereological composition (UMC) and universalism. Let UMC be the claim that every collection of distinct things compose a further thing, whilst construing universalism as being the narrower thesis that every collection of distinct *material objects* compose a further *material object*. Note that UMC doesn't entail Universalism for UMC only entails that all material objects compose *something*, not necessarily a material object. It is popular to endorse some form of composition like UMC or Universalism [Armstrong 1989: 92; Bunt 1985: 297; Leonard and Goodman 1940; Leśniewski 1916; Lewis 1986a: 211-3 *inter alia*], although it is not often that one focuses on the distinction between the two (examples of those who do include van Inwagen [1990: 19-20] and Donald Smith [2006: 367n2], who make clear they're discussing universalism and not UMC). There are, however, occasions when the distinction is relevant (for instance, the Lewis-Sider argument from vagueness [Lewis 1986a: 212-3; Sider 2001: 120-32] guarantees universalism, but it's hard to see how it could be tailored to guarantee UMC.) As will become clear, this distinction is also what allows me to remove universalism from the theories discussed below.

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As all of the theories of classes discussed below rely only upon UMC, and not universalism *per se*, one easy way to deal with classes and avoid a commitment to universalism is to accept a theory whereby UMC is true but not universalism. Examples include:

Example one: Supersubstantialists believe that material objects are identical to regions of spacetime. It's standard to believe that regions always have a union, and if we take the popular position of identifying unions with fusions of their sub-regions [Goodman 1966: 47; Parsons 2004: 89-90 *inter alia*] then material objects (being regions) must always compose a further region. But even though two material objects compose a region, it's open to the supersubstantialist to deny that the thing those regions compose is also a material object [see, e.g., Nolan Forthcoming]. So everything could compose (and UMC be true) without universalism being true.

Example two: Similar moves have been made by Nicholas Smith, who argues that everything always composes but denies that universalism follows for they may compose mere *possibilia*, as opposed to bona fide material objects [Smith 2005].

Thus, accepting UMC without universalism is one (very easy) way to meet the aims of this paper. However, neither Smith's view of *possibilia* nor the above version of supersubstantialism are main stream positions. So, whilst you *could* say such things, I won't assume that they are true, and will instead charitably assume that if material objects compose anything then they compose a material object (*a fortiori* that UMC entails universalism). So I take my task to be to remove a commitment to UMC from all of the theories discussed below.

2.2 Unrestricted Composition in other categories

People routinely think mereological relations (e.g. composition) hold between things from other categories: regions (see above); numbers and mathematical objects [Bell 2004; Parsons 2007: 205n3]; events [Mellor 1998: 86; Rea 2003: 249; Turetzky 1998: 131-2; *inter alia*]; properties [Hawthorne and Sider 2003: 32; van Cleve 1985:264]; facts [Koons 1997]; structured universals [Lewis 1986b and Hawley Forthcoming both discuss them as possibilities, although Lewis opts against them]; actions [Chant 2006]; abstract pictures [Westerhoff 2005]; and some think anything at all can stand in mereological relations [Armstrong 1989: 92; Lewis 1986a: 212n9; Sider 2007].

Given mereological relations can hold between things in those categories, it would be consistent for composition in one category of entities to be restricted (so UMC is false), whilst things unrestrictedly compose in another category. For example, it is consistent to accept an ontology containing only numbers and objects where the objects always compose further objects, but the numbers never compose anything. In that case, universalism is true but UMC is false. Or, alternatively, it is consistent to believe in regions and objects, whereby the regions always compose further regions but the objects only sometimes compose further objects. In that case, universalism (and UMC) is false but there is unrestricted composition amongst regions. It is cases like the latter that most interest me, whereby we have the unrestricted composition of things in categories other than material objects, whilst denying universalism. This paper will argue that we should deploy such principles of composition in order to remove universalism from the theories discussed below.

2.3 Gerrymandered objects

Before continuing, we should note *why* people generally disdain universalism. The most common line of worry is that if universalism is true then there are bizarre gerrymandered objects. For instance, the Eiffel Tower and the Taj Mahal would compose a strange gerrymandered material object: the Eiffel Mahal. It is these objects that often drive people away from endorsing universalism [e.g. Korman 2008; Markosian 2008]. Whilst this is not the only reason to deny universalism, this paper will assume that avoiding a commitment to such unwanted gerrymandered entities is something that must be respected. So whatever moves are made to

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rescue the various theories below from being committed to universalism, one of the criteria for success is that I do so whilst avoiding running roughshod over such intuitions.

3. Arguments from Expediency

Whilst one aim of this paper is to open up certain metaphysics of classes to those who deny universalism, the other aim is to undermine an alleged motivation for universalism. Whilst there are many motivations for believing UMC (and thus universalism, at least given the charitable assumption from above that UMC entails universalism) one motivation is oft relied upon but is rarely criticised. It is that motivation that this section gives an overview of, and it is that motivation that this paper serves to undermine.

Often universalism is introduced to serve a purpose in some philosophical theory. This itself becomes a motivation for UMC/universalism: accept universalism because it is *useful* to believe. Call this an *argument from expediency* for universalism. For each of the theories below, an argument from expediency for universalism is (either explicitly or implicitly) advanced on the grounds of the success of that theory in dealing with classes (Hudson [2006: 636] also endorses more generally that dealing with classes is a motivation for universalism, although he doesn't name names as to exactly whose theories he has in mind). So the success of each of the theories in dealing with the metaphysics of classes is itself a reason to accept universalism.

For each theory I will demonstrate that we can get a revised theory by replacing universalism with an alternative principle of unrestricted composition for things *other than material objects*. So we get all of the benefits, but without the downside of having to accept universalism. Hence, as the revised theory is just as good as the original, but with less downsides, it is *better* than the original theory. So anyone originally motivated towards a theory relying on universalism would now be motivated toward my (more appealing) revised theory. That is enough to scupper the arguments from expediency for universalism (and, clearly, it is likewise enough to demonstrate that, in general, one can have such theories without endorsing universalism.)

