Essays on Modality and Instantiation

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Abstract

The four essays in this dissertation form two natural pairs. The first pair, Chapters 2 and 3, defend standard modal realism by showing that it is not extensionally inadequate, contrary to what some recent critics have argued. The second pair, Chapters 4 and 5, defend a version of realism about universals by showing that some alternatives to it are either extensionally inadequate or suffer from an explanatory disadvantage.

First, I present an interesting package of views: modal realism plus recombination plus counterpart theory. It is a fun package to think about. And, although I ultimately reject it, I think that it is continually underestimated and misunderstood by its opponents. For example, some opponents argue that the package makes false some intuitively true de re modal claims. But it does not; the objection rests on an unmotivated premise that defenders of the package have a good, independent reason to reject (Chapter 2). Other opponents argue that the package makes false some intuitively true de dicto modal claims. But, again, it does not; the package accommodates the allegedly missing possibilities (Chapter 3). Or so I argue.
Second, I present another interesting package of views: realism about universals plus primitivism about instantiation. It is also a fun package to think about. And, unlike modal realism plus recombination plus counterpart theory, I actually think that it is true. Others disagree. For example, some opponents reject realism about universals for resemblance nominalism. But this is a mistake; the best current versions of resemblance nominalism are either extensionally inadequate or cannot explain why things selected from among a collectively similar plurality are always, themselves, collectively similar (Chapter 4). Other opponents accept realism about universals but try to explain instantiation in terms of identity. But, again, this is a mistake; any plausible version of realism along those lines is extensionally inadequate (Chapter 5). Or so I argue.
Dedication

To my father, mother, and brother. You’re the best family in the pluriverse.
Acknowledgments

Most of my early memories involve wanting to be an astronaut. I’d flip through books I couldn’t yet read and trace colorful pictures of galaxies with my fingers. I talked about becoming an astronaut with anyone who’d listen until someone told me about black holes, which ruined everything. Black holes were scary. I was hazy on the details, but it seemed that, if I ever got close to one, I couldn’t ever leave it and I’d be lonely in space forever. So I stopped wanting to be an astronaut.

From there, I moved on to professions where I could help people: first a firefighter, then a police officer. But those were also dangerous, so I moved on from them, too. Next I decided—along with almost every boy in my elementary school—that I was going to be a professional football player. That phase lasted an embarrassingly long time, at least into early high school, so it seems best to say nothing more about it here.

In high school, I wanted to be an actor, then a motivational speaker, then an actor who sometimes does motivational speaking. I chose to attend Kenyon because it had (and has) a great theater program, and I declared my drama major before I even arrived.
on campus. I switched to philosophy in the first week, after my second intro class, and I've never regretted it.

Steven Geisz, you changed my life forever and for the better. I knew immediately that you had. Thank you. Joel Richeimer and Andrew Pessin, my co-advisors at Kenyon, I owe you each a tremendous thanks for molding my enthusiasm into something useful without eroding my sense of wonder. Thank you.

My time at Ohio State has been the happiest and most productive of my life, and I've a lot of people to thank for it. To the members of my committee, Ben Caplan, David Sanson, Declan Smithies, and William Tascheck, thank you. Thank you. I wouldn't recognize myself today if I'd never met you, learned from your seminars, and benefited from your attention and support. Ben, I know that imagination isn't the best guide to possibility, but I cannot imagine a better advisor for me than you. Your feedback and encouragement and friendship were the most important and stable parts of my graduate career. Maybe someday soon we can go for another jog to bookend this experience, which I've loved.

To Lisa Shabel, my teaching mentor, thank you. Your teaching advice and willingness to talk about even my non-philosophical problems were a major factor in my finishing the program and remaining sane.

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I presented early drafts of Chapters 2, 3, and 5 in Dissertation Seminar from 2013–2015, and I presented an early draft of Chapter 5 at *Themes from Baxter II*, a workshop organized by the University of Geneva in fall of 2013. I owe sincere thanks to the participants of those workshops for their helpful comments.

Finally, Andrew Partsch, I wish you were here to see this. You’d be so proud. I miss you dearly.
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Chapter 1: Introduction

I read somewhere that confession is good for the soul, so here it goes: I am drawn to robust, inflationary metaphysical theories. I do not know why I am drawn to them, but the draw is persistent enough that I gave up trying to fight it long ago. I can handle the occasional eye-rolling from my colleagues and students. Unabashedly realist theories often just feel better to me. Desert landscapes are boring. Let my world instead be lush with wonders. If some of them are unobservable, then so be it. They are no less wonderful for that.

There is something to be said for a thoughtful defense of the surprising. One of philosophy’s main values lies is its ability to open our minds to new ideas,¹ so there is a good reason to think carefully about surprising theories even if we do not, upon reflection, endorse them. We can be confident in our beliefs only after we consider the alternatives, so I like taking surprising theories out for a jog and seeing where they lead me. A lot of my philosophical flirtations start with trains of thought that begin

¹ See Russell 1912, Chapter 15.
“Wouldn’t it be interesting if ....”

The four essays that follow are attempts to develop those flirtations into committed relationships. The essays form two natural pairs. The first pair, Chapters 2 and 3, defend David Lewis’s modal realism. According to modal realism, there exists a vast plurality of worlds other than ours. These other worlds are literal worlds, objects something like our own, rather than stories or pictures that merely represent worlds. Some worlds are filled with fantastic goings-on, although, to be fair, many others are fantastically boring. In fact, the worlds are said to be so varied that there is no way of recombining or rearranging things to build up anything novel. Anything that would result from such recombination and rearrangement is already part of some world or other. So we can take a lot of interesting claims—e.g. claims about what is possible or necessary—to be accurate descriptions of how other worlds are. It is no surprise then, with so many options available, that some otherworldly things are a lot like me, although, to be fair, many others differ from me in ways that I cannot even imagine. I find the ones similar enough to me, my counterparts, especially interesting. They are said to represent ways I might be, and I spend a fair amount of time imagining what their lives are like.

So we have an interesting package of views: modal realism plus recombination plus counterpart theory. It is a fun package to think about. And, although I ultimately reject it, I think that it is continually underestimated and misunderstood by its opponents. Or
so I argue. In Chapter 2, I present modal realism and counterpart theory more carefully and defend them against an objection from John Divers. In Chapter 3, I present recombination more carefully and defend it against objections from Jessica Wilson. Although I do not ultimately accept Lewis’s package of views, we should not reject it for the reasons that Divers and Wilson offer.

Chapters 4 and 5 form a second natural pair. They concern, in different ways, my favorite theory of properties: realism about universals. Like modal realism, realism about universals claims that many more things exist than we commonly think. For example, in addition to objects like my favorite mug and teapot, there exist additional things that qualitatively characterize my mug and teapot. To keep with tradition, I call those additional characterizing things “universals,” although I might just as easily call them “properties.” Universals include colors, like being scarlet, and shapes, like being mug-shaped.2

Although being scarlet is numerically distinct from my mug and teapot, my mug and teapot are intimately connected to it. Partly in virtue of that intimate connection, my mug and teapot are qualitatively one way rather than another. In other words, the connection that each of them has to being scarlet is qualitatively characterizing. Universals are ways for things qualitatively to be. Again, keeping with tradition, I call

2 Here and throughout, I write the names of universals and properties in italics. I sometimes also use italics for emphasis, but I hope that context prevents any confusion.
that intimate and qualitatively characterizing connection “instantiation,” although I might just as easily call it “having.” Things have properties; they instantiate universals. Maybe, as I think, that amounts to the same thing. Others disagree.

I believe universals exist because they are part of the best explanation of some phenomena. For example, I think that the English predicate ‘scarlet’ correctly applies to my mug because my mug instantiates being scarlet. Similarly, I think that my mug falls under the concept SCARLET because it instantiates being scarlet. And I think that distinct scarlet things, e.g. my favorite mug and teapot, are qualitatively similar in color because they each instantiate being scarlet. I think that universals help explain other phenomena, too—I discuss how they help explain recognition and sorting in Chapter 4—but I think that universals do a lot of that other work in virtue of grounding similarity.

I do not think that we can explain instantiation in fundamentally different terms, and I think that our theories of the world are better if we appeal to instantiation than if we do not, so I am happy to include INSTANTIATION among my primitive ideology. All explanations start somewhere, and I think that we have good reason to start here rather than somewhere else. So, again, we have an interesting package of views: realism about universals plus primitivism about instantiation. It is a fun package to think about. And, unlike modal realism plus recombination plus counterpart theory, I actually think that it is true. Others disagree. For example, some philosophers reject realism about universals

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3 Here and throughout, I write the names of concepts in smallcaps.
and take facts about qualitative similarity to be primitive instead. Other philosophers accept realism about universals but try to explain instantiation in fundamentally different terms. Both strategies fail. Or so I argue.

In Chapter 4, I consider an attempt to reject realism about universals for resemblance nominalism, a theory that takes qualitative similarity to be primitive. However, I argue that the attempt fails: either resemblance nominalism is extensionally inadequate or it suffers from an explanatory disadvantage. In Chapter 5, I consider various attempts to accept realism about universals but reject primitivism about instantiation. Again, I argue that the attempts fail: the resulting versions of realism about universals are extensionally inadequate. If I am right, then realism about universals plus primitivism about instantiation becomes comparatively more appealing. The world is full of wonders.
Chapter 2: A Convenient Modal Truth

Standard modal realists accept both an ontology of spatiotemporally isolated worlds (as per Lewis 1986a: Ch. 1) and a counterpart-theoretic semantics for modal claims (as per Lewis 1986a: Ch. 4). However, John Divers (2014) argues that some truths on a counterpart-theoretic semantics require spatiotemporal relations between worlds. If Divers is right, then these truths inconvenience standard modal realists by exposing a tension within their theory. But Divers is wrong.

First, I present Lewis’s ontological thesis (§1) and his argument for the thesis (§2). Then I present Lewis’s counterpart-theoretic semantics for de re modality (§3). Finally, I present some truths that are supposed to cause problems for anyone who accepts both Lewis’s ontological thesis and his counterpart-theoretic semantics, but I show how those truths are not problematic (§4).

1 Introducing the Pluriverse

David Lewis (1986a) argues that there exist countless worlds, each isolated from the rest.
Our world, the fusion of everything spatiotemporally connected to us, is merely one among a vast many.\textsuperscript{4} The other worlds are objects like ours: maximal fusions of things standing in external relations at least functionally similar to our spatiotemporal ones.\textsuperscript{5} The pluriverse is the fusion of everything; it is the fusion of all the worlds. So, according to Lewis, our world does not exhaust the pluriverse. More things exist than exist anywhere around here, even on a very loose understanding of what counts as “around here.” Way, way more things exist, according to Lewis, than are located in any direction, or at any distance, from us in time or space.

Let us not kid ourselves: these are incredible claims about what exists. According to Lewis, there exist things that we cannot reach by traveling in any direction or any distance through spacetime, and this is not due to any practical constraints. The problem is not that we would run out of fuel, or that we would die of old age, before we reached other worlds. We cannot reach them, even in principle; they are no spatial or

\textsuperscript{4} An object is the \textit{fusion} of some things just in case each of them is a part of it and each part of it overlaps at least one of them. Things \textit{overlap} just in case they have a common part.

\textsuperscript{5} A fusion is \textit{maximal}, relative to an external relation, just in case anything standing in that relation to part of the fusion is a part of the fusion. A relation is \textit{external} just in case its holding supervenes on the intrinsic properties of the fusion of its relata but does not supervene on the intrinsic properties of its relata. (See Lewis 1983b: 356 and 1986a: 61–62.) A property is \textit{intrinsic} just in case it cannot differ between duplicates. (See Lewis 1983a: 197, 1983b: 355–356, 1983b: 360, and 1986a: 62. For background, see Langton & Lewis 1998 and Lewis 2001.) Things are \textit{duplicates} just in case they have exactly the same natural properties. (See Lewis 1983b: 355–357 and 1986a: 61–62.) A property is \textit{natural} just in case its instances are objectively similar, it is causally relevant, and it is needed to completely characterize things without redundancy. (See Lewis 1983b: 346–347, 1986a: 59–60, and 2009: 204–205. However, see Schaffer 2004 for an important clarification. See Sider 2011 for an extension of Lewisian naturalness.)
temporal distance from us at all. There is no path through spacetime that leads from us to them.

That is surprising, but it might not yet seem incredible. Mathematical objects, like numbers and sets, are not located somewhere any spatial or temporal distance for us either. There is no path through spacetime that leads from us to them, but many people believe that they exist anyway. However, many of Lewis’s otherworldly things are not like mathematical objects. Mathematical objects are not located anywhere in relation to us because they are not located anywhere at all, and, in general, this is not true of otherworldly things. Many otherworldly things are perfectly ordinary, physical objects: automobiles, houses, softballs, and the like. Those otherworldly objects are located somewhere, just nowhere in relation to us.

One consequence of our spatiotemporal isolation from otherworldly things is that we cannot interact with them. Nothing we do can causally affect them, and nothing in them can causally affect us. So, for example, we cannot observe them. Again, this is not due to any practical constraints. The problem is not that forces originating from them are too weak to have observable effects by the time they reach us. Otherworldly causal forces cannot reach us, even in principle. There is no path they might travel to get here.

6 Maybe numbers are sets. And maybe sets are located wherever their members are collectively located. Lewis (1991: 32–33) discusses this suggestion, but remains neutral. If it is right, then so much the worse for the credibility of the other worlds; even numbers would be located somewhere in relation to us, provided their members are.
Nevertheless, Lewis argues, we should believe that there exist many other worlds, each located somewhere and somewhen disconnected to us. We cannot see them, although many of them are visible. Nor can we hear them, smell them, taste them, or feel them. We cannot interact with them or perceive them in any way, but, according to Lewis, we should believe that they exist, regardless. Taken together, these claims make up the ontological part of modal realism.

2 Motivating the Pluriverse

Why should anyone believe such things? Not because of our experiences, since we only ever experience things connected to us in space and time, and only then as a result of some causal process. And not because of the reliable testimony of others, since nobody giving us testimony can experience otherworldly things either. And not because their existence is a logical or conceptual truth. Lewis’s claims about other worlds are ontological claims, claims about what exists; logic and conceptual analysis do not bring anything into existence, and it is hard to see how they could justify any specific ontology unless they did.\(^7\)

Instead, Lewis argues, we should believe in other worlds because they are useful. If there were the kind of pluriverse that Lewis imagines, then it would help us do good

\(^7\) In classical logic, ‘(∃x)x=x’ is a logical truth. So maybe classical logic represents as true the general ontological claim that something exists, but general claims like that cannot help justify belief in the pluriverse. Besides, the classical logical truth of ‘(∃x)x=x’ has more to do with classical logicians’ stipulation that models have non-empty domains than with anything about logic, itself.
explanatory work, and so, Lewis argues, our belief that one exists is justified:

Why believe in a plurality of worlds?—Because the hypothesis is serviceable, and that is a reason to think that it is true. ... Modal realism is fruitful; that gives us a good reason to believe that it is true.⁸ (Lewis 1986a: 3–4)

The implicit methodological principle at work here is that a useful ontological theory is more likely to be true than a less useful, but otherwise equally good, one. Or maybe the principle is that, among otherwise equally good candidates, a useful ontological theory is more worthy of our belief than a less useful one, regardless of whether it is any more likely to be true.⁹ In short: usefulness should inform ontological belief formation.

Those principles make me uncomfortable. That an ontological theory is useful gives us a good reason to hope that it is true, since its being true would be convenient for us, and that is a reason for us to want to believe it rather than its less useful rivals. But it is wishful thinking to believe something because we hope that it is true or because we want to believe it. It would be convenient for our theorizing if ontology were responsive to our explanatory needs, but it is hard to think that it is while also thinking, as many metaphysicians do, that ontological facts are something to be learned about reality, not

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⁸ According to Lewis (1986a: 4), our good reason to believe modal realism is not conclusive, since it might be defeated by other considerations. For example, his analyses might not work, so the theoretical benefits they offer might be illusory. Or the theoretical benefits might be genuine but not worth their ontological cost, maybe because some other theory can get those benefits more cheaply.

⁹ I have in mind here the view that Bricker (forthcoming) calls “absolutism.” According to absolutism, pragmatic virtues make a metaphysical theory no more likely to be true, but they do make it more worthy of our acceptance. Bricker endorses absolutism, and he registers worries similar to mine about Lewis’s methodology. More on those worries shortly.
something to be projected by us onto it.

Lewis’s methodology makes more sense if the goal of metaphysics is, not only to form true beliefs about the world, but also, at least partly, to form useful beliefs about it, regardless of whether pragmatic properties track truth. I do not know whether Lewis held this more expansive view of metaphysics, but it makes his methodology more understandable.  

Although I worry about using pragmatic considerations to justify the truth of ontological claims, I want to set those worries aside. I am interested in other recent objections to Lewis’s modal realism. Divers (2014) and Wilson (2015) each argue that the pluriverse is less useful than Lewis believes, since it does not do the explanatory work that Lewis says it does. If they are right, then Lewis’s argument for the existence of the pluriverse is weakened. But they are wrong. I discuss Divers’s objection in this chapter and Wilson’s objection in the next.

Before I explain why I think Divers’s and Wilson’s objections fail, here is a quick recap. Lewis wants to motivate an ontological thesis,

(Plurality) There exists a vast plurality of worlds, each isolated from the rest.

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10 According to Lewis, using his methodology puts him in good company. He points out that mathematicians also accept controversial ontology for the sake of having better theories, and “mathematics is better known than any premise of sceptical epistemology” (1986a: 4). For what it is worth, I think that Lewis is underestimating the challenge. It does not take much controversial epistemology to see that wishful thinking is not a reliable way to form true beliefs about the world.
which he motivates by appealing to its usefulness:

- **P1** If an ontological claim is useful, then we have a defeasible reason to believe it.
- **P2** Plurality is a useful ontological claim.
- **P3** Our reason to believe Plurality is not defeated by other considerations.