One worry with this tactic is that whilst it might be *consistent* for things in one category to unrestrictedly compose, and UMC be false, there is nevertheless a strong pressure to think that, given that composition is unrestricted in one category, everything unrestrictedly composes and UMC is true. There are two reasons to think this. *Reason one*: We might think it is just *simpler* if the same composition principle applies across all categories – that it is somehow inelegant to complicate matters by having different principles of composition. But this drags us from one motivation for universalism (its expediency in dealing with classes) to another (that it provides an elegant and simple theory). I admit there is such a motivation on the grounds of making everything elegant and simpler, but dealing with *that* motivation is not my intention with this paper (although I do deal with it elsewhere [Effingham Forthcoming]). So I will not discuss it here, and set aside this second reason as being part and parcel of a quite different motivation for universalism. *Reason Two*: We might think it consistent but *unmotivated* to unrestricted composition in one category and restrict it in another. I deal with this latter in §4.3 and §6.3.

4. Constructive Nominalism

4.1 Constructive Nominalism: Motivation for Universalism

The first theory dealing with classes is Goodman and Quine's [1947]. Call it 'constructive nominalism' (CN). Though Quine famously accepted the existence of classes, he had earlier teamed up with Goodman in an effort to eliminate them. There is no explicit mention of an argument from expediency for universalism with regards to CN, but Goodman, if not Quine, almost certainly would have endorsed it. For instance when, co-writing with Leonard, he introduced classical mereology he tries to sell it on the grounds of it being 'a powerful and expedient instrument' [Leonard and Goodman 1940: 50]. Whilst he wouldn't have had the as-yet-unwritten CN in mind at the time of writing, I presume that he would see CN as being just such a demonstration of classical mereology's power (*a fortiori* the expediency of universalism). He also

makes similar statements some years after the 1947 paper [1966: 46], and again I think he would count CN as one demonstration of how useful classical mereology was, and part of the case for accepting universalism.

4.2 Constructive Nominalism: Discussion I

Goodman and Quine's joint paper comes in two parts: (i) a demonstration that various concepts like quantitative comparisons, ancestral relations etc. can be analysed without classes and (ii) for the remaining statements, whilst those statements are taken to be meaningless [1947: 111], Goodman and Quine provide a method for us to talk *about* such statements.

Begin with the first part. Classes are often put to use in analysing predicates. Goodman and Quine offer translations of such putative definitions which avoid commitment to classes. For instance, Frege's original analysis of '*x* is an ancestor of *y*' is:

x is an ancestor of *y* iff (i) *x* and *y* are distinct; (ii) for every class, *c*, if *y* is a member of *c*, and all parents of members of *c* are members of *c* then *x* is a member of *c*.

Goodman and Quine give a new translation, removing class-talk and replacing it with fusion-talk [1947: 108-9]. They replace all occurrences of 'member of' with 'part of', and all occurrences of 'class' with 'individual'. They then stipulate two extra conditions, that *x* is a parent and that *y* has a parent, to ensure that *x* and *y* are not just parts of organisms but are instead the organisms themselves (to prevent thumbs, organs etc. from turning out as being ancestors):

x is an ancestor of *y* iff (i) *x* and *y* are distinct; (ii) *x* is a parent of something; (iii) *y* has a parent; (iv) for every object *z*, if *y* is a part of *z*, and all parents of parts of *z* are parts of *z* then *x* is a part of *z*.¹

This analysis only works given a very liberal composition principle. With a restricted principle of composition the final conjunct may well end up being vacuously satisfied. For example, if we had a restricted principle of composition whereby (in most cases) two people were not part of a further object, conjunct (iv) would be vacuously satisfied and every person who has a child would be the ancestor of every other person who had a parent. That's not right at all. So we need a liberal composition, and the only such liberal principle on offer is universalism. To use the fusion-talk and ditch the classes, we must conscript in universalism.

But I believe there is a similar strategy that doesn't use universalism. Classes are so useful because, for any *ys*, there's something (the class) and the *ys* all stand in some relation to that thing (membership). Goodman and Quine substitute fusion talk: for any (material) *ys* there is a material object (the fusion) and the *ys* all stand in some relation to that object (parthood). I propose we do away with using material fusions, and substitute *spacetime regions*, to which all the *ys* stand in a certain relation (exactly occupying one of its sub-regions) to get this alternative analysis:

x is an ancestor of *y* iff (i) *x* and *y* are distinct; (ii) *x* is a parent of something; (iii) *y* has a parent; (iv) for every spacetime region *r*, if *y* is exactly located at a sub-region of *r*, and all parents of objects exactly located at sub-regions of *r* are exactly located at a sub-region of *r* then *x* is exactly located at a sub-region of *r*.²

¹ Even with the addition of conjuncts (ii) and (iii) there are still potential counterexamples. Imagine there are only two *human* parents in existence, Adam and Eve, and that they have a child, Caine. Next imagine that Caine has cell₁ as a part, which was the parent of some other cell in his body, cell₂. Clearly cell₁ is distinct from Caine, cell₁ is a parent of something (namely cell₂), and Caine has a parent – thus meeting the first three conjuncts of the definition. From the transitivity of parthood, any object that has Caine as a part will have cell₁ as a part. So conjunct (iv) is met as well. Therefore cell₁ ends up being an ancestor of Caine, which clearly isn't right! So their revision of Frege's analysis is not flawless.

² This analysis is not immune to counterexample. Imagine a ghost that is exactly superposed with a living human. If the ghost is a parent, but has no parents (say it is the ghost of Eve), whereas the living human has a parent, then it will turn out that the ghost is an ancestor of the human. But that need not be the case, for Eve's ghost might not be the living human's ancestor, as someone else (Lilith?) might be instead. So we

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So just as Goodman and Quine introduce a surrogate for classes by substituting fusions of the material objects, I introduce a surrogate by substituting regions. The region in question is the shadow in substantial space³ of the gerrymandered object that Goodman and Quine rely upon. Unlike normal shadows, though, when you remove the gerrymandered object (as I do by denying universalism) the shadow remains. Just as the gerrymandered object can play the appropriate role in obviating the need for classes, the region/shadow can play that role as well. Of course, it *does* demand that regions unrestrictedly compose, but as §2.2 makes clear, this isn't the same as endorsing universalism.

Here's another example translation that Goodman and Quine offer [1947: 109-10]. To translate 'There are more cats than dogs' they introduce the predicate ' is bigger than '. They then define:

x is a bit =_{df} for every y , if y is bigger than no other cat or dog, then neither is x bigger than y nor y bigger than x .

More loosely, an object is a bit if it's exactly as big as the smallest animal that is either a dog or a cat. Assume that the smallest dog or cat will be a cat (so x is a bit iff it is the same size as the smallest cat). Further assume that I divide into arbitrary parts. I will then have parts that are as big as the smallest cat, so I have some bits as parts. So too will dogs have bits as parts, and all cats (for all cats are at least as large as the smallest cat). Goodman and Quine then offer the following:

There are more cats than dogs =_{df} Every object that has (as a part) one bit from each cat is bigger than some object that has (as a part) one bit from each dog.

As the bits are the same size, if there are 10 cats and 5 dogs, then any fusion with 10 bits of the cats will be larger than a fusion of 5 bits from the dogs, and the paraphrase works.⁴ Again, it is obvious that the fusions of the 'bits' will be gerrymandered objects, thus we will need universalism for this second translation to work.

So again drop the talk of the fusions and switch instead to region talk. As the definition of bit deals only with the size of things, those things could be regions just as easily as objects. So we can retain the definition of 'bit' and say:

There are more cats than dogs =_{df} Every region that has (as a sub-region) one bit from each region that each cat exactly occupies, is bigger than some region that has (as a sub-region) one bit from each region that each dog exactly occupies.

So I think we can successfully replace fusion-talk with region-talk.

The only hitch is that this technique can only deal with spatiotemporal things. As is, my method could not deal with, say, ancestral relations between things which are unlocated e.g. numbers, Platonic universals, Cartesian souls etc. (whereas Goodman and Quine's theory could). To solve this, make the translations *disjunctive*: if the things under discussion are all spatiotemporally located then use my revised translation (replacing class-talk with region-talk), but if even one of the things ranged over is *not* so located then use Goodman and Quine's original translation scheme (replacing class-talk with fusion-talk).⁵ So whilst the definition of ' x is the ancestor of y '

have a counterexample. This is not fatal for, as *n1* points out, the original analysis is defective as well. As the counterexamples to my analysis are quite bizarre, and in using ghosts of parentless people etc. seem even more bizarre than the counterexample from *n1*, I do not feel overly worried.

³ This talk of shadows in substantial space is taken from Parsons [2007: 203].

⁴ There might be problems if the objects overlap, but as this is a problem for Goodman and Quine, I set it aside.

⁵ This means that if some of the things were not located and some were, there would be transcategorical fusions. In cases like these I'll rely on similar tactics that I use for Lewis's argument for the Main Thesis (*q.v.*), and argue that there's a principle of composition such that if there is an abstractum amongst the y s then the y s always compose. See §6.2.

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deals only with spatiotemporal things, and thus can be given in region-talk, the ancestral of, say, succession between numbers will revert to the fusion talk thusly:

x stands in the ancestral of succession to y iff (i) x and y are distinct; (ii) x is a number; (iii) y is a number; (iv) for every thing z , if y is a part of z , and all successors of parts of z are parts of z then x is a part of z .⁶

Of course, this *will* demand that numbers unrestrictedly compose (and, as similar tactics will be deployed for other non-spatiotemporally located things, all non-spatiotemporally located things will unrestrictedly compose). But that's fine: again, as §2.2 makes clear it is consistent to accept such a thing whilst denying universalism. Nor should we be too put off by having to use a disjunctive analysis. Whilst it makes the theory more piecemeal, using one tactic for spatiotemporally located things and a different one for non-spatiotemporally located things, CN is quite piecemeal in any case. Goodman and Quine not only have one technique for removing class talk from analysing ancestral relations, and another for counting more x s than y s, but they develop further – again, different – analyses for other sentences, such as ‘There are exactly one third as many Canadians as Mexicans’ (where, of course, I believe a ‘region-talk’ analysis will work just as well as their ‘fusion talk’ analysis, but space prohibits a full demonstration of this). Moreover, they are explicit that even having developed those different analyses they still haven't managed to develop a general method. There remain numerous sentences which they want to analyse into fusion talk which will require yet more different analyses that they have not yet developed [1947: 111]. So Goodman and Quine's original theory is piecemeal already, and while my revision adds some extra complexity, it is only a minor addition given how complex the original theory is. Moreover, that small added complexity looks well worth the cost compared to accepting universalism and its horde of gerrymandered objects.

4.3 Objections to the revised theory

I see three objections to my revised theory: (i) that I demand the unrestricted composition of unlocated things (and regions), and I cannot guarantee this given I reject UMC; (ii) that the liberal fusions of unlocated things are as reprehensible as gerrymandered material objects; and (iii) the revised theory is committed to substantivalism (an additional, and possibly unwanted, cost).

Objection one: I have already made clear that it's consistent to deny universalism whilst simultaneously accepting the unrestricted composition of regions and non-spatiotemporally located things. But just because it is not ruled *out* does not mean it is ruled *in*. As I have given up on UMC, how can I be *assured* that there *are* such fusions?