∴ **C1** We should believe Plurality.

Lewis motivates P1 by pointing out that it is accepted in respectable disciplines like mathematics (1986a: 4). He motivates P3 by replying to objections to modal realism (1986a: Chapter 2) and arguing that the work it does cannot be done at less ontological cost (1986a: Chapter 3). Suppose, for the sake of argument, that he is right. That leaves P2.

Lewis motivates P2 by using Plurality to help analyze various concepts, most prominently modal ones (1986a: Chapter 1). 11 If the analyses are successful, then his theory becomes ideologically simpler and more unified: ideologically simpler, since it would have fewer conceptual primitives, and more unified, since the analyses would reduce multiple concepts to the same collection of facts. Insofar as pragmatic virtues, like simplicity and unity, make for better theories, Plurality would be useful because it gives

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11 Lewis also uses facts about the pluriverse to help analyze counterfactual conditionals and closeness to the truth (1986a: §1.3), the content of belief (1986a: §1.4), and properties (1986a: §1.5). Other philosophers also use facts about the Lewisian pluriverse in their conceptual reductions. For example, Rodriguez-Pereyra (2002) uses facts about the pluriverse to defend his version of resemblance nominalism. The more uses philosophers find for Plurality, the stronger Lewis’s pragmatic argument for it becomes.
Divers and Wilson argue that Plurality is less useful than Lewis takes it to be, since they think his analysis of modality is extensionally inadequate. According to Divers, Lewis’s analysis falsifies some intuitively true de re modal claims; according to Wilson, it falsifies some intuitively true de dicto ones. Although I reject modal realism, I think it is continually misunderstood and underestimated by its critics. The problems with modal realism are not that its analysis of modality is extensionally inadequate.

3 Using the Pluriverse: De Re Modality

Lewis (1968, 1973a: 39–43, 1973b, and 1986a: 5–20, 192–263) uses facts about the pluriverse to analyze de re modality. Start with the idea that something’s modal profile depends on what it resembles: something is such that it might have a property just in case something it resembles closely enough has that property; it is such that it must have a property just in case everything it resembles closely enough has that property. For example, my cat, Plum, is such that she might be elected president just in case something that she resembles closely enough is elected president. She is such that she must be content just in case everything that she resembles closely enough is content. However, to help ensure that the analysis is extensionally adequate, Lewis denies that

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12 Better theories, in this context, might not be theories more likely to be true. I have similar worries about simplicity and unity that I have about usefulness, but I want to set those worries aside, too. Maybe simplicity and unity make a theory better, and so more acceptable, even if they do not make it more likely to be true.
Plum resembles only actual things. Plum resembles, and fails to resemble, lots of otherworldly things, and, according to Lewis, her de re modal profile partly depends on those resemblances, too.

It is worth pointing out that “resembles closely enough” is a rather flexible phrase. Which things we take Plum to resemble closely enough varies across contexts, depending on our interests and which of Plum’s qualities are salient, so de re modal attributions are going to be correspondingly inconstant. In contexts where Plum’s quiet dignity and tireless pursuit of goals are salient, she resembles rather closely some actual presidents-elect; in contexts where her whiskers and fondness for cat food are salient, the resemblances are less striking.

Call the things that Plum resembles closely enough, relative to a context, her counterparts, relative to that context. Something is such that it might have a property, relative to a context, just in case some of its counterparts, relative to that context, have the property; something is such that it must have a property, relative to a context, just in case all of its counterparts, relative to that context, have the property. Unlike accounts of de re modality that rely on modal machinery—e.g. primitive modal operators or primitive modal properties like being possibly elected president or being necessarily

13 See Lewis 1986a: §4.5.
14 Counterparts need not be parts of different worlds. See Lewis 1986a: 231–232. This reverses Lewis’s previous view that parts of the same world are counterparts only if they are identical. For a statement of the earlier view, see Lewis 1968: 27.
Lewis’s counterpart-theoretic account is genuinely reductive.

Lewis’s analysis is elegantly simple, but Divers (2014) argues that it is extensionally inadequate. According to Divers, some de re modal truths on a counterpart-theoretic semantics require spatiotemporal relations between worlds, and, since Lewisian worlds are spatiotemporally isolated from each other, such truths would inconveniently undercut his argument for Plurality.

4 Some Allegedly Inconvenient Truths

One allegedly inconvenient truth is

(1) It is true of the tallest actual thing that it might have been taller. (Divers 2014: 576, sentence renumbered)

On a counterpart-theoretic semantics, (1) is true only if the tallest actual thing has a taller counterpart. Since nothing actual is taller than the tallest actual thing, any taller counterpart would need to be otherworldly. This alone does not make (1) inconsistent with standard modal realism; the tallest actual thing might be spatiotemporally isolated from its taller counterparts. However, Divers accepts

(Necessary Condition “For any $x$, $y$, if $y$ is taller than $x$, then $x$ and $y$ stand in some spatiotemporal relation (are spatiotemporally related).” (Divers 2014: 576)

According to Necessary Condition, standing in a spatiotemporal relation to something is necessary for being taller than it. Divers does not provide any explicit motivation for Necessary Condition, but maybe his idea is that being taller than is, itself, a
spatiotemporal relation insofar as it compares spatial extensions.

(1) is inconvenient for standard modal realists who accept Necessary Condition, but they have a good reason to reject it. Their account of counterparts appeals to qualitative similarities between parts of distinct worlds. Maybe those similarities are primitive. Or maybe parts of distinct worlds are qualitatively similar because they share properties.15 For example, maybe parts of distinct worlds can instantiate the same universal. The precise nature of transworld similarity does not matter here.16 What does matter is that standard modal realists are committed to parts of distinct worlds somehow being qualitatively similar, one way for things to be qualitatively similar is with respect to extension, and this makes it possible to compare the heights of spatiotemporally isolated things.

15 Lewis distinguishes two conceptions of properties. On the sparse conception, “[t]he sharing of [properties] makes for qualitative similarity, they carve at the joints” (Lewis 1986a: 60). On the abundant conception, properties “pay no heed to the qualitative joints, but carve things up every which way. Sharing of them has nothing to do with similarity” (Lewis 1986a: 59). Since what matters here is the connection between properties and similarity, I have the sparse conception of properties in mind throughout.

16 Here are some other options. Maybe parts of distinct worlds are qualitatively similar because they are each a member of the same natural class. Or maybe parts of distinct worlds are qualitatively similar because they possess duplicate tropes. (Presumably, in that case, the qualitative similarities between their tropes would be primitive.) Lewis (1986a: 63–64) is officially undecided between realism about universals, natural class nominalism, and trope theory as an account of similarity. Elsewhere, he suggests that some versions of natural class nominalism and resemblance nominalism, according to which the similarities between parts of distinct worlds would be primitive, are “a single theory presented in different styles” (Lewis 1983b: 347–348). So Lewis himself is not overly concerned with how similarity works, provided that it work somehow and he could use facts about it in his analyses. I discuss the connection between similarity and property possession more in Chapter 4 and the nature of instantiation more in Chapter 5.
For example, suppose we wonder who is taller, Smith or Jones. If we know the top of Smith’s head comes up only to Jones’s nose, then we have our answer. Part of Jones, everything from her nose down, exactly resembles Smith with respect to height. Since the rest of Jones, everything from her nose up, has some non-zero height, Jones is taller than Smith.

This suggests the following principle:

(Simple Sufficient Condition) For any $x, y$, $y$ is taller than $x$ if a proper part of $y$ exactly resembles $x$ with respect to height.

$z$ is a proper part of $y$ just in case $z$ is part of $y$ but distinct from $y$. According to classical extensional mereology, this requires the existence of some mereological difference between $z$ and $y$: some other part of $y$ that does not overlap $z$. Simple Sufficient Condition tries to capture the insight behind the Smith and Jones example. Intuitively, if Smith is exactly as tall as one of Jones’s proper parts, then Jones is taller. After all, there is still some of Jones left over, everything from her nose up. Unfortunately, Simple Sufficient Condition is false. Suppose Williams and Johnson are exactly the same height. Williams has a Johnson-tall proper part, Williams minus her left hand, but is not taller than Johnson.

The problem is that Simple Sufficient Condition leaves out an important part of the story from before. The difference between the Smith-Jones example and the Williams-

\[17\] Recall that one thing overlaps another just in case there is something that is a part of them both.
Johnson example is that the part of Jones left over, everything from her nose up, contributes positively to her height, whereas the part of Williams left over, her left hand, does not. Only some of your proper parts add to your height, and Simple Sufficient Condition ignores that fact. So the real lesson to take from the Smith-Jones example is

(Sufficient Condition$_1$) For any $x$, $y$, $y$ is taller than $x$ if there is a $z$ such that (i) $z$ is part of $y$, (ii) $y$ is taller than $z$, and (iii) $z$ and $x$ exactly resemble with respect to height.

Williams and Johnson are not a counterexample to Sufficient Condition$_1$, since (ii) is false: Williams is not taller than Williams minus her left hand. Sufficient Condition$_1$ gets things right in the Smith-Jones example, too, since (ii) is true: Jones is taller than Jones-from-her-nose-down.

Sufficient Condition$_1$ captures something true about height comparisons. It is sufficient for Jones to be taller than Smith that her height exhausts Smith’s height with room to spare. Clause (i) is not problematic; it involves only a straightforward, intraworld parthood relation, which standard modal realists already accept. (They use intraworld parthood to define “world.”) And clause (ii) is not problematic; if $y$ is entirely in one world, then (ii) involves only a straightforward, intraworld height comparison. (Such comparisons are okay, even according to Divers.) So (iii) is where the real action is, and the important question is whether spatiotemporally isolated things can satisfy it.

I see no reason why they cannot. Nothing about the Smith-Jones example seems to
require that there be a path through spacetime from one to the other. The fact that
things cannot travel toward each other or causally interact does not, in general, stop
them from being qualitatively similar. And, at least intuitively, things in distinct worlds
can have the same height as readily as they have the same shape or mass, so there is
nothing in principle stopping Smith and the part of Jones she resembles from being parts
of distinct worlds. What matters for (iii) is only that Smith’s entire height is exhausted
by a part of Jones, and transworld similarities can ensure that as well as intraworld ones
would.

The details about how transworld similarities can ensure that might vary. For
example, Smith and Jones-from-her-nose-down might exactly resemble with respect to
height because they instantiate the same universal, being 168 centimeters long.18 After
call, Lewis grants that universals, if they exist, are the exception to his general rule that
no distinct worlds overlap:

Nor do [distinct worlds] overlap; they have no parts in common, with the
exception, perhaps, of immanent universals exercising their characteristic
privilege of repeated occurrence. (Lewis 1986a: 2)

So there is no general reason to think that otherworldly things cannot instantiate the

18 Or maybe it is a primitive fact that they exactly resemble in that way. Or maybe Smith and
Jones-from-her-nose-down are each members of the natural class of all and only the 168-
centimeter-long things. Or maybe Smith has a trope, Smith’s being 168 centimeters long, and
Jones-from-her-nose-down has a trope, Jones-from-her-nose-down’s being 168 centimeters long,
and those tropes are primitively similar duplicates. Again, the specific details do not matter
and Lewis does not take an official stance. There is room to disagree about exactly how
transworld similarities ensure that Smith’s entire height is exhausted by only a proper part of
Jones; the important point here is only that they can plausibly ensure it.
same universal. And there is no good reason to think that being 168 centimeters long, in particular, does not exist. Being 168 centimeters long explains the objective similarity between, and our ability to recognize new examples of, 168-centimeter-long things no worse than being negatively charged helps explain the objective similarity between, and our ability to recognize new examples of, negatively charged things. If those explanatory demands lead someone to accept being negatively charged, then they should lead her to accept being 168 centimeters long, too. The demands are the same in both cases.

If all of this is right, then truths like (1) are not inconvenient for standard modal realists. They do not require, on a counterpart-theoretic semantics, spatiotemporal relations between distinct worlds; they require only exact similarities between parts of distinct worlds, something standard modal realists already accept, and accept for independent reasons. Transworld similarities, even ones that involve spatiotemporal comparisons, are already part of standard modal realism:

Didn’t I speak, in connection with predetermination, of worlds that diverge? That is, of worlds that are exactly alike up to some time; and differ thereafter? Doesn’t that presuppose trans-world comparison of times, simultaneity or succession between events of different worlds? Trans-world spatiotemporal relations between the participants in those events, or the spacetime regions in which they happen? I think not. Trans-world comparisons, yes; trans-world spatiotemporal relations, no. … Temporal cross-sections of [two divergent] worlds, for instance, are excellent counterparts: there are counterpart centuries, or weeks, or seconds. Likewise there are counterpart places: galaxies, planets, towns. So things that are parts of the two worlds may be simultaneous or not, they may be in the same or different towns, they may be near or far from
one another, in very natural counterpart-theoretic senses. But these are not genuine spatiotemporal relations across worlds. The only trans-world relations involved are internal relations of similarity; not indeed between the very individuals that are quasi-simultaneous (or whatever) but between larger duplicate parts of the two worlds wherein those individuals are situated. (Lewis 1986a: 70–71)

So, according to Lewis, parts of distinct worlds can be similar with respect to their spatiotemporal features without there being any spatiotemporal relations between worlds. Lewis distinguishes between parts of worlds being spatiotemporally similar and their being spatiotemporally related. The spatiotemporal isolation of distinct worlds does not entail that transworld spatiotemporal comparisons are impossible; it entails only that transworld travel is impossible. There is no path through spacetime that leads from one world to another.

The tallest actual thing has a taller counterpart if it exactly resembles with respect to height a proper part of something otherworldly that is taller than that proper part. And a standard modal realist’s plenitude thesis (as per Lewis 1986a: §1.8) entails that there are many such otherworldly things, so (1) is true on her preferred semantics despite her commitment to spatiotemporally isolated worlds.¹⁹

This strategy, comparing the extensions of spatiotemporally isolated things by appealing to exact similarities between their parts, generalizes. For example, it works for Divers’s other allegedly inconvenient truths:

¹⁹ I discuss the plenitude thesis more in Chapter 3.
(2) Whatever is the longest-lasting thing in the world, it might have lasted longer.

(3) The fastest ever thing might have been faster yet. (Divers 2014: 576, sentences renumbered)

On a counterpart-theoretic semantics, (2) is true only if the longest-lasting thing in the world has a longer-lasting counterpart. And (3) is true only if the fastest ever thing has a faster counterpart. Since nothing actual is longer-lasting than the longest-lasting actual thing or faster than the fastest ever actual thing, any longer-lasting or faster counterpart would need to be otherworldly. This alone does not make (2) or (3) inconsistent with standard modal realism; the longest-lasting actual thing might be spatiotemporally isolated from its longer-lasting counterparts, and the fastest ever actual thing might be spatiotemporally isolated from its faster counterparts.

(2) and (3) are inconvenient for standard modal realists who think being spatiotemporally related to something is necessary for being longer-lasting or faster than it, but standard modal realists have a good reason not to think that. Otherworldly things are neither before nor after nor simultaneous with the longest-lasting actual thing, except maybe in a counterpart-theoretic sense.²⁰ They are no spatial or temporal distance from it at all, but they last longer than it if they satisfy the following condition:

(Sufficient Condition₂) For any \( x, y \), \( y \) is longer-lasting than \( x \) if there is a \( z \) such that (i) \( z \) is a temporal part of \( y \), (ii) \( y \) lasts longer than \( z \), and (iii) \( z \) and \( x \) exactly resemble with respect to duration.

And otherworldly things are not spatiotemporally related to the fastest ever thing, but they are faster than it if they satisfy the following condition:

**(Sufficient Condition 3)** For any $x, y$, $y$ is faster than $x$ if there is a $z$ such that (i) $z$ is a temporal part of $y$, (ii) $y$ travels further than $z$, and (iii) $z$ and $x$ exactly resemble with respect to distance traveled.

What about truths that Divers does not mention? Since I suggest comparing spatiotemporally isolated things by appealing to similarities between their parts, a truth about things without proper parts,

**(4)** The longest actual mereological simple\(^{21}\) might have been longer, might still seem inconvenient. But it is not. Not all of a mereological simple’s counterparts are, themselves, mereologically simple. That depends on what about the mereological simple is conversationally salient. In contexts where its mereological simplicity is not salient, it might have numerous mereologically complex counterparts. Otherworldly things are not spatiotemporally related to the longest actual mereological simple, but they are longer than it if they satisfy the following condition:

**(Sufficient Condition 4)** For any $x, y$, $y$ is longer than $x$ if there is a $z$ such that (i) $z$ is part of $y$, (ii) $y$ is longer than $z$, and (iii) $z$ and $x$ exactly resemble with respect to length.

But maybe that is not enough. (4) might still seem inconvenient in contexts that

\(^{21}\) A mereological simple is something without any proper parts. If no actual mereological simple is extended, but extended mereological simples are possible, then replace (4) with a claim about the longest mereological simple at a world. If extended mereological simples are impossible, then standard modal realists need not accommodate (4)’s truth.
make salient a counterpart relation on which the longest actual mereological simple has only mereologically simple counterparts. But it is not. Just as there are transworld similarities between things, there are transworld similarities between regions. Either extended mereological simples occupy non-simple regions or they do not. If they do, then we can compare their lengths by appealing to exact similarities between parts of the regions they occupy:

(Regional Sufficient Condition) For any $x$, $y$, $y$ is longer than $x$ if there is a region $w$ and a region $z$ such that (i) $x$ exactly fills $w$, (ii) $y$ exactly fills $z$, and (iii) $z$ is longer than $w$.