So we start by asking, say, why this is true:

Liberal Unlocated Fusions (LUF): For all ys , if the ys are not located in spacetime, then the ys compose a further thing.

To see why we should think LUF is true, remind yourself of the dialectic we are caught up in. The argument under discussion is whether universalism is motivated on the basis of an argument from expediency grounded by CN. So we start off agnostic about some principle of composition (i.e. universalism) and, having demonstrated the power of CN, we accept that the principle is true. Given the argument we are considering, this expediency alone is meant to be motivation for universalism.

So when we come to LUF we are agnostic about it – it *could* be true, but it might not be. But armed with LUF I can gain the full power of my revised theory. So LUF is expedient and *that fact and that fact alone* motivates it. So it is not just some *ad hoc* stipulation that all unlocated things compose, I am merely playing the same game the universalist is playing in trying to motivate

⁶ For quantitative comparison of abstracta this won't work as ‘bits’ would have to be parts of numbers, and those parts would have to be bigger than other numbers. But this is a problem for both the revised theory and the original theory, so can be ignored.

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their principle of composition. The same line of reasoning gives us a motivation for thinking that regions unrestrictedly compose.

Objection two: Perhaps liberal fusions of unlocated things are just as gerrymandered and unwanted as gerrymandered material objects. So, given the concerns of §2.3, I've shot myself in the foot for I avoid universalism only by failing to respect the same intuition driving the resistance to it.

I disagree. Just because folk intuitions disdain objects like the Eiffel Mahal, that doesn't mean that folk intuitions tell against liberal fusions of unlocated things. My reasoning for this broadly follows a similar move made by McDaniel concerning the *de re* modal properties of regions [McDaniel 2004: 152]. If we had strong folk intuitions about the composition of non-spatiotemporally located things then we would have to have strong folk intuitions that such things existed in the first place. As we *don't* have strong folk intuitions that such things exist, we clearly don't have strong intuitions about their mereological structure. This is quite unlike material objects where the claim is that we do have strong intuitions about their mereological structure and that universalism does not respect those intuitions. So, unlike universalism, the things that must exist given this theory are not repugnant to any strongly held intuitions.

Objection three: In making use of regions I commit CN to substantivalism. As will become clear though, the second part of Goodman and Quine's project demands substantivalism anyhow. So it is no cost *in comparison* for my theory to rely upon it. With that in mind, let us turn to that second part.

4.4 Constructive Nominalism: Discussion II

Goodman and Quine cannot translate every sentence that involves class talk, e.g. mathematicians' talk about set-theoretic axioms, theorem or proofs. So they say that such talk about classes is meaningless (perhaps it is instead false – it makes little difference for our purposes here). So every inscription in every maths text book is meaningless (or false). Goodman and Quine say we can nevertheless save maths, as we can still say things *about the inscriptions* themselves. For example, take an axiom of propositional logic:

$(\varphi \supset (\psi \supset \varphi))$

Goodman and Quine say that the inscription expresses nothing, but it is still true *of the inscription itself* that it falls under the predicate of ' is an axiom' (or, in the case of other inscriptions, ' is a theorem' etc.). Goodman and Quine build up the rules governing when inscriptions fall under the predicates of ' is a theorem', ' is an axiom' etc. out of predicates concerning typographical shape. So there is a predicate "LPar" that applies to an object when it has the typographical shape of a left parenthesis, e.g. "("; there is a predicate "Ac" which applies to any object that has the typographical shape of an accent, e.g. "' "; and so on for a variety of marks.⁷ Mereological fusions of marks form 'concatenations' when those marks are orientated in the appropriate way. So the above axiom is a fusion of four parentheses inscriptions, two inscriptions shaped like horseshoes, two inscriptions that are phi-shaped, and one inscription that is psi-shaped. Because they are all orientated 'correctly' i.e. from left to right with a small, regular, space in between, then the fusion is a concatenation (as opposed to a mere fusion of scattered, random, marks).

Goodman and Quine then define predicates such as ' is a theorem' and ' follows validly from ' in terms of these typographical predicates. For example, we could have one concatenation, C₁, that is the fusion of the marks ' $\varphi \supset \psi$ '. It could stand in the 'line below' relation to the concatenation, C₂, that is ' φ ', then the final concatenation C₃, which is simply the

⁷ As a matter of artistic license (and for the sake of ease and modernity) I use contemporary logic symbols, whilst Goodman and Quine did everything in terms of the Sheffer Stroke (*cf* Cohnitz and Rossberg [2006: 247n8]).

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inscription ‘ ψ ’, stands in the ‘follows validly from’ relation to the fusion of C_1 and C_2 . The exact definitions, and how they build them up out of their small stock of primitives, is a long and in-depth (and interesting!) enterprise. There is no need to detail it in full here, and hopefully the above examples give enough of an idea of how the project works for me to carry on without further detail.

It’s the concatenations where universalism rears its gruesome head. Given universalism, and given the marks (in correct orientation), you’ll always get the concatenation. Not so with restricted composition. For instance, if you believe van Inwagen’s *Life* principle [van Inwagen 1990] then there are only simples and living organisms. There would be no marks on pages (indeed, no pages!) *a fortiori* no concatenations either. So, if I am to appeal to all restricted compositioners, I should not assume that the correct composition principle entails that such concatenations exist.

Fortunately, Goodman and Quine already have a similar problem, and I can use their method of escape just as easily as they can. Certain concatenations are theorems because they stand in the appropriate relations to other marks i.e. the rest of the proof. But some inscriptions are theorems even though no-one has ever written out the proof. Noting this problem, Goodman and Quine supplement the existing written inscriptions by saying that what counts as an inscription need not just be marks on a page [1947: 121]. *Anything* that is appropriately shaped and orientated can count as an inscription, where this includes spacetime regions [1947:106]. There are regions of spacetime that are left parenthesis shaped, accent shaped etc. and the existence of these regions with appropriate typographical shapes vastly increases the inscriptions we have available. So an inscription can be a theorem even if the proof hasn’t been written out by human hands, for it’s enough that it stands in the appropriate relations to those inscriptions around it which are literally written on the fabric of spacetime.

First, in reifying regions, this obviously commits Goodman and Quine to substantivalism, so it is no embarrassment that the revised theory laid out above also commits to it. Second, having introduced this strategy, I can avoid universalism. The original theory avoids talking about classes by claiming that the talk is actually about something else: *sometimes* concatenations on a page, and *sometimes* about regions of spacetime with a specific shape. I can make a similar move, but instead say that it’s *always* about spacetime regions with a specific shape. Where Goodman and Quine say we are talking about an inscription on a page – a fusion of ink-blots that may not exist given a denial of universalism – I claim we are talking about the region of space that those inkblots occupy (so, again, the gerrymandered fusion of ink blots may not exist, but – as the revised theory endorses the unrestricted composition of regions – their ‘substantial shadow’ does). Since Goodman and Quine have already allowed that *sometimes* talk turns out to be about regions, there is no harm saying that it is *always* about regions. If anything, it is more theoretically unified and so better than the original theory.

4.5 Constructive Nominalism: Conclusion

There is an alternate version of constructive nominalism that does not rely on universalism, but does rely on liberal fusions of spacetime regions (and abstracta, if there be any). It is at least as plausible as the original theory, for the original theory already relies on liberal fusions of regions (and abstracta, if there are any) so it cannot be an additional cost for me to do likewise. Moreover, the revised theory avoids commitment to gerrymandered objects. So my revised theory has all of the benefits, and one less cost, than the theory using universalism. Therefore an argument from expediency for universalism, when relying on CN, will fail as, at best, an argument from expediency will end up motivating my revised theory instead (as it has as much power but less costs).

5. Classes as States of Affair

5.1 *Classes as States of Affairs: Motivation for universalism*

Unlike Goodman and Quine, Armstrong tries not to eliminate classes, but instead make his ontology more parsimonious by identifying them with states of affairs. Armstrong argues that universalism is essential to this treatment of classes, and indeed *explicitly* advances an argument from expediency for universalism on the back of the alleged success of his theory [2004: 119]. *Contra* Armstrong we can have the benefits of his theory without universalism.

Armstrong has two *different* methods for dealing with classes. The first *is* committed to universalism but it is flawed – indeed Armstrong considers it only a preamble to the second theory. The second theory works, but (unlike the former method) does *not* require universalism.

5.2 *Classes as States of Affairs: Discussion I*

The first (flawed) theory works like this. For each whole, there are many ways to divide it. A house can be divided into rooms, or divided into floors, or divided into a pile of bricks. Each of these collections (the rooms, the floors, the bricks) have the same fusion i.e. the house. But the class of the parts of one division is not identical to the class of parts of another division e.g. the class of rooms is distinct from the class of bricks, which are both distinct from the class of floors. Given this notion of division, Armstrong offers up his first theory:

Given [universalism] to every class there corresponds an aggregate which is the mereological sum of the members of that class. The class is, in a way, the aggregate, but it is the aggregate with something added, viz. a certain particular division of the aggregate, *with that particular division as essential to making it that class.* [Armstrong 1997: 186; his emphasis]

So a class is the fusion (the ‘aggregate’) of (i) the fusion of the members of the class and (ii) a ‘division’ (i.e. that thing that is essential to making it that class). As any collection of material objects has a corresponding class, this would demand that for any collection of objects there must be a mereological fusion of those objects (so universalism would be true). So if *this* was Armstrong’s explanation then universalism *would* be demanded. Fortunately it is not Armstrong’s actual explanation of classes. Armstrong gives this discussion only as a *preliminary* to his theory of classes. The notion of a ‘division’ remains undefined, and it is mysterious what a ‘division’ is meant to be. Armstrong himself readily admits this [1997: 186] and it is that reason why he attempts a second explanation to eliminate this mysteriousness.

5.3 *Classes as states of affairs: Discussion II*

The second explanation begins by taking singletons to be states of affairs. A singleton, $\{a\}$, is identical to the state of affair Fa ⁸ where F is a ‘unit-making property’. A unit-making property is a property that demarcates the object as a single object, such as *being a (delineated) square* or *being a man*. So a unit-making property is such that if a has it, then a is one, single, thing (Armstrong’s actual treatment of unit-making properties is more extensive than this, but this caricature will suffice). That accounts for the singletons. To account for many-membered classes, he accepts Lewis’s Main Thesis (*q.v.*): that classes are mereological fusions of their subclasses. So classes are just fusions of singletons.

Here’s an example of how it works. Take two decompositions of a person, such as a decomposition into atoms and a decomposition into organs and other body parts. So there are two, distinct classes: the class of atoms that compose the person and the class of organs (and body parts) which do likewise. Call them Atom-class and Organ-class. From the Main Thesis, Atom-

⁸ Later Armstrong retracts his claim that the state of affairs is identical to the singleton, and claims it is just the truthmaker for the singletons existing [Armstrong 2004: 121]. Were you to take this line of argument then you would have to make appropriate modifications to what I say later in this section, but it should not unduly affect my argument.

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class is a fusion of the singletons of the atoms, and Organ-class is a fusion of the singletons of the organs. The singletons of the atoms are states of affairs, *atom x having property F* where *F* is the unit-making property *being an atom*. The singletons of the organs are also states of affairs, namely *organ y having property G* where *G* is the unit-making property *being an organ*. These states of affairs are obviously different from one another, so the singletons of the atoms and of the organs (being identical to these states of affairs) are likewise distinct. Concurrently, both the Atom-class and the Organ-class are fusions of distinct states of affairs, and are distinct classes.