And if extended mereological simples do not occupy non-simple regions, then we can compare their lengths by appealing to their exact similarities to proxy objects that have proper parts:

(Proxy Sufficient Condition) For any $x$, $y$, $y$ is longer than $x$ if there is a $w$ and a $z$ such that (i) $x$ and $w$ exactly resemble with respect to length, (ii) $y$ and $z$ exactly resemble with respect to length, and (iii) $z$ is longer than $w$.

For example, consider two extended mereological simples, Biggie and Smalls, that are spatiotemporally isolated from each other. If Biggie and Smalls occupy regions with sufficient mereological complexity, then we can compare their extensions by comparing the extensions of the complex regions they exactly fill: if Biggie exactly fills a longer region than Smalls exactly fills, then Biggie is longer than Smalls. Regional Sufficient Condition captures this fact.
If, on the other hand, Biggie and Smalls do not occupy regions of sufficient mereological complexity, then we can compare their extensions by comparing the extensions of some mereologically complex proxies, i.e. some mereologically complex objects that they exactly resemble with respect to length. If Biggie exactly resembles in length a longer object than Smalls exactly resembles in length, then Biggie is longer than Smalls. Proxy Sufficient Condition captures this fact. If we cannot apply Sufficient Condition\textsuperscript{4} to Biggie and Smalls, themselves, then we can compare their extensions by applying it to things relevantly related to them, the regions they exactly occupy or some mereologically complex stand-ins, say Jones and Smith, that they exactly resemble in length.

5 Adequacy Constraints

My reply satisfies the three adequacy constraints that Divers proposes. First, Divers cautions against extensively or deeply revising Lewisian spatiotemporal or modal metaphysics (Divers 2014: 577). My account requires no revision of Lewisian spatiotemporal or modal metaphysics.

Second, Divers cautions against revising standard modal realism by replacing, in certain roles, spatiotemporally relations with relation of another kind unless the replacements introduce no similar inconvenience (Divers 2014: 577). Divers seems to have in mind revisions that allow worlds to be unified by natural external relations other than
spatiotemporal ones (as per Bricker 1996). Although I am generally agreeable to that sort of revision,\textsuperscript{22} my reply does not require it. My reply involves only transworld similarity and intraworld parthood, both of which standard modal realists already accept for good, independent reasons. Besides, those relations do not introduce similar inconveniences if (4) is any guide.

Third, Divers cautions against appealing to inequalities between numbers to help compare non-numeric things, since Lewis resists that move elsewhere (Divers 2014: 577). Lewis resists it because he thinks it “is no fair. For that’s not how the English does it” (Lewis 1986a: 13). But I am not sure that Lewis’s worries about remaining true to English apply here. Lewis raises those worries in response to someone who tries to avoid quantifying over possibilia by analyzing modal comparatives like “a red thing could resemble an orange thing more closely than a red thing could resemble a blue thing” in terms of numerical inequalities between degrees of resemblance.

I do not need to worry about any of the Sufficient Conditions being an \textit{unfair} analysis of how English works, since none of them is an analysis of how English works. I am not giving a reductive analysis of spatiotemporal comparisons. My point is not, for example, that Jones is taller than Smith \textit{because} she is taller than one of her parts that exhausts all of Smith’s height. My point is only that she \textit{is in fact} taller than Smith if she is taller than one of her parts that exhausts all of Smith’s height, that standard

\textsuperscript{22} See Chapter 3, §3.
modal realists’ acceptance of transworld spatiotemporal comparisons lets Jones satisfy that condition even if she and Smith are parts of distinct worlds, and, therefore, that standard modal realists have a good reason to reject Necessary Condition. If sentences (1)-(4) are false, according to standard modal realism, then it is not because distinct worlds are spatiotemporally isolated and she accepts a counterpart-theoretic semantics; it is because the worlds are less plentiful and diverse than Lewis hopes.\textsuperscript{23}

In any case, the English does not say that Jones is taller than Smith because Jones is \( n \) cm tall, Smith is \( m \) cm tall, and \( m < n \). And neither do I. Instead, I say that Jones is taller than Smith if Smith’s entire height is exhausted by a part of Jones that Jones, herself, is taller than, and I argue that, according to standard modal realism, this can be true whether or not Jones and Smith are spatiotemporally related to each other.

\textsuperscript{23} Wilson argues that the principle of recombination Lewis uses to say the worlds are plentiful and diverse enough is unacceptable. But I think she is wrong. See Chapter 3.
Recall that Lewis wants to motivate an ontological thesis,

(Plurality) There exists a vast plurality of worlds, each isolated from the rest,

and that he tries to motivate it by appealing to its usefulness:

P1 If an ontological claim is useful, then we have a defeasible reason to believe it.

P2 Plurality is a useful ontological claim.

P3 Our reason to believe Plurality is not defeated by other considerations.

∴ C1 We should believe Plurality.

I want to focus, again, on P2, which Lewis motivates by using Plurality in various conceptual analyses. In the previous chapter, I considered an argument from Divers that some true claims are false on Lewis’s analysis of de re modality. If Divers is right, then it weakens Lewis’s argument for Plurality, insofar as it partly undermines Lewis’s case for P2; Lewis’s analysis of de re modality would be extensionally inadequate, and giving us access to a bad analysis does not make an ontological thesis especially useful. However,
Divers’s argument depends on an unmotivated premise that standard modal realists have a good, independent reason to reject.

Wilson (2015) raises a similar objection to Lewis’s analysis of de dicto modality. According to Wilson, some true claims are false on Lewis’s analysis of de dicto modality. If Wilson is right, then it weakens Lewis’s argument for Plurality, insofar as it partly undermines Lewis’s case for P2; Lewis’s analysis of de dicto modality would be extensionally inadequate, and, again, giving us access to a bad analysis does not make an ontological thesis especially useful. However, Wilson is also wrong. Or so I argue.

First, I present Lewis’s analysis of de dicto modality (§1) and the recombination thesis he uses to help him say that the pluriverse is richly enough populated with worlds for his analyses to be extensionally adequate (§2). In the remaining sections, I discuss several kinds of possibilities that Lewis allegedly misses: possibilities for objects not in spacetime (§3), for macro-objects (§4), and for co-located objects (§5). In each case, I argue that Lewis’s analysis accommodates the possibilities in question.

1 Using the Pluriverse: De Dicto Modality

Lewis’s reductive analysis of de dicto modality goes like this. Start with the standard possible worlds account: something is metaphysically possible just in case it is true at a possible world; it is metaphysically necessary just in case it is true at each possible world. But then add the claim that possible worlds are literal worlds, the ones that make
up the pluriverse, and something is true at a world just in case it is true when the domain of quantification is restricted to include only what exists at that world, that world’s parts. Unlike accounts of possible worlds that rely on modal concepts—a set’s consistency, a state’s possibly obtaining—Lewis’s account of possible worlds is genuinely reductive.

This analysis is elegantly simple, but it faces a problem: not all pluralities of worlds would cooperate. Lewis’s analyses are extensionally adequate only if the pluriverse satisfies specific descriptive conditions, and there is no guarantee that an arbitrary pluriverse satisfies them. For example, his analysis of de dicto modality is adequate only if there are enough worlds to represent every metaphysical possibility, but, for all we know, there might not be. As Michael Jubien puts the point,

Certainly there might exist what we may neutrally call (spatiotemporally) detached realms. So suppose there really are such things. ... For all we know, there might be just two such realms, or twenty-seven, or uncountably many, or even ‘set-many’. (Jubien 2009: 61, italics in original)

That would not do for Lewis’s purposes. If there are not enough worlds to represent every possibility and, for example, every world happens to have beer, then Lewis’s analysis entails that the existence of beer is metaphysically necessary, which is wrong.

Although we should be open to revising our modal beliefs, accepting that beer is

metaphysically necessary goes too far.\footnote{25}{The same point, that Lewis’s analysis is good only if the pluriverse meets specific descriptive conditions, generalizes. For example, his analysis of de re modality is extensionally adequate only if there is enough otherworldly variety that there exists a counterpart for each way that something can be; Lewis’s analysis of properties is extensionally adequate only if there is enough otherworldly variety to distinguish between intuitively distinct, but actually coextensive, properties, etc.}

Only a pluriverse rich enough in variety to make Lewis’s analyses extensionally adequate is useful for our theorizing, so Lewis tries to describe the pluriverse he wants to motivate in a way that ensures “[t]here are no gaps in logical space; no vacancies where a world might have been, but isn’t” (1986a: 86).\footnote{26}{Lewis does not mention the corresponding worry about gluts in logical space, embarrassments where a world might not have been, but is. But this is understandable. Other worlds are supposed to be things like ours. If something is true at a world, then it is true and, therefore, possible. The appropriate worry is about descriptive (rather than ontological) gluts, descriptions of the pluriverse that entail something impossible exists. Such descriptions are embarrassing, since they are necessarily false. I discuss descriptive embarrassments further in §2.} A description of the pluriverse avoids vacancies by denying uniformity among the worlds. If the worlds uniformly have beer, then, on Lewis’s analysis, beer is metaphysically necessary. So an adequate description of the pluriverse needs to entail that some worlds lack beer. There is no big trick here. We might simply say so directly, by listing various descriptive conditions: some worlds lack beer, some worlds lack softballs, etc. However, that would not be very satisfying. There are too many descriptive requirements; we would never finish listing them all. Besides, our modal knowledge is imperfect, so our list would almost certainly contain errors.

We can get around those problems by simply asserting that the pluriverse is rich
enough for Lewis’s purposes, rather than trying to list all the ways that it is rich. For example, modal realists might simply replace Plurality with

(Rich Plurality) There exists a vast plurality of worlds, each isolated from the rest, rich enough in number and variety that Lewis’s analyses in terms of it are extensionally adequate.

Jubien worries (correctly, I think) that Plurality might not be useful, depending on the details. But at most this shows is that Plurality is not the ontological claim that Lewis wants to motivate. Lewis is not arguing for the existence of a plurality of worlds, in general; he is arguing for the existence of a useful plurality of worlds. His argument does not apply to anything else. Insofar as Plurality seems useful for our theorizing, it is because we have in mind something like the pluriverse described by Rich Plurality, and Jubien’s worry does not apply to Rich Plurality. If Rich Plurality is true, then it is straightforwardly useful; Rich Plurality wears its usefulness on its sleeve. So, if an ontological claim’s being useful gives us a good (but defeasible) reason to believe it, then we have a good (but defeasible) reason to believe Rich Plurality. The plurality of worlds that Rich Plurality describes is useful, if it exists, and that might be a good enough reason to think it does.

So why not go that route? If the goal is simply to say of the pluriverse that it is useful for Lewis’s purposes, then why not just say that? Because, I think, the goal is not simply to say of the pluriverse that it is useful for Lewis’s purposes. This approach to
denying uniformity among worlds, replacing Plurality with Rich Plurality, leaves us without any useful information about what, specifically, the pluriverse is like and, so, badly off with respect to modal epistemology. If all Lewis wants to say is that there are worlds enough for his analyses to be extensionally adequate, he might as well just say so directly. He does not, and the fact that he does not, I suspect, is due his wanting to have at least some interesting modal knowledge, however incomplete that knowledge might be.

And this fits with Lewis’s argumentative goal. A plurality of worlds would be even more useful to us if we knew enough about it to give us some substantive modal knowledge. So a good description of the pluriverse serves two purposes: a descriptive one and an epistemic one. First, it describes a pluriverse that would be useful for Lewis’s purposes; second, it describes the pluriverse in enough detail for us to know the truth-values, on Lewis’s analyses, of some interesting claims.

If that is right, then Lewis’s case for Plurality is even stronger if he does not merely say that the worlds are varied and abundant enough for his analyses to be extensionally adequate, but instead shows that they are in some detail. Straightforwardly asserting that the pluriverse is useful admirably achieves Lewis’s descriptive goal, but it feels more like theft than honest toil, insofar as it fails badly at achieving his epistemic goal. Instead, Lewis uses recombination both to say that the pluriverse is varied enough for his purposes and to describe the pluriverse in enough specific detail for us to have some interesting modal knowledge.
Lewis’s recombination principle is attractive. It is schematic, so it avoids the problems that go along with trying to list descriptions of the pluriverse one-by-one. And it is relatively specific, so it avoids the epistemic problems that go along with merely asserting that the pluriverse is useful for Lewis’s purposes. However, Lewis’s recombination principle has faced a range of criticisms: it is trivial, it is not reductive, it is unmotivated, it describes too many worlds to represent only possibilities, it describes too few worlds to represent every possibility.\footnote{For example, Divers & Melia (2002), (2003), and (2006) argue that the principle either describes too few worlds or is not modally reductive; Hofmann (2006) argues that the principle both describes too many worlds and allows necessary connections between disjoint things; Cameron (2008) argues that the principle is motivated only by viciously circular reasoning; Denby (2008) argues that the principle both describes too few worlds and is trivial; deRosset (2009) argues that the principle either describes too few worlds or is not modally reductive.}

Wilson (2015) raises new objections to Lewis’s recombination principle. But, since the principle serves both a descriptive and an epistemic function for Lewis, it is important to be clear about where she thinks recombination falls short. According to Wilson, her primary focus is on recombination’s “usefulness as a metaphysical principle” rather than its “epistemic usefulness” (Wilson 2015: 156). By its “usefulness as a metaphysical principle,” she seems to mean the ability of Lewis’s recombination principle to serve “as a broadly axiomatic combinatorial generator of the space of possibility” (Wilson 2015: 143) or, as she goes on to say, its ability

\begin{quote}

to characterize certain worlds (namely, the metaphysically possible ones) in something like the way that the Peano axioms are intended to characterize certain mathematical entities (namely, the integers) \ldots.
\end{quote}
So, in other words, Wilson’s objections are supposed to show that recombination fails at its descriptive function, characterizing a plurality of worlds varied enough to represent every metaphysical possibility, rather than its epistemic one, characterizing those worlds in enough detail to give us access to substantive modal knowledge. According to Wilson, Lewis’s principle describes too few worlds and, therefore, describes a pluriverse that leaves some genuine possibilities unrepresented. But it does not; or it is easy to fix if it does.

2 Describing the Pluriverse

Lewis tries to rule out descriptive omissions, e.g. failing to say that some worlds lack beer, while avoiding descriptive embarrassments, e.g. mistakenly saying that some worlds have round squares, with a recombination principle. Roughly, his principle is

anything can coexist with anything else, at least provided they occupy distinct spatiotemporal positions. Likewise, anything can fail to coexist with anything else. (Lewis 1986a: 88)

The first thing to say about the principle is that recombination itself does not rule out any descriptive embarrassments; that is the work of various restricting conditions, like “at least provided they occupy distinct spatiotemporal positions” and “size and shape [of the resulting spacetime] permitting,” an additional restriction that Lewis adds and that I discuss below (Lewis 1986a: 89). So, to describe a pluriverse useful for his purposes,
Lewis needs two kinds of principles: expansive ones that help him avoid descriptive
omissions and restrictive ones that help him avoid descriptive embarrassments.
Recombination only builds up descriptions of the worlds; it is the various restrictive
conditions, rather than recombination, itself, that filter out any undesirables. 28

Wilson argues that Lewis’s recombination principle fails to describe a pluriverse
varied enough to represent every metaphysical possibility. In contrast, she is
comparatively unimpressed by worries that Lewis accidentally describes a pluriverse too
rich to represent only metaphysical possibilities:

the main thing, one might reasonably think, is to ensure that all the
desired genuine possibilities are generated in principled fashion; extras can
be excluded in one or other semi-principled fashion. (Wilson 2015: 147)

In other words, the most important thing for Lewis is to make sure that his description
of the pluriverse lacks any descriptive omissions. It is better for his systematic
description of the pluriverse to say that too many worlds exist than to say that too few
of them exist. If his initial description of the pluriverse also contains some descriptive
embarrassments, then so be it; he can use some restrictive condition or other to filter out

28 It is worth pointing out that, although recombination does not rule out any descriptive
embarrassments, it need not produce them. Lewis’s recombination principle entails the
existence of metaphysically impossible worlds only if the pluriverse contains metaphysically
impossible objects or the principle allows metaphysically impossible rearrangements. The
former is no problem. If something exists, then it possibly exists, so no object that a pluriverse
contains is metaphysically impossible. Besides, if an impossible object did exist, then the
impossibility would not be due to any recombination-based description. To avoid the latter, i.e.
to avoid saying that things are somewhere arranged in impossible ways, Lewis builds
restrictions into his recombination principle like the prohibition on especially large
the embarrassing descriptions somewhere downstream. If Wilson is right about this, then it helps explain why Lewis seems more interested in saying that there are no gaps in logical space than he is in saying that there are no gluts in it. However, if she is right, then her objection to Lewis—that his recombination principle describes a pluriverse too impoverished for his purposes—would be especially damning if it were good.