5.4 Classes as states of affairs: Doing without universalism

But with this second, superior, explanation in place we no longer need universalism. Imagine the class {Mars, Alpha Centauri, Galaxy NGC 6207}. All three objects must have unit-making properties (say *F*, *G* and *H*), and so there are states of affairs: *Mars is F*; *Alpha Centauri is G*; *Galaxy NGC 6207 is H*. Each of these states of affairs is a singleton (of Mars, Alpha Centauri and the Galaxy respectively). For the class to exist there must be a fusion of the singletons, *but there need not be a fusion of the members of the singletons*. We don't need a fusion of Mars, Alpha Centauri and some far flung galaxy, so we don't need universalism to guarantee that such a fusion exists. Nor is it the case, as Armstrong says in the first explanation, that there must be a whole that the class is 'associated' with. Instead we can 'build-up' classes without talking about material wholes that are 'associated' with the members of every class. If we don't need 'associated' wholes, we don't need universalism. So at no point during this second explanation need we believe that *material objects* unrestrictedly compose, only that states of affairs unrestrictedly compose (and, even then, only some of them need compose i.e. the singletons).

So to have Armstrong's theory we just need the unrestricted composition of states of affairs (or, if you'd prefer, just the singletons). We will then always have the requisite fusions to identify with classes, and do not need universalism. Adding universalism to the theory would be a cumbersome and unnecessary addition that incurs a philosophical cost in the form of gerrymandered objects yet yields no philosophical benefit (at least, no benefit to do with the metaphysics of classes). Thus, *contra* Armstrong, there is no argument from expediency to be found here. And, as argued in §4.3 with regards to unlocated things in general, there is no reason to treat these liberal fusions of singletons as being 'gerry mandered' or in any way counterintuitive.

6. Lewis's Main Thesis

6.1 Main Thesis: Motivation for universalism

But perhaps we are being too hasty, for Armstrong relies on the Main Thesis. The Main Thesis is part of megethology: Lewis's system of deriving set theory by assuming a (primitive) singleton function, plural quantification and classical mereology. In assuming classical mereology, megethology assumes UMC/universalism. So Armstrong may reasonably complain that his argument from expediency has bite after all – to have his theory you must bring in the Main Thesis, which brings universalism with it. This section details how to revise the argument for the Main Thesis without assuming universalism/UMC. So if you want Armstrong's metaphysics of classes (or, indeed, ran an independent argument from expediency using any theory that relied upon the Main Thesis) you can have it without universalism.

6.2 Main Thesis: Discussion I

Lewis's argument begins with some definitions: singleton, null set and definitions of size. It takes as primitive ' is the singleton of ', and defines 'singleton' as anything that appears on the left hand side of that relation. That has nothing to do with universalism, so I can take that as primitive as well.

For 'null set', as no individual has members, each of them is suited to being the null set. Lewis defines the null set as being some individual that is arbitrarily selected, and arbitrarily picks the fusion of *all* individuals. Given universalism is false it might be that there isn't such a fusion, so it

would be safer to build an argument for the Main Thesis without relying on such a thing. We should instead arbitrarily pick some other object to be the null set e.g. George Bush. One might worry that this is a problem because Bush is contingent, whereas the null set is not. But this looks like a worry for Lewis's theory as well for the fusions of all individuals at distinct worlds needn't be transworld identical with one another. To demonstrate, imagine two worlds, at both of which there exists only a single human being. At one world it is George Bush, at the other world that single human being is Barack Obama. The fusion of every individual that exists at the first world is Bush, at the second it is Obama. But Barack Obama is not transworld identical to George Bush, so neither are those fusions. So it follows that the null set, if it is the fusion of all individuals, would be contingent even if you endorsed Lewis's theory (although as every world has a fusion of individuals, although not the same fusion across worlds, it's necessary that there exists something that is a null set). (Further, see Cameron [2008] which argues that *no* world is transworld identical to any other world – again allowing us to conclude that the null set is contingent, even if there is necessarily *a* null set).

One wrinkle is that you might use counterpart theory to try and avoid the problem. For instance, under one counterpart relation, Bush isn't Obama's counterpart, whilst under another he is. Similarly for every world's fusion of all individuals at that world – under *some* counterpart relation that fusion *will* exist at every world, and so the null set would be necessary. But what's sauce for the goose is sauce for the gander: I can then make the same move for George Bush and say that under *some* counterpart relation he *does* exist at every world – and that the null set (when identified with Bush) *is* necessary. So, with that wrinkle smoothed, there is no problem with the null set being some other arbitrarily selected object.

Finally we have the 'definitions of size': large; small; many; few. Start with the first two. In pre-theoretic jargon (and where an atom is anything with no proper parts) an object is large iff it has as many atoms as parts as there are atoms that exist, otherwise it is small. So if there are beth-four atoms that exist, an object is large iff it has beth-four atoms. However, as we haven't managed to define ordered pairs yet (we don't even have the basics of set theory!), we cannot count one-to-one correspondence *a fortiori* cannot rely upon this pre-theoretical jargon in giving the definition. Instead Lewis says:

x is *large* iff there are some things such that (1) no two of them overlap, (2) their fusion is the whole of Reality [i.e. the fusion of everything], and (3) each of them contains exactly one atom that is part of *x* and at most one other atom. Otherwise *x* is small. [1991: 89]

If we're trying to avoid universalism, and gerrymandered objects, this definition won't work. The first worry is that the second conjunct demands that the fusion of everything exists, which isn't assured given restricted composition. The more serious worry is that the second and third conjuncts demand outlandishly liberal composition. Consider: if there existed an object with the same cardinality of atoms as there were in Reality, it should be large. Imagine that (*per impossible*) the Taj Mahal was just such an object, and was composed of an infinite number of point sized particles. According to the third conjunct of Lewis's definition there are numerous diatoms (where a diatom is any object with only two atoms as parts). Each of those diatoms are composed of one atom from the Taj Mahal and one atom disjoint from the Taj Mahal, such that *every* atom disjoint from the Taj Mahal is a part of exactly one diatom (for otherwise their fusion would not be identical to Reality, which the second conjunct demands). So one of these diatoms will be composed of an atom from the Taj Mahal and an atom from, say, my left toe; another composed of an atom from the Taj Mahal and an atom from Bill Clinton's knee etc. Such things are clearly gerrymandered, and so will need a liberal composition principle such as universalism.

This is how to change the definition to no longer rely upon universalism. Since every atom is a part of one of the diatoms, if the Taj Mahal is large, then some of the diatoms will be mixed fusions composed of one *material* atom belonging to the Taj Mahal and an *abstract* atom (which, for Lewis, includes singletons). Lewis admits that much already. Just as the revision of CN

required liberal fusions of abstracta, we can revise Lewis's argument for the Main Thesis to include liberal mixed fusions by endorsing:

The Principle of Singleton Composition (PSC): For any (distinct) *ys* if some of the *ys* have singletons as parts then the *ys* compose.⁹

As will become clear, PSC does all of the work when it comes to revising the argument for the Main Thesis. First it solves all of the concerns from above. PSC secures the existence of a fusion of everything ('Reality') *Proof:* Assume there is at least one individual.¹⁰ That individual will have a singleton, *x*. Now take the collection of every thing – clearly it includes *x*. Given PSC, that collection composes, and has every existing thing as a part i.e. there is a fusion identical to Lewis's Reality. QED.

PSC also allows me to redefine 'large'. The pre-theoretical definition of 'large' was that an object is large iff it has as many atoms as Reality is composed of. Instead of Lewis's definition (which entails the existence of gerrymandered objects) define it as:

x is large iff there is a plurality of diatoms, the *ys*, such that (i) every atom of *x* is a part of at least one of the *ys*; (ii) every one of the *ys* has a singleton as a part; (iii) none of the *ys* overlap; and (iv) every singleton is part of one of the *ys*. Otherwise *x* is small.

This definition meets the pre-theoretical requirements just as well as Lewis's original definition. *Proof:* Imagine there is a thing which has as parts as many atoms as there are in creation. Call it *a*, and call the atoms in creation the *bs*. There are at least as many classes in creation as there are atoms in creation (for every atom that is an individual has a singleton).¹¹ As it will later transpire (given subsequent assumptions) all and only classes that are atoms are singletons, so obviously the singletons and atoms in creation are equinumerous. So we can pair the singletons and *bs* one-to-one. As (at least) one of each pair will have a singleton amongst it, then the pair will (given PSC) compose a diatom. Call these diatoms the *cs*. As we paired off every atom of *a* with every singleton we meet conjunct (i), (ii), and (iv). As they were paired off we meet conjunct (iii).¹² So pre-theoretically large things come out as large according to the revised definition. The pre-theoretically small will also come out small. Imagine that there is a thing, *a*, that has less parts, *bs*, than there are atoms in creation. As the singletons are always equinumerous with all of the atoms in creation, when we try and pair the atoms with the singletons then there will be more singletons than *bs*. So the resulting collection of diatoms can only include every singleton by overlapping with some other diatom i.e. by one of the singletons being a part of two or more of the diatoms. But then conjunct (iii) will fail to be met, ergo *a* must be small. So the pre-theoretically small end up being small given my definition. So the definition does the work required. QED.

⁹ As Lewis's theory entails that no individual has a member, PSC won't entail universalism.

¹⁰ This isn't a contentious assumption as Lewis's original argument for the Main Thesis needs at least one individual with which to identify the null set with. So, in comparison to the original theory, it's no problem for the revised theory to make that same assumption.

¹¹ Notice that for this proof, and the one below of 'few'/'many', it is okay to use terms and principles such as every individual having a singleton, the notion of pairing etc. just as long as we don't use such notions *in the definition*. Whilst the *definition* has to be free of such things (as we haven't got set theory at this stage), the *proof* does not for all the proof is doing is demonstrating that, at the end of the day and in the final theory, it will end up corresponding to the pre-theoretic notion (which we were unable to use because that notion was previously defined in terms denied to us, such as pairing). If you've got a problem with that, then that problem cuts against Lewis's original theory as well (e.g. if every individual didn't have a singleton, Lewis's original attempts at defining terms is itself done for [Lewis 1991: 89] so Lewis's own definitions only work by playing on an assumption he will later prove).

¹² To ensure conjunct (iii) is met, stipulate that the pairs are such that if a part of *x* is paired with another part of *x* then that latter part of *x* must likewise be paired with the former.

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The remaining definitions are ‘few’ and ‘many’, which apply to pluralities. The pre-theoretical explanation of ‘many’ is that the *ys* are ‘many’ iff there are an equal number of the *ys* as there are atoms in existence. Otherwise the *ys* are few. Lewis’s definition is:

the *ys* are few iff there is some small thing *x*, and some things, the *zs*, such that (i) *x* does not overlap the fusion of the *ys*; (ii) each of the *zs* is a diatom composed of one of the *ys* and one atom of *x*; (iii) for each of the *ys*, one of the *zs* is a fusion of it and one of the atoms of *x* and (iv) no atom of *x* is part of two or more of the *zs*. Otherwise they are many. [cf 1991: 91; I have made minor alterations for clarity]

Conjunct (i) is a problem as pluralities which are few might not have a fusion. But that’s easily solved: just let conjunct (i) be that ‘none of the *ys*, nor any part of any of the *ys*, are a part of *x*’. More problematic are conjuncts (ii), (iii) and (iv). Since some material atoms can be few, there must be some diatoms composed of one of the material atoms and the atoms of some small thing. But one may worry that the only small thing might be a material object, so the diatoms would be composed of one of the (few) material atoms and an atom from the small material object. For example, in a universe where the only small object was the Taj Mahal and there were some (few) atoms far off in space there would be bizarre gerrymandered diatoms composed of one of the atoms of the former and one of the latter.