I say “especially damning” and not “fatal.” Lewis wants his description of the pluriverse to do two things: (i) describe a pluriverse that would make his analyses extensionally adequate, and, so ensure Plurality is useful for our theorizing, and (ii) describe the pluriverse in enough detail to give us some substantive modal knowledge. I am not sure what Lewis gains, other than the tidiness of the resulting theory, by having one principle fill both roles rather than dividing the work among multiple principles. If the worry is that Lewis’s recombination principle does not describe a pluriverse varied enough to ensure that Plurality is useful, then standard modal realists need only replace it with a description that does. Swapping out Plurality for Rich Plurality seems to do nicely. In that case, standard modal realists can still use Lewis’s recombination principle to secure for us whatever modal knowledge it is able to secure, and there is no serious harm done if the modal knowledge it gives us is incomplete. Lewis never intended recombination to give us complete modal knowledge:

I think our everyday modal opinions are, in large measure, consequences of a principle of recombination .... For more far-fetched possibilities,
recombination is less useful. But there are other principles that we can apply [e.g. a principle that rejects “arbitrary seeming limits on the plenitude of worlds”]. ... On still other questions, there seems to be no way at all of fixing our modal opinions, and we just have to confess our irremediable ignorance. I think one question of this kind concerns incompatibility of natural properties. Is it absolutely impossible for one particle to be both positively and negatively charged? Or are the two properties exclusive only under the contingent laws of nature that actually obtain? I do not see how we can make up our minds; or what guarantee we have that there must be some way to settle the question. Certainly we are not entitled just to make the truth be one way or the other by declaration. Whatever the truth may be, it isn’t up to us. (Lewis 1986a: 113–114)

So it is no objection to Lewis’s recombination principle that it does not give us complete modal knowledge. Lewis, himself, was clear that it does not. Besides, that is probably too much to ask. So I think standard modal realists are on good footing even if Wilson is right that Lewis’s recombination principle does not describe enough worlds to represent every metaphysical possibility. Other descriptions of the pluriverse do, even if they are short on the specifics, and that is enough.

The second thing to say about the rough initial statement of Lewis’s recombination principle is that it needs work. Each world is supposed to be isolated. Since nothing is part of more than one world, the relevant kind of coexistence is vicarious.29 Things vicariously coexist, in the relevant sense, just in case they have duplicates that are parts of the same world; they vicariously fail to coexist just in case each has a duplicate that is

29 Here and throughout, I use “vicarious” differently than Lewis uses it; for Lewis, things vicariously coexist just in case they have counterparts, rather than duplicates, that are worldmates. See Lewis 1986a: 69.
part of a world no part of which duplicates any of the others.

The rough initial statement needs other improvements, too. Lewis wants his principle to entail that something like a unicorn exists, but his rough statement does not. It tells us only which things exists at a world, not how they are arranged. Something like a unicorn might fail to exist even in worlds with parts that duplicate horns and parts that duplicate horses, since the horn and horse duplicates might not be arranged in the right way. So Lewis also needs to say, roughly, that the parts of each world vicariously stand in any arrangement.\(^{30}\) Like vicarious coexistence, vicarious arrangement involves duplication. Things vicariously stand in an arrangement just in case they have duplicates in that arrangement.

However, saying that the parts of each world vicariously stand in any arrangement is too cavalier. If there are metaphysically impossible arrangements—maybe, for example, arrangements with numerically distinct, co-located duplicates of my cat, Plum—then Lewis needs to qualify his principle to stop it from entailing that things are arranged in those ways. Instead, Lewis needs to say that they vicariously stand in any *suitable* arrangement. And if there is a maximum size of spacetime, itself—a question that Lewis wants to remain neutral on\(^{31}\)—then Lewis needs to qualify his principle to stop it from entailing that a world has more parts than can fit into it. For the latter reason, Lewis

\(^{30}\) See Divers & Melia 2002: 16.

\(^{31}\) See Lewis 1986a: 89.
adds the following qualification:

Our principle therefore requires a proviso: ‘size and shape permitting’. The only limit on the extent to which a world can be filled with duplicates of possible individuals is that the parts of a world must be able to fit together within some possible size and shape of spacetime. Apart from that, anything can coexist with anything, and anything can fail to coexist with anything. (Lewis 1986a: 89–90)

Lewis does not say which arrangements are of suitable size or shape; instead, he defers to mathematicians to tell us which mathematical representations of spacetime are possible. ³²

Finally, the earlier restriction, “at least provided they occupy distinct spatiotemporal positions,” requires comment. It appears, without discussion, in Lewis’s rough initial statement of his recombination principle, but it is absent, again without discussion, from all of his subsequent refinements. I read the qualification as an attempt to block the implication that anything can be co-located with anything else: anything vicariously coexists with anything else, provided their duplicates occupy distinct positions whenever they (i.e. the duplicates) are parts of the same world. The restriction prevents, for example, recombination from saying that there exist numerically distinct, co-located duplicates of Plum. Understood this way, the qualification is a further restriction on which arrangements are suitable. Written out in full, the proviso quoted above would

³² Arrangements that Lewis takes to be unsuitable include ones that result in worlds strictly larger than themselves. Forrest & Armstrong (1984) argue that the unrestricted version of Lewis’s principle commits him to such metaphysically impossible worlds. For Lewis’s discussion of the Forrest-Armstrong argument and his reply, see Lewis 1986a: 101–104. For a different reply, and an argument that Lewis is better off without the restriction, see Nolan 1996.
read “size and shape and prohibitions on co-location permitting.” Depending on what Lewis means by the “shape” of spacetime, the last conjunct might be redundant; maybe co-located Plum duplicates would result in a spacetime of unsuitable shape. If so, then this explains why explicit talk about co-location drops out of the discussion when explicit talk about the shape of spacetime enters into it.

Wilson reads the qualification differently, as blocking Lewis’s recombination principle from saying anything about things not in spacetime or about things that are co-located:

Lewis’s combinatorialism applies only to (duplicates of) non-overlapping occupants of spacetime (“at least provided they occupy distinct spatiotemporal positions”). (Wilson 2015: 148)

In other words, Wilson reads the qualification as making the principle’s claims that things vicariously coexist, vicariously fail to coexist, and vicariously stand in any suitable arrangement conditional on their being spatiotemporal and not co-located. Understood this way, Lewis’s principle tells us about the vicarious lives of only spatiotemporal things occupying distinct locations; it says nothing about the vicarious lives of anything else.

There are good reasons to think that Wilson’s interpretation of the restriction is mistaken. After presenting his rough, initial sketch, Lewis clarifies that any possible individual should admit of combination with itself: if there could be a dragon, then equally there could be two duplicate copies of that dragon side by side, or seventeen or infinitely many. (Lewis 1986a:
So it is clear that Lewis wants his recombination principle to let things recombine with themselves. However, *everything* is co-located with itself, so nothing recombines with itself on Wilson’s interpretation of the principle. Besides, Lewis’s claim that the duplicate dragons be “side by side” rules out that the dragon copies be co-located, not the originals, which suggests that he intends the earlier qualification, “provided they [i.e. the duplicates] occupy distinct spatiotemporal positions,” to be a restriction on which arrangements are suitable rather than as a restriction on which objects admit of recombination.

There is another problem with Wilson’s interpretation of the qualification “at least provided they occupy distinct spatiotemporal positions.” According to Wilson, the qualification prevents recombination from saying anything about the vicarious lives of non-spatiotemporal things. But that also cannot be right. Lewis explicitly denies that a commitment to the existence of spacetime is part of modal realism:

Throughout this book, I shall presuppose that there are such things as spatiotemporal regions, whether or not there also are distinct things that occupy those regions. But I believe this presupposition plays no important role, and I could have been more neutral at the cost of clumsier writing. I certainly don’t mean to suggest that the existence of spacetime and its parts is an essential tenet of modal realism. (Lewis 1986a: 76)

And Lewis explicitly accepts worlds that are not spatiotemporal:

each world is interrelated (and maximal with respect to such interrelation)
by a system of relations which, if they are not the spatiotemporal relations rightly so called, are at any rate analogous to them. (Lewis 1986a: 75)

So it is unlikely that Lewis intends for his recombination principle, his systematic description of what the pluriverse is like, to say things about the vicarious lives of only spatiotemporal things. Instead, we should understand “spatiotemporal,” as it occurs in “at least provided they occupy distinct spatiotemporal positions,” in an extended sense that includes things occupying positions only analogously spatiotemporal.\(^{33}\)

Although I think Wilson’s interpretation of the restriction, “at least provided they occupy distinct spatiotemporal positions” is wrong, I do not want to insist on it. Her objections fail even if her interpretation of Lewis’s recombination principle is correct. So, for the sake of argument, I am happy to adopt her interpretation, provided that we understand “spatiotemporal” as “spatiotemporal or analogously spatiotemporal.” Adopting her interpretation and understanding “spatiotemporal” broadly gives us something like the following principle:

\begin{equation}
\text{(Analogue Recombination)} \quad \text{Any part of the pluriverse has a duplicate that exists with, and a duplicate that exists without, a duplicate of any part of the pluriverse occupying a distinct spatiotemporal or analogously spatiotemporal position, in any arrangement of suitable size and shape.}^{34}\end{equation}

\(^{33}\) I discuss analogously spatiotemporal worlds more in §3.

\(^{34}\) Analogical Recombination is based on Lewis’s most careful formulation of his recombination principle: “[a]nything alien can coexist, or fail to coexist, with anything else alien, or with anything else not alien, in any arrangement permitted by shape and size” (1986a: 92). A few things about this formulation deserve comment. First, Lewis admits “there is room to improve” it (1986a: 113). For suggested improvements, see Divers & Melia 2002, Efird &
Think of recombination in terms of inputs and outputs. The inputs are combinatorial elements; for Lewis, these are parts of worlds. The outputs are arrangements of duplicates of inputs; for Lewis, these are worlds. Analogical Recombination characterizes the pluriverse by making descriptive claims about which worlds exist. And it does *that* by saying there exist duplicates of inputs standing in a structure of external relations suitable for unifying a world. The more inputs Lewis has, and the more arrangements he takes to be suitable for unifying a world, the more outputs Analogical Recombination says exist.

So, in general, Lewis can respond to the claim that he lets possibilities go unrepresented in four ways. First, he can deny the alleged possibilities are genuine; not accommodating the possible existence of a round square is a virtue not a vice. Second, he can recombine more inputs; by arranging duplicates of the new inputs, he might get an output capable of representing the missing possibility. Third, he can take more arrangements to be suitable; by arranging duplicates of the inputs in new ways, he might get an output capable of representing the missing possibility. Fourth, he can do more
with the outputs he already has; by having his outputs represent more situations, one of
them might come to represent the missing possibility. In short: Lewis can reject the data,
multiply inputs, multiply outputs, or multiply possibilities represented.

3 Configuration Space
One kind of example that Wilson raises as a problem for Lewis involves objects not
located in spacetime:

   a comparatively vast array of possibilities—all those associated with
   spaces in some or other respects different from ordinary spatiotemporal
   space—are simply left out of Lewis’s account. (Wilson 2015: 153)

In particular, Wilson has in mind possibilities where things are located in “some more
abstract space—most saliently configuration space” (2015: 153). Wilson’s argument is
that, since all of Lewis’s inputs are located in spacetime, there is no way for him to
recombine duplicates of them to get worlds where something is located in a different kind
of space and, therefore, Lewis fails to describe a world able to represent possibilities like

   (Configuration Space) Possibly, something is located in configuration space.

First, it is worth pointing out that this objection fails on the interpretation of Lewis’s
recombination principle that I defend in §2. The restriction, “at least provided they

36 On a straightforward, realist interpretation of quantum mechanics, there exists something
called “the wavefunction” located in a radically high-dimensional space called “configuration
space.” Ney (2012) presents the realist interpretation of quantum mechanics and argues that
the familiar three (or four) dimensions from our experience of the world are not somehow
contained within the dimensions of configuration space.
occupy distinct spatiotemporal positions,” is not best understood as limiting which things are suitable inputs for recombination. It is better understood as a restriction on which arrangements are suitable for outputs. Besides, there are good reasons to think that we should read “spatiotemporal” as “spatiotemporal or analogously spatiotemporal.”

But set those issues aside. Wilson’s objection fails even if we accept her interpretation of Lewis’s recombination principle. After all, duplicates are guaranteed to share only their intrinsic properties and something’s location is not intrinsic to it.37 Therefore, duplicates of things located in spacetime need not, themselves, be located in spacetime. Lewis can accommodate Configuration Space by multiplying outputs, i.e. by including among his suitable arrangements of inputs ones structured by non-spatiotemporal external relations.38

Maybe this is not enough. Maybe occupants of configuration space are not duplicates of spatiotemporal things arranged in non-spatiotemporal ways. If so, then Lewis also needs non-spatiotemporal inputs to accommodate Configuration Space. But this is no problem; Lewis explicitly accepts worlds, and therefore parts of worlds, that are not strictly spatiotemporal. If necessary, Lewis can accommodate Configuration Space by multiplying outputs and inputs, i.e. by putting duplicates of non-spatiotemporal objects

37 Recall that a property is intrinsic just in case it cannot differ between duplicates. Since duplicates can occupy distinct locations, something’s location is not intrinsic to it.
38 Recall that a relation is external just in case it is intrinsic to the fusion of its relata but not intrinsic to its relata.
into non-spatiotemporal external relations.

Maybe this still is not enough. All of Lewis’s worlds are unified by external relations at least analogous to spatiotemporal ones. Maybe Wilson’s objection is that configuration space is not even analogous to spacetime, so none of Lewis’s worlds represent worlds with configuration space. Although it is far from clear, there are two reasons to think that configuration space is analogous to spacetime in the relevant sense. First, the relations that structure configuration space meet all the necessary conditions that Lewis (1986a: 75–76) gives for being analogously spatiotemporal: they are natural, pervasive, discriminating, and external.39 This is not definitive, since Lewis does not give any sufficient conditions for being analogously spatiotemporal, but it is some evidence that configuration space is among the kinds of space that Lewis has in mind.

Second, Alyssa Ney (2012) argues that it is plausible to think about configuration space in a way that preserves most of the manifest image of it from our everyday experience, i.e. as containing ordinary objects that are specifically locatable in space.40 If Ney is right, then being in configuration space is, in some important ways, like being in

39 A relation is pervasive just in case “mostly, or perhaps without exception, when there is a chain of relations in the system running from one thing to another, then also there is a direct relation”; a relation is discriminating just in case “it is at least possible ... that there be a great many interrelated things, no two of which are exactly alike with respect to their place in the structure of relations” (Lewis 1986a: 76).
40 According to Ney, the key is to accept a functionalism about ordinary objects, i.e. to accept that for an object to exist is for something to occupy its functional role. Since parts of the wavefunction fill roles corresponding to ordinary objects, we would get the existence of ordinary objects even in configuration space. Furthermore, these ordinary objects would be locatable: they would correspond to the wavefunction’s high amplitude parts.
spacetime. This suggests, again, that configuration space is analogous to the spacetime of our everyday experience.

Regardless, if I am wrong about configuration space being analogous to spacetime, then no matter. A relatively straightforward fix suggested by Phillip Bricker (1996) would let standard modal realists accommodate possibilities like Configuration Space. Much like Wilson, Bricker argues, from premises about quantum mechanics, that Lewis fails to describe a pluriverse able to represent possibilities for things located somewhere not even analogously spatiotemporal:

Physicists have often speculated, in trying to make sense of quantum mechanical mysteries such as wave-particle duality, that spacetime is not physically fundamental .... Moreover, it may be that none of the fundamental, (perfectly) natural relations are even structurally analogous to the spatiotemporal relations .... Lewis’s analysis, by requiring that worlds be spatiotemporally unified [or unified in an analogous way], in effect rules out the physicist’s speculation a priori. That’s not right. Any possibility for actuality must find a place in logical space. Lewis’s conception of logical space, then, is too narrow. (Bricker 1996: 229-230, italics in original)

However, Bricker suggests a fix:

I propose, then, that we take [the family of world-unifying relations] to contain all natural external relations: worlds are maximal externally unified regions of logical space. (Bricker 1996: 230, italics in original)

The kind of worlds that Bricker suggests Lewisians need, fusions maximal with respect to relations not even analogously spatiotemporal, are not generated by Analogical Recombination. So, if a Lewisian accepts such worlds (and accepts Wilson’s
interpretation of Lewisian recombination), then she should replace Analogical Recombination with

(External Recombination) Any part of the pluriverse has a duplicate that exists with, and a duplicate that exists without, a duplicate of any part of the pluriverse occupying a distinct position in a space unified by natural external relations, in any arrangement of suitable size and shape.41

If she does, then she can accommodate Configuration Space by more liberally multiplying outputs and inputs, i.e. by putting duplicates of non-spatiotemporal objects into the natural, external relations that unify configuration space, regardless of whether those relations are analogously spatiotemporal.

To review, there are four ways for Lewisians to reply to Wilson. First, accept the interpretation of Lewis’s recombination principle that I defend in §2 rather than Wilson’s interpretation. Second, accept Analogical Recombination and put duplicates of spatiotemporal objects in the relations that structure configuration space. Third, if that fails because objects in configuration space are not duplicates of spatiotemporal ones, then put duplicates of non-spatiotemporal objects in those relations instead. Fourth, if

41 Lewis (1986a: 76–78) anticipates and rejects Bricker’s suggestion, since Lewis thinks that there might be natural external relations—his examples are like-chargedness and opposite-chargedness—that hold between parts of distinct worlds. Bricker argues that Lewis is wrong about this. According to Bricker (1996: 231), Lewis’s intuition that like-chargedness and opposite-chargedness would relate parts of distinct worlds “is a holdover ... from the (more customary) view that charge is intrinsic” and that, if you really think like-chargedness and opposite-chargedness are external relations, then you will think interworld charge relations are “unnecessary and gratuitous,” since they would determine no facts about the distribution of charge or laws governing it at a world. Even if you side with Lewis rather than Bricker on this point, there remain the other replies to Wilson’s objection that I give above.
that fails because the relations of configuration space are not even analogously spatiotemporal, then accept Bricker’s suggestion about which relations unify worlds, accept External Recombination, and put duplicates of non-spatiotemporal objects into external relations not even analogously spatiotemporal.