But this won’t be a problem, for even if there are no small *objects*, there will be small *classes*.

Proof: Lewis assumes that there are at least beth-one atoms (see *Hypothesis I* below), so there will be some plurality, the *ys*, of beth-zero atoms. So there will be at least beth-zero singletons, for either the *ys* are singletons, or are individuals that must themselves have singletons. Given PSC, those beth-zero singletons have a fusion. So there is definitely a small fusion. QED.

Given that there is always a small *class* (of the appropriate size) the diatoms need not be gerrymandered *material* objects, but can instead be mixed fusions of one of the collection of few things and one atom of that small class. Given PSC those atoms will compose (so again PSC does the work universalism would otherwise be called upon for). So we can also successfully redefine few and many.

With the definitions in place we can turn to the axioms of megethology that Lewis relies upon to get to the Main Thesis:

Functionality: Nothing has two different singletons.

Distinctness: No two things have overlapping singletons, nor does any part of the null set overlap any singleton.

Induction: If there are some things, if every part of the null set is one of them, if every singleton of one of them is one of them, and if every fusion of some of them is one of them, then everything is one of them.

Domain: Any part of the null set has a singleton; any singleton has a singleton; any small fusion of singletons has a singleton; and nothing else has a singleton. [see Lewis 1991: 95-6]

I can take *Functionality* unaltered. *Domain*, *Distinctness* and *Induction* must be modified given my redefinition of what the null set is. If Bush is the null set, then according to *Domain* the only individuals that would have singletons would be the parts of Bush. That is obviously false. But this is solvable. ‘Every part of the null set’ is intended to pick out all and only the individuals i.e. those things without singletons as (improper or proper) parts. So we can replace ‘every part of the null set’ with ‘every object that has no singleton as a part’. Indeed, this rewriting is explicitly approved by Lewis [1991: 96]. So we have:

Distinctness:* No two things have overlapping singletons, nor does any thing that has no singleton as a part overlap any singleton.

Induction:* If there are some things, if every object that has no singleton as a part is one of them, if every singleton of one of them is one of them, and if every fusion of some of them is one of them, then everything is one of them.

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*Domain**: Any object that does not have a singleton as a part has a singleton; any singleton has a singleton; any small fusion of singletons has a singleton; and nothing else has a singleton.

Finally there are some hypotheses about the size of reality:

Hypothesis P: If something is small, then its parts are small.

Hypothesis U: If some things are small and few, their fusion is small.

Hypothesis I: Some fusion of atoms is infinite and yet small. [Lewis 1991: 93-4]

Both *Hypothesis P* and *Hypothesis I* can remain as they are. *Hypothesis U* needs only a small modification for without universalism it is not certain that all small and few things have a fusion. Thus:

*Hypothesis U**: If some things are small and few, and they have a fusion, then that fusion is small.

So we can give the various definitions and hypotheses without relying upon universalism by instead relying upon PSC. With that in place, Lewis derives the Main Thesis from the arithmetic. I won't sketch the proof that Lewis gives for it works exactly the same under my revised system as it does under Lewis's [1991: 96-100]. Conclusion: Lewis's argument for the Main Thesis does not require universalism/UMC just as long as PSC is true.

6.3 Main Thesis: Discussion II

All of this revolves around PSC being true. I see two objections.

Objection one: There is no reason to accept PSC.

Rejoinder: As with my revised version of CN and LUF, we should accept PSC because of the dialectic we are involved in. If the expediency of accepting universalism and using it in an argument for the Main Thesis is a reason to believe universalism, then that's reason enough also to accept PSC. And, of course, PSC is better in having less costs (i.e. no gerrymandered objects).

Objection two: The mixed fusions PSC commits us to are as repugnant as gerrymandered objects.

Rejoinder: Again, run the same line we did with CN in §4.3. Folk intuitions do not rule out liberal fusions of abstracta (or mixed fusions) as they do liberal fusions of material objects for then we'd have strong intuitions that these things existed. As we don't have such strong intuitions, we can't have strong intuitions about their mereological structure. So PSC does not run roughshod over our folk intuitions.

6.4 Main Thesis: Without universalism

We have ended up with two arguments for the Main Thesis, the original mereological argument, and the revised version. The revised argument has an obvious benefit above and beyond Lewis's original – it does not overpopulate the world with gerrymandered objects. So accepting the Main Thesis does not demand universalism.

7. Conclusion

It is traditional to use universalism to help solve problems in the metaphysics of classes. Having examined three such theories, we can now see how universalism can be removed and replaced with a different principle of composition that does less violence to our intuitions about what exists. There are more theories about classes than just the three described, but space prohibits a discussion of them. For instance, Leśniewski [1916], Bunt [1985] and Martin [1988; 1992] all develop treatments of classes that rely upon classical mereology (and, therefore, universalism/UMC). Nevertheless I would hope that a similar technique – that of replacing universalism with a different unrestricted principle of composition – would work in the case of such theories. So, in conclusion, I hope to have undermined a traditional motivation for universalism, whilst simultaneously allowing those who do not believe in universalism access to philosophical theories that they were previously denied. Moreover, I hope to have introduced a tool (replacing universalism with unrestricted composition in other categories) that might prove

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useful elsewhere in surgically removing a commitment to universalism from an ontological theory.¹³

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