None of this is very satisfying for modal epistemology, but that is not surprising. Since Lewisian recombination characterizes the pluriverse by telling us about the vicarious lives of the world parts, Lewis needs a stock of world parts before he can use recombination to describe the pluriverse. However, Lewis has a stock of world parts only if he has a stock of worlds, so he needs a stock of worlds before he can use recombination to describe the pluriverse. Does that make his attempt to describe the pluriverse doomed to failure? I do not think so. Lewis does not use recombination to motivate the existence of other worlds. He motivates the existence of other worlds by appealing to their usefulness for our theorizing. If that motivation is good, then Lewis already has a stock of useful worlds. He just needs to describe them, so we know what it is that his argument motivates, and that is where recombination comes in. Recombination serves a descriptive function for Lewis, and nothing about Lewis’s recombination principle stops it from describing a pluriverse varied enough to represent Configuration Space.

To be clear: recombination also serves an epistemic function for Lewis, but Lewis grants that it does not serve this function perfectly. This might be one area where our
epistemic knowledge comes up short. Alas, such is our modal ignorance. However, recall that Wilson’s primary concern is with recombination’s usefulness for describing the pluriverse, not its epistemic usefulness. Besides, Wilson also suggests that Lewis multiply inputs to avoid undergeneration. In response to the suggestion that only parts of the actual world are available for recombination and, therefore, Lewis undergenerates with respect to alien possibilities, Wilson writes

> the combinatorial elements may be either actual or (merely) possible. ... there was no presupposition that the principle [of recombination] applied only to actual spatiotemporal occupants …. It is the more general recombinatorial principle that is ultimately at issue in Lewis’s combinatorialism. (Wilson 2015: 145)

In other words, Wilson suggests that Lewis can describe a pluriverse varied enough to represent possibilities for alien objects by multiplying inputs to include alien objects. Multiplying inputs to include objects in configuration space is no more descriptively or epistemically problematic than accommodating possibilities for alien objects by multiplying inputs to include them. In fact, it might be less problematic: a plausible interpretation of our best science tells us that some actual objects occupy configuration space, and recombination applies to parts of the actual world if it applies to anything.

Maybe Wilson thinks there is a special reason that multiplying inputs, although acceptable for alien individuals, fails for things in configuration space. She argues that applying Lewis’s recombination to configuration spaces jeopardizes his reductive project
in a way that applying it to (spatiotemporal) alien objects does not:

Lewis’s reductive aim is threatened, no matter how [his combinatorialism] might be expanded to accommodate configuration and other more abstract spaces .... Once the combinatorial principle is applied to more abstract elements, which are not (at least in the first instance) occupants of spacetime but rather of some more general space, it is no longer clear that Lewis’s extensional gambit applies. (Wilson 2015: 154)

However, Wilson does not say why Lewis’s extensional gambit—analyzing how things can or must be in terms of how things are—would no longer apply and, at least on its face, there is no reason to think that it would not. Lewis’s reductive strategy does not depend on the objects in question being in spacetime; it depends only on them existing and having the properties they represent other objects as possibly having. Where they are is not relevant to the success of the proposed reduction, which is adequate as long as they exist and there are enough of them to represent every possibility.

4 Plaid Kangaroos

A second kind of example that Wilson raises as a problem for Lewis involves objects like plaid kangaroos:

[Lewisian recombination] generates “juxtapositional” possibilities—e.g., it generates the possibility that there be a kangaroo wearing (that is, appropriately proximate to) a plaid coat. But the possibility of a plaid kangaroo is not a juxtapositional possibility, but rather requires that the property of being plaid somehow overlap (that is, be instantiated in) a kangaroo. (Wilson 2015: 150)

According to Wilson, Lewis fails to represent possibilities like
(Plaid Kangaroos) Possibly, there are plaid kangaroos,

unless he presupposes an additional principle that, Wilson argues, makes his theory less elegantly systematic and not modally reductive.\(^{42}\) However, Wilson’s argument is good only if none of Lewis’s inputs are plaid kangaroos. Otherwise, Plaid Kangaroos is a juxtapositional possibility: it is the result of juxtaposing a plaid kangaroo with (or without) anything else. Unless something prevents a plaid kangaroo from being among Lewis’s inputs, Plaid Kangaroos is no problem for Lewis.

What might prevent a plaid kangaroo from being among Lewis’s inputs? If Lewis’s inputs had to be actual, then plaid kangaroos would not be among them; there are no actual plaid kangaroos. However, Wilson denies that Lewis’s inputs are all actual in her discussion of alien objects. Instead, Wilson’s idea seems to be that plaid kangaroos are not the right kind of thing to be among Lewis’s inputs; she argues that Lewis’s inputs are all “elements in (actual or possible) Humean supervenience bases” (Wilson 2015: 150). In a well-known passage, Lewis says that much of his work is part of a “prolonged campaign” on behalf of Humean supervenience, the doctrine that

all there is to the world is a vast mosaic of local matters of particular fact, just one little thing and then another …. We have geometry: a system of external relations of spatiotemporal distance between points. ... And at those points we have local qualities: perfectly natural intrinsic properties which need nothing bigger than a point at which to be instantiated. For short: we have an arrangement of qualities. And that is all. There is no difference without difference in the arrangement of qualities. All else

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\(^{42}\) I discuss the additional principle that she thinks he needs, Humean supervenience, below.
supervenes on that. (Lewis 1986b: ix-x)

Call a point-sized bearer of natural intrinsic properties a *micro-object*. Wilson bases her claim that Lewis’s inputs are all micro-objects on his acceptance of Humean Supervenience. If Wilson is right, then her objection stands; plaid kangaroos are not micro-objects.

However, Lewis believes that Humean supervenience is contingent: actually true but possibly false and, therefore, false in some world. Immediately after giving the statement of Humean supervenience quoted above, Lewis adds

> First say it, then qualify it. I don’t really mean to say that no two possible worlds whatsoever differ in any way without differing in their arrangements of qualities. For I concede that Humean supervenience is at best a contingent truth. Two worlds might indeed differ only in unHumean ways, if one or both of them is a world where Humean supervenience fails. (Lewis 1986b: x)⁴³

A world where Humean supervenience fails is one where something fails to supervene on the distribution of micro-objects. To describe such a world using recombination, it is not enough to talk about the vicarious lives of only micro-objects; doing so leaves out exactly what makes the world unHumean. So it is unlikely that Lewis intends for micro-objects to be his only combinatorial inputs.

Unless there is some other reason to think that plaid kangaroos are unacceptable inputs, Plaid Kangaroos is no problem for Lewis. He accommodates it by multiplying

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⁴³ Also see Lewis 1994: 474–475.
inputs, i.e. by taking plaid kangaroos to be among his stock of combinatorial elements.

Besides, there is precedent for this, since it is how Lewis handles similar possibilities:

Surely it ought to be possible to take ‘talking donkey’ and whatnot as primitive when we are analysing modality, whatever other project we might care to undertake on another day. That’s how I do it: I say it’s possible for there to be a talking donkey iff some world has a talking donkey as a part—no utopian analysis of ‘talking donkey’ in terms of arrangements of particles is required. (Lewis 1986a: 156, italics in original)

According to Lewis, we should be able to give a reductive account of modality without first reducing everything physical to the microphysical; he takes it to be a problem for linguistic ersatzism—the theory that a possible world is a maximal consistent set of sentences that, intuitively, describe how things are at that possible world—if it cannot do this.44 Lewis avoids this problem by using a talking donkey to directly represent the possibility of a talking donkey rather than using an arrangement of micro-objects to indirectly represent it. Similarly, he can use plaid kangaroos to directly represent Plaid Kangaroos.

5 Bosons and Fermions

A third kind of example that Wilson raises as a problem for Lewis involves co-located objects:

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44 I am not convinced by Lewis’s argument that linguistic ersatzism cannot do this. The argument seems to require the assumption that Humean supervenience is necessarily true, something Lewis himself denies. A linguistic ersatzer who denies that Humean supervenience is necessarily true can adopt a rich world-making language, one that describes both the micro- and macrophysical goings on, without falling into inconsistency. In any case, the virtues and vices of linguistic ersatzism are beyond the scope of my argument.
As it stands, [Lewis’s combinatorialism] does not specify what is or is not possible for spatiotemporally overlapping entities; the principle is simply silent on the matter. (Wilson 2015: 148)

Wilson’s argument for this conclusion is that, since Lewis’s recombination principle describes the vicarious lives of only inputs that are not co-located with each other, he fails to describe a pluriverse that represents possibilities for co-located things.

First, it is worth pointing out, again, that this objection fails on the interpretation of Lewis’s recombination principle that I defend in §2. The restriction, “at least provided they occupy distinct spatiotemporal positions,” is not best understood as limiting which things are suitable inputs for recombination. It is better understood as a restriction on which arrangements are suitable for outputs.

But set that issue aside. Wilson’s objection fails even if we accept her interpretation of Lewis’s recombination principle. According to Wilson, it is a problem for Lewis that his principle is silent about the vicarious lives of co-located things, since “possibilities can substantively differ as regards such entities,” but it is not clear which of the possibilities she thinks Lewis misses. For example, Wilson points out that bosons can be co-located but fermions cannot be. Insofar as Wilson’s objections are supposed to show that Lewis undergenerates metaphysical possibilities, the objection seems to be that Lewis’s recombination principle does not describe a pluriverse with worlds enough to represent
(Co-Located Bosons) Possibly, bosons can be co-located.

However, there are actually co-located bosons, so the actual world represents Co-Located Bosons. Co-Located Bosons is no problem for Lewis.

Maybe that is too easy. We know the actual world is part of the pluriverse because we inhabit it, not because Lewis’s recombination principle tells us. So maybe appealing to the actual world is cheating. No worries. Recombination describes many other worlds that represent Co-Located Bosons, too. Consider some proper part of our world that contains co-located bosons. Call this part “Bozo” and call the remainder of our world, our world less Bozo and everything co-located with it, “Remainder.” Since Bozo and Remainder occupy distinct spatiotemporal locations, recombination tells us that a duplicate of Bozo exist without any duplicate of Remainder. Whatever else, if anything, a world contains in addition to a duplicate of Bozo, it represents Co-Located Bosons, provided (as seems reasonable) that duplicates of bosons are bosons.

So maybe Wilson’s objection is that Lewis fails to describe a pluriverse able to represent de re possibilities for co-located objects. Let “Bo” refer to an actual boson that is not co-located with any other boson and let “Son” refer to an actual boson that is co-located with another boson (but not Bo). Wilson’s objection might be that Lewis gets no world to represent possibilities like

(Squishing) Bo is such that, possibly, it is co-located with another boson
or, maybe, that he gets no world to represent possibilities like

(Separation) Son is such that, possibly, it is not co-located with another boson.

But, he does. Recall that Lewis uses counterparts to analyze de re modality: an object is such that it possibly has a property just in case it has a counterpart with that property. So, Lewis accommodates Squishing if there is a world with something that is both a counterpart of Bo and co-located with another boson, and he accommodates Separation if there is a world with something that is both a counterpart of Son and not co-located with another boson.

In both cases, there is: the actual world. Since Bo and Son are both bosons, they resemble each other to a very large degree. So, on almost any counterpart relation, they are great candidates for being counterparts. Because of this, Son represents a possibility for Bo, namely Squishing, and Bo represents a possibility for Son, namely Separation. Neither Squishing nor Separation is a problem for Lewis.

Again, this might be too easy. We know the actual world is part of the pluriverse because we inhabit it, not because Lewis’s recombination principle tells us. So maybe appealing to the actual world is cheating. No worries. Recombination describes many other worlds that represent Squishing and Separation, too. Since there are actually co-located bosons, recombination entails that there are otherworldly co-located bosons. Given counterpart theory, each of them represents a possibility for Bo, namely Squishing.

45 See Chapter 2, §3.
Likewise, since there are actually bosons not co-located with another boson, recombination entails that there are otherworldly bosons not co-located with another boson. Given counterpart theory, each of them represents a possibility for Son, namely Separation.

The key is seeing that, given Lewis’s account of de re modality, Bo and Bo’s duplicates do not merely represent possibilities for Bo; they represent possibilities also for Son. Likewise, Son and Son’s duplicates represent possibilities also for Bo. So Lewis can accommodate Squishing and Separation by multiplying possibilities represented. On my interpretation of Lewis’s recombination principle, it is not silent about the vicarious lives of co-located things. But, even if I am wrong, that does not mean that Lewis is silent about what is possible for co-located objects. His principle describes worlds that represent possibilities for co-located things in other ways, which is enough.
Chapter 4: Similarity and Revenge

1 The General Insight

There is an intuitive distinction to draw between things and the ways that things are. Being one way, rather than another, corresponds to a qualitative difference between things; being the same way, rather than a different one, corresponds to a qualitative similarity. These patterns of qualitative difference and similarity are pervasive. My kitchen, for example, is full of them. My spoons and forks are similarly reflective and metallic, but they are differently sized and shaped. My two teapots are similarly sized and shaped, but differently glazed and patterned. Call facts like these similarity facts and difference facts. Similarity facts and difference facts are so entirely commonplace that we do not often think about them explicitly in those terms; but they are all around us.

Patterns of qualitative difference and similarity are important enough that we often track them with linguistic and conceptual distinctions. I describe and think about the

46 Here and throughout, I use “thing” broadly. Both objects and properties are things.
world at least partly in terms of a distinction between the metallic things and the non-metallic ones. And it is a good thing that I do! Paying attention to which things in my house are metallic has practical consequences that I am better off tracking. For example, paying attention to that distinction helps me make better decisions about what to put in my microwave. That my fork and spoon are both metallic is an attribution fact.\footnote{Maybe attribution facts reduce to facts about predicates or concepts. For example, that my spoon is metallic might reduce to the fact that “metallic” correctly applies to my spoon, that my spoon falls under the concept \texttt{METALLIC}, or a combination of the two. Or maybe attribution facts are the worldly structures in virtue of which predicates correctly apply to things and things fall under concepts. In the former case, I think that attribution facts have no interesting role to play in explaining the correlation between similarity and property possession that I discuss below. In the latter case, I think that attribution facts probably do play an important role in that explanation, but that is because they are probably identical to property-possession facts, which I introduce below. Since attribution facts are not the main focus of this chapter, I do not take a particular stance here.} Again, attribution facts are so entirely commonplace that we do not often think about them explicitly in those terms; but they are all around us, too.

Similarity facts and attribution facts are correlated. Patterns of similarity in our experience correlate with patterns of attribution in our language and thought. And, like any correlation, this raises an interesting question. What makes similarity facts and attribution facts line up so nicely? If you think, in general, that how the world is depends on how we talk and think about it, then you might think that similarity facts and attribution facts are correlated because patterns in our language and thought determine which things are similar. And if you think, instead, that much of our talk and thought about the world aims toward accurately representing how things are...
independently of us, then you might think that similarity facts and attribution facts are correlated because patterns of objective similarity determine what we correctly attribute to things.

I tend to be as robust and inflationary about metaphysics as anyone, but the latter option is unsatisfying on its own, even to me. That explanation misses something important. When my favorite mugs are similar, it is not a naked qualitative happenstance. There is something about the natures of my mugs—the overall ways that my mugs are—that is importantly involved in their similarity. Maybe the ways that my mugs are explain their qualitative similarity. Or maybe their qualitative similarities explain why they are certain ways. Regardless, how my mugs are is an important part of the story.

If so, then there is more to say about the qualitative goings-on in my kitchen. When I want to talk about the similarities and differences among the things in my kitchen, or about what to attribute to them, it is tempting to talk about the various properties that they either have or lack. For example, my two favorite mugs are similar in color and shape. Those similarity facts are correlated with some attribution facts: that my two

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48 Two points of clarification. First, for ease of presentation, I focus throughout this chapter on properties, but everything I want to say applies also to relations, with only straightforward adjustments. Second, recall that Lewis distinguishes two conceptions of properties. On the sparse conception, “[t]he sharing of [properties] makes for qualitative similarity, they carve at the joints” (Lewis 1986a: 60). On the abundant conception, properties “pay no heed to the qualitative joints, but carve things up every which way. Sharing of them has nothing to do with similarity” (Lewis 1986a: 59). Since I am interested in the connection between properties and similarity, I have the sparse conception of properties in mind throughout.
favorite mugs are both scarlet and mug-shaped. And those similarity and attribution facts are further correlated with some *property-possession facts*: that my mugs both have *being scarlet* and *being mug-shaped*.\(^{49}\) Property-possession facts capture the ways that things are; a property *just is* a way for things to be. I believe that property-possession facts are all around us, too. They are as much a part of our world as similarity facts and attribution facts.

I want to be as neutral as possible about how to understand properties. Given my inflationary leanings, I tend to think of properties as additional things in my ontology that play various explanatory roles. But I do not want to insist on that here. All I want to insist on is that, whenever things are similar, there is something about them that they have in common. You can think of what they have in common like I do—as a literal thing, distinct from them, to which they have some kind of intimate relationship that qualitatively characterizes them—or you can think of it some other way. For example, Rodriguez-Pereyra is happy to talk about things having and sharing properties:

> Here are some facts: a certain rose is red, a certain ring is round, a certain tile is square, a certain vase is cold. These and similar facts are completely uncontroversial. My favorite way of describing in a general way these facts is by saying that they consist of particulars—the rose, the ring, the tile,

\(^{49}\) Throughout this chapter, my specific examples of properties are mainly for ease of presentation. I think that my examples involve only sparse properties, but no worries if I am wrong. For the majority of my argument, nothing depends on a specific view about which properties are sparse. With the exception of my examples from §7, which play an important role in my argument, feel free to substitute your favorite examples of sparse properties in for mine anywhere my choices seem controversial. For what it is worth, I argue in §8 that my examples of sparse properties from §7 are legitimate.
the vase—having certain properties—the property of *being red*, the property of *being round*, the property of *being square*, the property of *being cold*. So when confronted with two red roses I say, for instance, that they share a certain property, the property of *being red*. ... That many different particulars can and do have the same properties I take to be undeniable or, as others would say, a ‘Moorean’ truth or fact. (Rodriguez-Pereyra 2002: 14–15, italics in the original)

So far, Rodriguez-Pereyra and I disagree about nothing. Attribution facts like the ones he lists involve things having various properties, and to miss out on this detail is to miss out on something important about the world. However, Rodriguez-Pereyra adds

[All my use of ‘property’ commits one to is the idea of an identity of nature between some different particulars. But this need not mean that there are one or more entities, over and above the particulars that are identical in nature, which are present in those particulars. This may be the case, if universals or tropes exist; but it will not be the case if that identity of nature consists, for instance, simply in that the particulars in question resemble each other. (Rodriguez-Pereyra 2002: 16–17)]

Rodriguez-Pereyra’s point here is that engaging in property talk requires only that things be somehow identical in nature. It leaves open any question about what being identical in nature involves. If Rodriguez-Pereyra is right, then it is important not to read universals or tropes into the claim that things have and can share properties. Maybe properties are universals. Or maybe they are tropes (or else sets of duplicate tropes). Or maybe properties are specific sets of objects (or else fusions or pluralities of those objects). Or maybe property-possession facts consist in similarity facts, as Rodriguez-Pereyra suggests, without there existing a distinct thing that is the possessed
property. This is a disagreement best left for another day, since nothing about my argument in this chapter depends on making one choice rather than another. So I am happy to adopt, for the sake of argument, Rodriguez-Pereyra’s interpretation of property talk as not committing us to the existence of anything beyond some similar particulars.

Why accept that things possess properties? Because, I think, properties do good explanatory work. Properties, understood as “identities in nature,” help explain our ability to recognize new instances of familiar kinds. For example, someone with normally working vision can reliably tell you whether a newly encountered mug is scarlet or gray. She can reliably tell you whether it is patterned or monochromatic. She can reliably tell you whether it is smooth or rough. She can reliably tell you whether it is chipped or pristine. She can reliably tell you a lot about a newly encountered mug, and it is hard to see how she can do that unless there are things about the mug, genuine “identities in nature,” that she is tracking. Properties help us explain our abilities to recognize and correctly categorize things.

If all of this is right, then we have three apparently connected phenomena: qualitative similarity and difference, correct and incorrect linguistic and mental attribution, and property possession and lack. Recall my two favorite mugs. They are similar in color and shape. They are both scarlet and mug-shaped. They both have the same color, being scarlet, and the same shape, being mug-shaped. Given the correlation
between facts like these, there are apparently some intimate connections involved. However, there is room to disagree about what that connection is. What, if anything, explains the correlation between similarity, attribution, and property possession?

It is probably no surprise that I, disposed as I am toward inflationary realist views, do not think that attribution facts ultimately explain the correlation. Attribution strikes me as metaphysically downstream of similarity and property possession. In general, things fit into our linguistic or mental categories because of how they are, not the other way around. So I think that either similarity or property possession has explanatory priority here. Attribution facts ride on their coattails. Suppose, for the sake of argument, that I am right: attribution facts are correlated with similarity facts and property-possession facts because either similarity facts or property-possession facts explain why attribution facts obtain.

This still leaves an important question unanswered. What explains the correlation between similarity facts and property-possession facts? Two possibilities seem plausible. First, patterns of property possession might explain why things are similar. For example, realists about universals say that my mugs are similar in color because they both instantiate \textit{being scarlet}. Second, patterns of similarity might explain why things share properties. For example, resemblance nominalists say that my mugs have \textit{being scarlet}

\footnote{Set aside for now a third possibility, that similarity and property possession are actually independent but each correlated with some third thing that explains their apparent connection to each other.}
because they are similar. So, on some level, realists and nominalists accept the same
general insight,

(General Insight) Things are qualitatively similar just in case they have the same
property,

but they disagree about the direction of dependence involved.

2 Revenge Problems

One difficulty for theories that say similarity depends on property possession is that
there are similarities among properties, too. For example, *being scarlet* and *being mug-
shaped* are similarly monadic. A common criticism of realism is that it cannot give a
good account of similarities among universals.\(^5\) If a realist says that *being scarlet* and
*being mug-shaped* are similar because they instantiate *being monadic*, then she introduces
so-called “higher-order” universals. Some realists find this unsettling,\(^5\) and higher-order
universals tend to ruin otherwise good accounts of instantiation.\(^5\) However, if she
explains the similarity between *being scarlet* and *being mug-shaped* in some other way,
e.g. by taking it to be primitive, then it is not clear what would be lost by explaining
similarities between particulars that way, instead, and avoiding universals in the first
place.

This is a kind of revenge problem. If a theory posits things to help explain similarity,

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51 See, for example, Friesen 2006 and Eddon 2007.
52 See, for example, Armstrong 1989: 105.
53 See Chapter 5.
then it might, as a result, also introduce new similarities to be explained. And, if no explanation of those similarities is acceptable, then it is not clear the theory makes any genuine progress; it would simply shift the rug’s bump, reintroducing elsewhere the same kind of problem it is intended to solve.

However, revenge problems like that are general, and there is an analogous one about property possession. If a theory posits things to help explain property possession, then it might, as a result, also introduce new instances of property possession to be explained. And, if no explanation of those instances is acceptable, then it is not clear the theory makes any genuine progress; it would simply shift the rug’s bump, reintroducing elsewhere the same kind of problem it is intended to solve.

Some of realism’s rivals face this revenge problem, but that they do is not widely discussed. Consider a simple case. A class or a set is natural just in case all of its members share at least one sparse property. According to natural class nominalism, my mugs both have *being scarlet* because they are members of the same natural class, the class of scarlet things. So natural class nominalists posit classes (at least partly) to help explain property possession. However, classes also have properties, so positing them introduces new instances of property possession to be explained. Unfortunately, natural

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54 Lewis (1983b: 347, 1986a: 60–63) presents an influential version of natural class nominalism. As far as I know, he does not explicitly discuss the problem *being a class* poses for the view, although he makes the closely related point that property possession cannot, in general, be class membership, since the relation of class membership runs afoul of Russell’s paradox. (See Lewis 2002: 8.)
class nominalism cannot account for all of the new instances. For example, the class of scarlet things and the class of mug-shaped things both have *being a class*, but the explanation of this cannot be that they are members of the same natural class, the class of all classes. Russell looms large: there is no such class under threat of paradox.

So natural class nominalism is either incomplete or extensionally inadequate. On the one hand, if natural class nominalism does not try to account for every instance of property possession, then it is not a good general account of property possession: it might be a good account, but it would not be a general one. As an account of property possession, it would be incomplete. On the other hand, if it does try to account for every instance of property possession, then it is not a good general account of property possession: it might be a general account, but it would not be a good one. As an account of property possession, it would get the wrong result in at least some cases. Either way, natural class nominalism is not a good general account of property possession. Revenge strikes.

That is one example of a revenge problem facing realism’s rivals. There are others. For example, Rodriguez-Pereyra (2002) posits sets to help explain property possession. However, sets also have properties, so positing them introduces new instances of property possession to be explained, and Rodriguez-Pereyra cannot account for all of the new instances. Although revenge, again, involves an inability to account for all the properties
of some class-like things, it has nothing to do, in this case, with Russell’s paradox. The problem for Rodriguez-Pereyra is much more widespread. Or so I argue.

It is easier to understand Rodriguez-Pereyra’s version of resemblance nominalism after seeing a problem with a simpler version of the theory. So I first present the standard objection to resemblance nominalism (§3) and present two possible replies: one that Rodriguez-Pereyra rejects (§4) and one that he accepts (§5). Rodriguez-Pereyra’s reply depends on specific similarity facts involving sets, so I present his account of similarity between sets (§6) and argue that it makes his version of resemblance nominalism vulnerable to a revenge problem (§7). Finally, I argue that some replies to my argument fail (§8).

My argument should be of interest to resemblance nominalists who follow Rodriguez-Pereyra, but I hope it is of wider interest, too. I think that revenge problems like the ones I discuss are widespread in the property literature, and I think realism about universals gets unfairly singled out for abuse. Revenge problems are common enough, and systematic enough, for theories of properties that it is worth thinking more about why and how they keep cropping up. They show that our theories of properties do not do the general explanatory work that their proponents often think they do. Hopefully, seeing that there are systematic problems, rather than just local problems internal to realism, will help illuminate something important about the metaphysics of properties.
I should also say, in the interest of full disclosure, that I do not think revenge problems are generally fatal. Most philosophical objections are not. In light of revenge problems, realists might decide that accepting higher-order, sometimes self-instantiating, universals is not so bad. And natural class nominalists might decide that, in addition to classes, there exist higher-order class-like things that help explain why classes have some of their properties. And resemblance nominalists might decide that the reply from §4 is not so bad, after all. Revenge problems show that some sacrifices are necessary, but they are necessary for pretty much everyone.

3 Imperfect Communities

Modern resemblance nominalists say my mugs are scarlet because they are similar to the scarlet things, my mugs are mug-shaped because they are similar to the mug-shaped things, and being scarlet is not identical to being mug-shaped because the scarlet things are not all and only the mug-shaped things. More generally, modern resemblance nominalists accept instances of the schema

(Central Schema) \( \text{Something has the property being } F \text{ just in case (and because) it is similar to the Fs.} \)

When resemblance nominalists say things like this, it is important for them to understand “the scarlet things,” “the mug-shaped things,” and, more generally, instances of \( \text{the Fs} \) extensionally. For example, they cannot say that something is one of the

55 See, for example, Lewis 1983b, Rodriguez-Pereyra 2002, and Paseau 2012.
scarlet things because it has *being scarlet*. That would get their story backwards. The idea is supposed to be that my mug has *being scarlet* because it is one of the (collectively similar) scarlet things, not the other way around. So phrases like “the scarlet things” and “the mug-shaped things” need to be only shorthand conveniences, ways to refer to a specific plurality that could otherwise, at least in principle, be picked out without reference to any properties.\(^{56}\)

But exactly which pluralities are phrases like that supposed to pick out? Not just any ones, since that would make some instances of Central Schema false; most pluralities do not share any (sparse) property. Resemblance nominalists need to be more selective about which expressions \(\{\text{the Fs}\}\), as it occurs in Central Schema, can be replaced by.

The simplest thing to say, for a resemblance nominalist, is

(\text{Simple Answer}) \(\{\text{the Fs}\}\), as it occurs in Central Schema, can be replaced by any expression that refers to the members of a maximal similarity set.\(^{57}\)

Simple Answer requires some unpacking. A set is a *similarity set* just in case its members are collectively similar. Exactly which pluralities are collectively similar is going to be a matter of dispute—more on this shortly—but the general idea is that some things are

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\(^{56}\) This point is widely accepted among both defenders and critics of resemblance nominalism. See, for example, Goodman 1966: 147, Armstrong 1978a: 28, and Rodriguez–Pereyra 2002: 65.

\(^{57}\) Simple Answer is not the only thing a resemblance nominalist might say. For example, she might accept a more aristocratic version of the theory and say that my mugs are scarlet because they are similar to a few, especially iconic, scarlet things. See, for example, Price 1953: 20–22. For critical discussion, see Rodriguez-Pereyra 2002: 127–141.
collectively similar when they all resemble each other. Finally, a similarity set is maximal just in case everything that is similar to all of its members is one of its members.

Simple Answer seems to capture resemblance nominalists’ core belief, that things share properties because they are similar, but avoid the circularity that would come from saying that “the scarlet things” refers to some things because they have being scarlet. However, Simple Answer also introduces a potential problem. Anyone who accepts each instance of Central Schema suggested by Simple Answer needs to take every similarity set to be natural. Unfortunately, Goodman proved that some similarity sets are not natural, at least if we understand collective similarity in a certain way. Goodman (1966: 164) calls this “the difficulty of imperfect community.”

The difficulty, as I mentioned, is partly due to a view about when things are collectively similar. Suppose that, instead of two favorite mugs, I had seven, that these were my only mugs, and that I named them sequentially after the days of the week. For example, Monday is one of my mugs, and so is Wednesday. Since my mugs are collectively similar, the set of them is a similarity set. This is a good result for defenders of Simple Answer, since my mugs share at least one property, being mug-shaped. Furthermore, any non-empty subset of my mugs is a similarity set, too. For example, {Monday, Wednesday} is a similarity set, since its members are collectively similar.  

58 Recall that a set is natural just in case all of its members share at least one sparse property.  
60 Dyadic similarity is the limiting case of collectively similarity.
{Friday, Saturday, Sunday} is, too, and for the same reason. This is how it should be. If some things are collectively similar, then each combination of them is collectively similar, too. Collective similarity is not something things lose when we consider fewer of them. It is pervasive. It percolates down from pluralities to sub-pluralities.

One way to ensure that this is true of collective similarity is to take some things to be collectively similar whenever each one of them is pairwise similar to each one of the rest. In short, we might accept

(Pairwise) Some things are collectively similar just in case they are pairwise similar.

And this seems to make sense. If some things are collectively similar, then each one of them is similar to each one of the rest. And, it is tempting to think, if some things are not collectively similar, then there is at least one outlier among them: at least one of them is not similar to at least one of the rest.

Unfortunately, someone who accepts each instance of Central Schema suggested by Simple Answer cannot also accept Pairwise, as Goodman’s argument shows. Consider, for example, the set of all the round red things, all the round wooden things, and all the red wooden things. In other words, consider

(Bad News) \{x : x is either round and red, or round and wooden, or red and wooden\}

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61 Quine (1969: 9) suggests generating the difficulty this way, which is less technical than Goodman’s own presentation of it.
The members of Bad News are pairwise similar. Each round red member is similar to each round wooden member (intuitively, in shape), to each red wooden member (intuitively, in color), and to each red round member (intuitively in shape and color); each round wooden member is similar to each round red member (intuitively, in shape), to each red wooden member (intuitively, in material), and to each round wooden member (intuitively, in shape and material); and each red wooden member is similar to each round red member (intuitively, in color), to each round wooden member (intuitively, in material), and to each red wooden member (intuitively, in color and material). Furthermore, Bad News is maximal: only its members are similar to each of its members.

So, if we accept Pairwise, then Bad News is a maximal similarity set, which is bad news for anyone who accepts each instance of Central Schema suggested by Simple Answer. Central Schema, Simple Answer, and Pairwise entail that Bad News is natural, but it is not. There is no single property that the members of Bad News all share.\footnote{Remember that resemblance nominalists are trying to give an account of the sparse properties, the ones somehow intimately connected to qualitative similarity. It is no help that members of Bad News share some abundant properties, e.g. being either round, red, or wooden. The members of any set share infinitely many abundant properties, so abundant properties are of no help to resemblance nominalists.} Being wooden is not shared by the members of Bad News, since some red round things are not wooden; being round is not shared by them, since some red wooden things are not round; and being red is not shared by them, since some round wooden things are not red. Bad News is not natural. Call it, following Goodman, an \textit{imperfect community}. An
imperfect community is an unnatural similarity set. In other words, although the members of an imperfect community are pairwise similar and so, by Pairwise, collectively similar, there is no sparse property that they all possess. Any version of resemblance nominalism that cannot distinguish an imperfect community from a natural similarity set is extensionally inadequate, since it would get at least some property-possession facts wrong.

The source of the difficulty is clear: although the members of Bad News are pairwise similar, they are not all similar in the same respect, so, at least intuitively, they are not collectively similar. And this is a problem for resemblance nominalists precisely because they cannot appeal to respects of similarity in their account of property possession or collective similarity. A basketball might be similar to a football in texture and similar to a baseball in shape, but only if they have shapes and textures to be similar in respect to. Similarity-in-a-respect presupposes that things have properties, so resemblance nominalists cannot use it to explain why things have properties. Resemblance nominalists grant this point. For example, Rodriguez-Pereyra says

An important consequence of the primitiveness of resemblance is that it must be a relation of overall resemblance, not of resemblance-in-a-respect. For in Resemblance Nominalism what makes it true that \( a \) is \( F \) cannot be that \( a \) resembles the \( F \)-particulars in respect of property \( F \). For their having the property \( F \) would be the ontological ground of the resemblance and not vice versa. ... The resemblances that the Resemblance Nominalist invokes are too basic to be distinguished into different respects in which they resemble. (Rodriguez-Pereyra 2002: 64, italics in the original)
Bad News is bad news for resemblance nominalists precisely because they cannot
distinguish between it and natural sets like, for example, the set of all mugs by appealing
to respects of similarity. If someone accepts Pairwise, then both sets are maximal
similarity sets, and if only one is natural, then so much the worse for Simple Answer.
Something must go.

4 Rejecting Pairwise

To give up Central Schema is to give up resemblance nominalism, so resemblance
nominalists need to reject Pairwise, Simple Answer, or both. Rodríguez-Pereyra (2002)
accepts Pairwise and rejects Simple Answer, but it is worth considering the other option.

For example, Lewis (1983b: 347–348) suggests that resemblance nominalists should reject
Pairwise and, instead, say things are collectively similar whenever a primitive, variably
polyadic similarity relation holds among them. In other words, Lewis suggests

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63 I will not explicitly discuss the option of rejecting both. It preserves the problems of rejecting
each without adding any additional benefits.
64 Lewis’s suggestion is actually a bit more complicated than that, since he wants the relation
also to be contrastive, “\(x_1, x_2, \ldots\) resemble one another and do not likewise resemble any of \(y_1, y_2, \ldots\)” (Lewis 1983b: 347). Lewis wants this so he can use the relation to say when a set is a
maximal natural set, rather than just a natural set, since he wants to identify (sparse)
properties with maximal natural sets. It is not important for my purposes that we identify
properties with maximal natural sets, so I set aside the contrastive bit for simplicity. Lewis
also suggests that this version of resemblance nominalism and primitive natural class
nominalism are notational variants, “a single theory presented in different styles” (Lewis
1983b: 348). Primitive natural class nominalism says that it is a primitive fact whether or not
a class is natural. However, one advantage resemblance nominalism has over primitive natural
class nominalism is that, at least intuitively, it is something about the members of a natural
class that makes the class natural. See Manley 2002: 80–81. For an alternative to primitive
natural class nominalism that analyzes naturalness in terms of resemblance, see Busse 2016.
(Primitive) It is a primitive fact whether or not some things are collectively similar.

If a resemblance nominalist accepts Primitive rather than Pairwise, then she can deny that the members of Bad News are collectively similar despite the fact that each one is pairwise similar to each one of the rest. This would ensure that Bad News is not a maximal similarity set and, so, not natural according to Central Schema and Simple Answer.

Resemblance nominalists already take facts about dyadic similarity to be primitive, so why not go this route? Because, Rodriguez-Pereyra (2002: 80–81) argues, it puts resemblance nominalists at an explanatory disadvantage. Collective similarity has formal properties that resemblance nominalists cannot account for if they take facts about it to be primitive. Recall my day-of-the-week mugs. If Friday, Saturday, and Sunday are collectively similar, then so are Friday and Saturday, Friday and Sunday, and Saturday and Sunday. Collective similarity percolates down from pluralities to their sub-pluralities.

Some theories explain why collective similarity percolates down like that. For example, realists say that things are collectively similar because they all instantiate the same universal. So it is no surprise that things selected from among some collectively similar ones are always, themselves, collectively similar. If Friday, Saturday, and Sunday are collectively similar because they instantiate at least one universal in common, then Friday and Saturday are also similar, and for the same reason. My mugs do not stop
instantiating their universals when we consider fewer of them.

Resemblance nominalists who accept Pairwise can explain why collective similarity percolates down, too. They say that things are collectively similar because each of them is pairwise similar to each of the rest. So, again, it is no surprise that a smaller number of some collectively similar things are also, themselves, collectively similar. If Friday, Saturday, and Sunday are collectively similar because Friday and Saturday are similar, Friday and Sunday are similar, and Saturday and Sunday are similar, then it follows trivially that Friday and Saturday are also similar.

However, the fact that collective similarity percolates down would be a mysterious coincidence if facts about collective similarity were primitive. That kind of regularity is exactly what we want our theories of the world to explain, and accepting Primitive prevents us from doing so. As Rodriguez-Pereyra puts it,

True, [primitivists about collective resemblance] can stipulate that, if their collective resemblance relation obtains between members of a certain class, then it obtains between the members of every subclass of it. But this does not explain why, if the members of a class resemble, then so do the members of its subclasses. The explanation of this is, I maintain, that resemblance links pairs of particulars; so that what makes the members of any class resemble is that they resemble pairwise, which entails that the members of all its subclasses also resemble. (Rodriguez-Pereyra 2002: 81, italics in the original)

So a resemblance nominalist is at an explanatory disadvantage if she rejects Pairwise for Primitive. Maybe, all things considered, the benefits outweigh this cost. But it is worth
thinking about other options, since resemblance nominalists have another way to deal
with imperfect communities.

5 Rejecting Simple Answer
Grant, for the sake of argument, that the members of Bad News are collectively similar
and, therefore, that Bad News is a similarity set. Resemblance nominalists need to deny
that all similarity sets are natural. Maybe Bad News is not natural, despite being a
similarity set, since its members do not meet some further necessary condition. Saying
this requires rejecting Simple Answer and being pickier about which instances of Central
Schema are acceptable. For example, according to Rodriguez-Pereyra, my mugs are not
scarlet because they are similar to some specific, collectively similar things, i.e. the
scarlet ones. Instead, they are scarlet because they are similar to some specific,
collectively similar things, i.e. the scarlet ones, and, furthermore, the pairs of the scarlet
things are also collectively similar to each other, and the pairs of those pairs are
collectively similar to each other, and so on up the set-theoretic hierarchy.

In other words, Rodriguez-Pereyra accepts

(Complex Answer) 

\[ \{x \mid \text{the Fs}\} \]

as it occurs in Central Schema, can be replaced by any
expression that refers to the members of a maximal similarity set that also has
the following feature: the pairs of its members are, themselves, collectively similar
to each other, and the pairs of the pairs of its members are collectively similar to
each other, and so on.

Like Simple Answer before it, Complex Answer requires some unpacking, and some extra
terminology might help. Say that a pair is *first-order hereditary* just in case its members
are particulars. Say that a pair is *second-order hereditary* just in case its members are
first-order hereditary pairs. Say that a pair is *third-order hereditary* just in case its
members are second-order hereditary pairs, and so on. In general, for each (non-zero)
natural number \(n\), say that a pair is \((n+1)\)-order hereditary just in case its members are
\(n\)-order hereditary pairs.

According to Complex Answer, the acceptable instances of Central Schema are the
ones that substitute for \(\{\text{the Fs}\}\) any phrase that refers to all and only the members of a
maximal similarity set such that the collective similarity between those members is
mirrored, as it were, among the increasingly higher-order hereditary pairs built up from
them. In other words, the first-order hereditary pairs of those members are collectively
similar to each other, the second-order hereditary pairs of those first-order hereditary
pairs are collectively similar to each other, and so on for each of the increasingly higher-
order pairs, too. The idea is to ensure that the collective similarities among a natural
set’s members are similarities in the same respect, but to ensure it set-theoretically
rather than by using similarity-in-a-respect, itself. Unfortunately, this strategy also
ensures that Rodriguez-Pereyra’s version of resemblance nominalism faces a revenge
problem.
6 Similarities Among Hereditary Pairs

An example might help make clearer how Rodriguez-Pereyra’s version of resemblance nominalism is supposed to work. However, since similarity among hereditary pairs plays such an important role in Rodriguez-Pereyra’s theory, I first need to present his account of similarity among hereditary pairs. The key to understanding his account is to focus (for now) on only the properties sets have just in case their members have other properties. For example, a set has being pure just in case its members all have being a set; it has being a singleton just in case its members all stand in the identity relation to each other. Call properties like that, ones correlated with there being a certain pattern of property-possession facts among a set’s members, hereditary. Sets “inherit” hereditary properties, as it were, from the properties of their members.\(^{65}\)

Suppose that, among my favorite mugs, Monday, Tuesday, and Wednesday have a glossy finish, but Thursday has a matte finish. (Pretend, for the sake of simplicity, that my mugs have no other properties.) The situation looks like this:

<table>
<thead>
<tr>
<th></th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Being glossy</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

It is straightforward which of Monday through Thursday are similar. Monday, Tuesday,
and Wednesday are collectively similar, but none is similar to Thursday. That is the easy part. What about the similarities among the hereditary pairs built up from my mugs? Which of them are pairwise similar?

According to Rodriguez-Pereyra, there is a sense in which some of my mugs’ first-order hereditary pairs, e.g. {Monday, Tuesday} and {Monday, Wednesday}, are similar to each other but not to {Monday, Thursday}, since {Monday, Tuesday} and {Monday, Wednesday} are both pairs of glossy things, but {Monday, Thursday} is not. And, Rodriguez-Pereyra continues, there is a sense in which some of my mugs’ second-order hereditary pairs, e.g. {{Monday, Tuesday}, {Monday, Wednesday}} and {{Monday, Tuesday}, {Tuesday, Wednesday}}, are similar to each other but not to {{Monday, Tuesday}, {Monday, Thursday}}, since {{Monday, Tuesday}, {Monday, Wednesday}} and {{Monday, Tuesday}, {Tuesday, Wednesday}} are both pairs of pairs of glossy things, but {{Monday, Tuesday}, {Monday, Thursday}} is not.

One way accommodate these similarity facts and attribution facts is to say that {Monday, Tuesday} and {Monday, Wednesday} each have a property, being a pair of glossy things, since Monday, Tuesday, and Wednesday each have being glossy, and that {{Monday, Tuesday}, {Monday, Wednesday}} has a property, being a pair of pairs of glossy things, since {Monday, Tuesday} and {Monday, Wednesday} each have being a pair of glossy things. We could, at least in principle, go on like this indefinitely,

66 See, for example, Rodriguez-Pereyra 2002: 162–163.
introducing a new property for each increasingly higher-order hereditary pair: being a pair of pairs of pairs of ... glossy things.

The properties introduced this way, e.g. being a pair of glossy things and being a pair of pairs of glossy things, are hereditary, since whether a set has them depends on whether there is a specific pattern of property possession among its members. For example, whether a pair has being a pair of glossy things depends on whether its members both have being glossy, and whether a pair has being a pair of pairs of glossy things depends on whether its members both have being a pair of glossy things.

To make talking about hereditary properties like these easier, distinguish them by orders. Call hereditary properties like being a pair of glossy things “first-order hereditary,” since they are properties that first-order hereditary pairs inherit from a specific pattern of property possession among their members. And call hereditary properties like being a pair of pairs of glossy things “second-order hereditary,” since they are properties that second-order hereditary pairs inherit from a specific pattern of property possession among their members. In general, for each (non-zero) natural number \( n \), call a hereditary property that an \( n \)-order hereditary pair inherits from a specific pattern of property possession among its members \( {}^n \)-order hereditary\(^3\).

Rodriguez-Pereyra uses similarities correlated with hereditary properties like these to help him solve the difficulty of imperfect community. To start, he introduces a dyadic
primitive similarity relation, which he calls “R*,” that he stipulates to have the following extension:

1. R* holds between two particulars just in case they share a sparse property, and

2. for any (non-zero) natural number $n$, R* holds between two $n$-order hereditary pairs just in case they share an $n$-order hereditary property.\(^{67}\)

According to Rodriguez-Pereyra (2002: 166–172), resemblance nominalists can use similarities between hereditary pairs to explain why imperfect communities are not natural. For example, consider again Bad News, the set of all things both round and red, all things both round and wooden, and all things both red and wooden. Bad News is a maximal similarity set, according to Pairwise, but a resemblance nominalist need not say that it is natural if she accepts only the instances of Central Schema suggested by Complex Answer. Although each pair of Bad News’s members shares a sparse property, some of them share a different one. Because of this, Rodriguez-Pereyra argues, the first-order hereditary pairs of Bad News’s members are not collectively similar: there is no first-order hereditary property shared by each of them.

To help see why someone might think this, suppose “Frisbee” refers to my round and red plastic Frisbee, “Nickel” refers to my round and unpainted wooden nickel, and

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\(^{67}\) See Rodriguez-Pereyra 2002: 163–165. Explicitly mentioning properties here is not supposed to be circular, since Rodriguez-Pereyra is merely specifying the extension of a primitive relation in terms that we independently understand. He is not saying that R* holds between things because they have those properties.
“Firetruck” refers to my red and wooden toy truck. (Again, pretend, for the sake of simplicity, that my things have no other properties.) The situation looks like this:

<table>
<thead>
<tr>
<th>Property</th>
<th>Firetruck</th>
<th>Nickel</th>
<th>Frisbee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Being round</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Being red</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Being wooden</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Frisbee, Nickel, and Firetruck are members of Bad News. Frisbee is similar to Nickel (intuitively, in shape), similar to Firetruck (intuitively, in color), and similar to itself (intuitively, in every respect); Nickel is similar to Frisbee (intuitively, in shape), similar to Firetruck (intuitively, in material), and similar to itself (intuitively, in every respect); and Firetruck is similar to Frisbee (intuitively, in color), similar to Nickel (intuitively, in material), and similar to itself (intuitively, in every respect). So Firetruck, Nickel, and Frisbee are collectively similar, according to Pairwise, which makes \{Firetruck, Nickel, Frisbee\} a similarity set. But \{Firetruck, Nickel, Frisbee\} is also an imperfect community. There is no sparse property that Firetruck, Nickel, and Frisbee all share: they do not share being round, since Firetruck lacks it; they do not share being red, since Nickel lacks it; and they do not share being wooden, since Frisbee lacks it.

However, Rodriguez-Pereyra argues, \{Frisbee, Nickel\} and \{Frisbee, Firetruck\} are
first-order hereditary pairs of Firetruck, Nickel, and Frisbee that share no first-order hereditary property: they do not share being a pair of round things, since \{Frisbee, Firetruck\} is not a pair of round things; they do not share being a pair of red things, since \{Frisbee, Nickel\} is not a pair of red things; and they do not share being a pair of wooden things, since neither of them is a pair of wooden things. So, according to Rodriguez-Pereyra, a resemblance nominalist who accepts only the instances of Central Schema suggested by Complex Answer is not committed to \{Firetruck, Nickel, Frisbee\} or Bad News being natural. The members of those sets are pairwise similar to each other, but the first-order hereditary pairs of their members are not.  

7 Revenge Problems Revisited

Rodriguez-Pereyra’s version of resemblance nominalism has some virtues. First, it avoids the difficulty of imperfect community. Second, it lets resemblance nominalists explain why collective similarity percolates down from pluralities to their sub-pluralities. Unfortunately, it also faces a revenge problem.

Recall the structure of a revenge problem. Rodriguez-Pereyra posits sets to help

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68 Some sets with members that share more than one property with each other, but where no single property is shared by them all, have first-order hereditary pairs that are pairwise similar. However, in that case, their second-order hereditary pairs would not be pairwise similar. Or their third-order pairs would not be. Or some even higher-order pairs would not be. (It depends on how many properties each two members share.) This is why it is important, for Rodriguez-Pereyra, that the collective similarities go all the way up the set-theoretic hierarchy. The more properties each member of an imperfect community shares with each other member, the longer it will be before some hereditary pair of them is dissimilar. See Rodriguez-Pereyra 2002: 168–169.
explain property possession. In particular, he posits them to help explain why imperfect communities are not natural. However, sets also have properties, so positing them introduces new instances of property possession to be explained and, unfortunately, Rodriguez-Pereyra cannot account for all of the new instances. So his theory makes no genuine progress; it simply shifts the rug’s bump, reintroducing elsewhere the same kind of problem it is intended to solve.

Sets are similar in a lot of ways beyond the ones captured by R*. For example, \{Frisbee, Nickel\} and \{Frisbee, Firetruck\} are not both pairs of round things or pairs of red things, but they are both sets. They are both pairs. They are both hereditary pairs. They are both first-order hereditary pairs. They are both impure. They are both similarity sets. They are both abstract. And each of those apparent similarities makes a difference. Not every particular is abstract. Not every abstract particular is a set. Not every set is a pair. Not every pair is a hereditary pair. Not every hereditary pair is a first-order hereditary pair. Not every first-order hereditary pair is a similarity set. So the apparent similarities behind these attributions are discerning: they track distinctions that make a difference.

It is hard not to think that there is an “identity of nature,” to borrow Rodriguez-Pereyra’s phrase (2002: 16), among sets in at least some of those cases. All pairs have exactly two members, which is an identity in the nature of pairs that makes them
collectively similar and distinguishes them from both non-pairs and non-sets. Unfortunately, Rodriguez-Pereyra cannot account for this fact while adequately handling imperfect communities. To handle imperfect communities, he denies that \{Frisbee, Nickel\} and \{Frisbee, Firetruck\} are similar: they do not stand in R*. Unfortunately, this means that they also cannot share any sparse properties. Collective similarity is still necessary for property sharing, on his view, even if it is not sufficient.

Roughly speaking, the problem for Rodriguez-Pereyra’s version of resemblance nominalism is that, since it uses similarity facts about sets to explain why a set’s members have certain properties, it cannot also use similarity facts about sets to explain why the sets, themselves, have properties. The similarities Rodriguez-Pereyra needs to do the former are not the same ones he needs to do the latter. On the one hand, for example, he needs pairs like \{Frisbee, Nickel\} and \{Frisbee, Firetruck\} not to be similar; otherwise he has no way to avoid saying that imperfect communities like Bad News are natural. His theory would be extensionally inadequate, since it would incorrectly entail that the members of an imperfect community have a sparse property in common. But, on the other hand, Rodriguez-Pereyra needs pairs like \{Frisbee, Nickel\} and \{Frisbee, Firetruck\} to be similar, otherwise he cannot say that they have any sparse properties in common. Again, his theory would be extensionally inadequate, since it would incorrectly entail that \{Frisbee, Nickel\} and \{Frisbee, Firetruck\} do not have being a set, being a pair, being abstract, being natural, etc. So Rodriguez-Pereyra’s version of resemblance
nominalism either incorrectly entails that the members of imperfect communities have sparse properties they lack or it incorrectly entails that sets lack sparse properties they have. Either way, the theory is extensionally inadequate. Rodriguez-Pereyra’s version of resemblance nominalism can deal with the difficulty of imperfect community or it can correctly account for the properties of sets. It cannot do both.

If Rodriguez-Pereyra avoids the difficulty of imperfect community, then he does so either by being silent about some instances of property possession or by being wrong about them. This is bad, in general, but it is especially bad for Rodriguez-Pereyra: properties required for the success of his theory are among the ones he misses. For example, his theory appeals to $n$-order hereditary pairs, for each (non-zero) natural number $n$. So Rodriguez-Pereyra is apparently committed, for example, to there being something that distinguishes the things that are first-order hereditary pairs from the things that are not first-order hereditary pairs. Unfortunately, that distinction is not available to him. To deal with imperfect communities while accepting Pairwise, Rodriguez-Pereyra needs to deny that some first-order hereditary pairs are similar, and he cannot acknowledge a property that unifies first-order hereditary pairs and distinguishes them from other things, i.e. being a first-order hereditary pair, in light of that dissimilarity. Again, collective similarity is necessary for property possession, on his view, even if it is not sufficient. So, although Rodriguez-Pereyra needs, for his theory to work, a distinction between things that are first-order hereditary pairs and things that
are not, there is no such distinction according to his own theory.69

According to Rodriguez-Pereyra’s primitive similarity relation, R*, hereditary pairs are similar only if they share a hereditary property. But this entails that they are similar only if their members are similar, which is wrong. Sets are similar in lots of ways that have nothing to do with any similarity among their members. Rodriguez-Pereyra even seems to acknowledge this fact, but he says that his interests are elsewhere:

Can I then say that the relevant resemblance relation between pairs [i.e. R*] holds between any two of them sharing some property? But which properties? For example, do not [two first-order hereditary pairs] share the property being a first-order pair? ... From now on when I speak about properties of a hereditary pair x I shall always be referring to the members of f(x). In general, when I speak of a property of an entity x I shall be referring to a member of f(x). Thus, as the only properties of particulars I am interested in are their sparse properties, the only properties of hereditary pairs I am interested in are those specified by f(x). (Rodriguez-Pereyra 2002: 163–164)

69 This is a bit too quick. Rodriguez-Pereyra can accept a distinction between the things that are first-order hereditary pairs and those that are not, but only if the distinction is based on an abundant property, rather than a sparse one. However, this might not be enough. Any group of things share an abundant property. So, if the distinction between first-order hereditary pairs and everything else is based on an abundant property, then it would be no deeper than any arbitrary grouping of things, which seems wrong. That the distinction between first-order hereditary pairs and everything else does important and unique theoretical work for Rodriguez-Pereyra suggests that it is not just an arbitrary one. Not just any group of things works for Rodriguez-Pereyra’s purposes. There is something special about the first-order hereditary pairs, in particular—an “identity in nature”—that lets them do the work Rodriguez-Pereyra needs, which suggests that they share a sparse property, rather than an abundant one. Since not just any arbitrary distinction helps Rodriguez-Pereyra, we might wonder what is special about this group of things, in particular. Abundant properties are not suited to tell us what is special about the first-order hereditary pairs. There are objective similarities, and corresponding sparse properties, that Rodriguez-Pereyra misses if the distinctions between n-order hereditary pairs, for each n, are based on merely abundant properties.
Again, this requires some unpacking. $f(x)$ is a function from inputs to sets of properties that Rodriguez-Pereyra uses to specify the extension of $R^*$, and its definition has different clauses for different kinds of inputs. According to his definition, $f(x)$ is the set of all and only $x$'s sparse properties, if $x$ is a particular; $f(x)$ is the set of all and only $x$'s $n$-order hereditary properties, if $x$ is an $n$-order hereditary pair; and $f(x)$ is the empty set, otherwise. By stipulation, $R^*$ holds between $x$ and $y$ just in case $f(x)$ intersects $f(y)$; in other words, it holds just in case $x$ and $y$ share a sparse property (if they are particulars) or an $n$-order hereditary property (if they are $n$-order hereditary pairs).

So, when Rodriguez-Pereyra says that the only properties of hereditary pairs that he is interested in are those specified by $f(x)$, it means that he is interested in only their hereditary properties. Maybe Rodriguez-Pereyra is not interested in a hereditary pair’s other properties because he is not trying to give an account of them. If so, then his theory is not a good general account of property possession. It would account for only

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70 Rodriguez-Pereyra 2002: 164.
71 There is an immediate tension here. According to Rodriguez-Pereyra, everything is a particular; there are no universals (or tropes) on his view. So sets are particulars, which means that the clauses of $f(x)$ overlap. Insofar as hereditary pair $x$ is a particular, the members of $f(x)$ are supposed to be its sparse properties, but insofar as it is a hereditary pair, the members of $f(x)$ are supposed to be its hereditary properties. This is not inconsistent if its sparse properties are its hereditary properties, but nothing Rodriguez-Pereyra says ensures that. Rodriguez-Pereyra can resolve this tension by changing the first clause of his definition to say instead that $f(x)$ is the set of all and only $x$'s sparse properties, if $x$ is a non-set particular. However, that further highlights his need for a distinction between sets and non-sets, and there is no such distinction on his theory. Being a set is not a property, on his view, since it would prevent him from dealing with imperfect communities. If being a set is a sparse property, then \{Frisbee, Nickel\} and \{Frisbee, Firetruck\} are similar, after all. Rodriguez-Pereyra might instead try saying that being a set is an abundant property, but see footnote 68.
the properties of non-sets and the properties that hereditary pairs ultimately inherit from the properties of their non-set members. All the other instances of property possession would be unexplained. On the other hand, if Rodriguez-Pereyra does want to account for all the properties of sets, then his theory is not a good general account of property possession. It would entail either that members of imperfect communities have properties they lack or that sets lack properties they have. Either way, Rodriguez-Pereyra’s version of resemblance nominalism is not a good general account of property possession.

In short: my objection can be put as a dilemma. Sets are either collectively similar or they are not. On the one hand, if sets are collectively similar, then Rodriguez-Pereyra’s reply to the difficulty of imperfect community fails. Not only would the members of Bad News be collectively similar, but so would their pairs, the pairs of their pairs, and so on, because they would all be sets and hence all be collectively similar. Rodriguez-Pereyra’s version of resemblance nominalism would entail that all imperfect communities are natural, which would be bad because it is false. On the other hand, if sets are not collectively similar, then Rodriguez-Pereyra cannot account for any property shared by all sets. Things share a property, on his view, only if they are collectively similar and sets would not be. Rodriguez-Pereyra’s version of resemblance nominalism would entail that sets do not share properties like being a set or being abstract, which would be bad, again, because it is false. Either way, Rodriguez-Pereyra’s version of resemblance nominalism
entails something false.

So Rodriguez-Pereyra’s version of resemblance nominalism does not both solve the difficulty of imperfect community and account for all of the properties of his theoretical posits. By introducing sets to deal with imperfect communities, Rodriguez-Pereyra introduces new instances of property possession to be explained and, unfortunately, he cannot explain all of those new instances without undermining his reply to the difficulty of imperfect community. His theory reintroduces elsewhere the same kind of problem that it is supposed to solve, which is to explain why things have properties. Revenge strikes again.

8 Possible Replies
Rodriguez-Pereyra’s version of resemblance nominalism conflicts with, or at least fails to explain, some property-possession facts. Faced with this mismatch between theory and data, a resemblance nominalist might reject those property-possession facts. In other words, she might deny that my examples from §7—being a set, being a pair, being pure, being abstract, being natural, etc.—are genuine sparse properties. Maybe this is what Rodriguez-Pereyra has in mind when he says that he is interested in only the hereditary properties of sets: those are the only properties of sets that he is interested in, since they are the only properties of sets that he thinks there are.

However, denying that those properties are genuine is not very satisfying. First, it
would need independent motivation to avoid seeming ad hoc. That denial treats sets as if they’re a kind of second-class entity, but there is no obvious reason for thinking that. If we take the apparent properties of non-set particulars seriously enough to posit sets (at least partly) to help explain them, then it is not clear why we should not take the apparent properties of sets with a similar seriousness. The fact that sets are theoretical posits should not make a difference. Physicists sometimes posit unobserved particles and fields to explain various physical phenomena, and there is no similar temptation to discount the apparent properties of those posits. Besides, Rodriguez-Pereyra takes some of the apparent properties of sets seriously—the hereditary ones that sets ultimately inherit from non-set particulars—so, from the point of view of the reply, the problem with the apparent properties of sets is not general. If we take some of a set’s apparent properties seriously, then we need a good reason not to take their others seriously, too. Otherwise the distinction is unmotivated.  

Second, and more importantly, we should not deny that the relevant properties exist, since they do good explanatory work. Again, those properties help us explain our ability to recognize new instances of familiar kinds. Someone familiar with sets can reliably sort newly encountered ones into groups. For example, mathematicians can reliably tell you

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72 The need for independent motivation is especially important if the difficulty realists have explaining the apparent similarities between universals is supposed to be a mark against realism. A realist might equally want to deny that the apparent similarities between universals are genuine, but that feels wrong. If that reply is unpalatable when a realist gives it, then a resemblance nominalist’s analogous reply is unpalatable, too.
whether or not a newly encountered set is a pair. They can reliably tell you whether or not it is pure. They can reliably tell you a lot about it, and it is hard to see how they can do that unless the apparent properties of sets are genuine “identities in nature” that the mathematicians are tracking. Insofar as similar explanatory demands lead someone to accept properties like being mug-shaped and being scarlet, then they should lead her to accept being a pair and being pure, too. The explanatory demands are the same in both cases.

So suppose, instead, that a resemblance nominalist accepts that the properties of sets discussed earlier are genuine. Maybe she can accommodate them by further complicating her account of property possession. The problem for Rodriguez-Pereyra arises because he tries to use similarities between sets in two conflicting ways. First, he wants them to help explain what grounds the properties of sets, insofar as sets are particulars; second, he wants them to help distinguish imperfect communities from natural sets. Unfortunately, the similarities he needs to do the former are not the same ones he needs to do the latter. Since his problem is using one similarity relation to do two conflicting things, the most obvious fix is to use instead two distinct similarity relations, one for each task:

(Sparse Similarity) Similarity\textsubscript{1} holds between particulars \(x\) and \(y\) just in case \(x\) and \(y\) share a sparse property.

(Hereditary Similarity) Similarity\textsubscript{2} holds between \(n\)-order hereditary pairs \(x\) and \(y\) just in case \(x\) and \(y\) share an \(n\)-order hereditary property of the kind that Rodriguez-Pereyra is interested in.
Intuitively, “an \( n \)-order hereditary property of the kind that Rodriguez-Pereyra is interested in” quantifies over all and only the \( n \)-order hereditary properties needed to explain why imperfect communities are not natural.

The idea would be that there are two primitive similarity relations: a more familiar one, similarity\(_1\), that holds between things with a shared sparse property and a less familiar one, similarity\(_2\), that holds only between pairs with a shared hereditary property of the right sort. With two relations, there can be a division of labor: similarity\(_1\) can help achieve Rodriguez-Pereyra’s first goal, partially grounding the properties of particulars (including sets), and similarity\(_2\) can help achieve his second goal, explaining why imperfect communities are not natural.

If a resemblance nominalist accepts both Sparse Similarity and Hereditary Similarity, then she might try avoiding my objection to Rodriguez-Pereyra by accepting

\[
\text{Two-Dimensional Answer} \quad \left\langle \text{the Fs} \right\rangle
\]

as it occurs in Central Schema, can be replaced by any expression that refers to the members of a maximal similarity\(_1\) set that also has the following feature: the pairs of its members are, themselves, collectively similar\(_2\), and the pairs of the pairs of its members are collectively similar\(_2\), and so on.

The idea is that a resemblance nominalist can deny that various hereditary pairs are similar\(_2\)—helping her distinguish natural sets from imperfect communities—without needing to say that those hereditary pairs share no sparse properties, since she can still maintain that they are similar\(_1\).
However, this reply would be unsatisfying, too. First, it is objectionably artificial. Nothing in our experience suggests that there are two distinct types of primitive qualitative similarity. The reply feels more like a technical solution to a specific philosophical problem than a plausible view about the nature of qualitative similarity. Intuitively, similarity₂ is just similarity₁ in respect to some strategically picked hereditary properties, not a unique second type of primitive qualitative similarity.

Second, and more importantly, the reply would be unsatisfying because it does not work. Consider a more complicated example of an imperfect community, one where each member shares at least three properties with each other member:

\[(\text{Worse News}) \{ x \colon x \text{ is either round, red, wooden, and glossy; or round, red, wooden, and chipped; or round, red, glossy, and chipped; or round, wooden, glossy, and chipped; or red, wooden, glossy, and chipped} \}\]

In other words, the members of Worse News are all and only the things that have at least four of the following five properties: \textit{being round}, \textit{being red}, \textit{being wooden}, \textit{being glossy}, and \textit{being chipped}.

Worse News is a similarity₁ set, since each of its members is similar₁ to each of its other members (intuitively, in either shape, color, material, finish, or condition). Furthermore, Worse News is a maximal similarity₁ set, since everything that is similar₁ to all of its members is one of its members. However, Worse News is not natural, since its members do not all share a (sparse) property: they do not share \textit{being chipped}, since
some things round, red, wooden, and glossy are not chipped; they do not share being glossy, since some things round, red, wooden, and chipped are not glossy; they do not share being wooden, since some things round, red, glossy, and chipped are not wooden; they do not share being red, since some things round, wooden, glossy, and chipped are not red; and they do not share being round, since some things red, wooden, glossy, and chipped are not round.

Unfortunately, a resemblance nominalist who accepts Two-Dimensional Answer cannot both explain why Worse News is not natural and account for all of the properties of sets. Each member of Worse News is similar, to each other member. Furthermore, since each member of Worse News shares at least three properties with each other member, the first-order hereditary pairs of its members are similar. This is no problem if some higher-order hereditary pairs of its members are not similar, but saying that makes Two-Dimensional Answer versions of resemblance nominalism extensionally inadequate.

To help see why, suppose that there is more to know about Frisbee, Nickel, and Firetruck. They are all glossy—Frisbee is made of glossy red plastic, Nickel has a glossy clear lacquer, and Firetruck is painted a glossy red—and they are all chipped from years of routine play. Furthermore, suppose that “Checker” refers to one of my matte red,

73 This will be easier to see shortly, in the context of a specific example. But, for a general proof of this, see Rodriguez-Pereyra 2002: 167–169.
chipped, wooden checkers and that “Coaster” refers to one of my glossy red, round, pristine-condition, wooden drink coasters. (Again, pretend, for the sake of simplicity, that my things have no other properties.) The situation would look like this:

<table>
<thead>
<tr>
<th></th>
<th>Firetruck</th>
<th>Nickel</th>
<th>Frisbee</th>
<th>Checker</th>
<th>Coaster</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Being round</strong></td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Being red</strong></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Being wooden</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Being glossy</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Being chipped</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Frisbee, Nickel, Firetruck, Checker, and Coaster are members of Worse News. Each of them is similar₁ to each of the others. For example, Firetruck and Frisbee are similar₁ (intuitively, in color, finish, and condition). Checker and Coaster are similar₁ (intuitively, in shape, color, and material).

Furthermore, each first-order hereditary pair of Firetruck, Nickel, Frisbee, Checker, and Coaster is similar₂. For example, {Firetruck, Nickel} and {Frisbee, Coaster} are similar₂, since they both have being a pair of glossy things. {Nickel, Frisbee} and {Checker, Coaster} are similar₂, since they both have being a pair of round things. Defenders of Two-Dimensional Answer need to look toward higher-order hereditary pairs to explain why Worse News is not natural.
This might not seem so bad. Some second-order hereditary pairs look like promising candidates. For example, \{{{\text{Firetruck, Nickel}}, \{\text{Frisbee, Checker}\}}\) and \{{{\text{Firetruck, Nickel}}, \{\text{Frisbee, Coaster}\}}\) do not share \textit{being a pair of pairs of round things} or \textit{being a pair of pairs of red things}, since \{\text{Firetruck, Nickel}\} is not a pair of round things or a pair of red things; they do not share \textit{being a pair of pairs of wooden things} or \textit{a pair of pairs of chipped things}, since \{\text{Frisbee, Coaster}\} is not a pair of wooden things or a pair of chipped things; and they do not share \textit{being a pair of pairs of glossy things}, since \{\text{Frisbee, Checker}\} is not a pair of glossy things. So a defender of Two-Dimensional Answer might deny that \{{{\text{Firetruck, Nickel}}, \{\text{Frisbee, Checker}\}}\) and \{{{\text{Firetruck, Nickel}}, \{\text{Frisbee, Coaster}\}}\) are similar\(^2\) and cite that fact in her explanation of why \textit{Worse News} is not natural. Unfortunately, that would also make her theory extensionally inadequate. \{\text{Firetruck, Nickel}, \{\text{Frisbee, Checker}\}, \text{and} \{\text{Frisbee, Coaster}\}\) share no properties, according to her theory, unless their first-order hereditary pairs similar\(^2\), and \{{{\text{Firetruck, Nickel}, \{\text{Frisbee, Checker}\}}\) and \{{{\text{Firetruck, Nickel}, \{\text{Frisbee, Coaster}\}}\) are among their first-order hereditary pairs. And this would be bad because \{\text{Firetruck, Nickel}, \{\text{Frisbee, Checker}, \text{and} \{\text{Frisbee, Coaster}\}\ do share properties: \textit{being a set, being abstract}, etc. Defenders of Two-Dimensional Answer face the same problem as Rodriguez-Pereyra. Dividing the theoretical work between two similarity relations does not solve the problem; it just pushes it up one level.

The dilemma from earlier remains. Either \{{{\text{Firetruck, Nickel}, \{\text{Frisbee, Checker}\}}\)
and \{\{\text{Firetruck, Nickel}\}, \{\text{Frisbee, Coaster}\}\} are similar$_2$ or they are not. On the one hand, if they are similar$_2$, then a resemblance nominalist cannot use them to explain why Worse News is not natural, which would be bad because her theory is extensionally inadequate unless she solves the difficulty of imperfect community. Her theory would entail that the members of Worse News share a sparse property, which is false. On the other hand, if \{\{\text{Firetruck, Nickel}\}, \{\text{Frisbee, Checker}\}\} and \{\{\text{Firetruck, Nickel}\}, \{\text{Frisbee, Coaster}\}\} are not similar$_2$, then her theory is extensionally inadequate. It would entail that \{\text{Firetruck, Nickel}\}, \{\text{Frisbee, Checker}\}, and \{\text{Frisbee, Coaster}\} share no sparse properties, which it is false. Either way, versions of resemblance nominalism that rely on Two-Dimensional Answer entail something false.

Rodriguez-Pereyra runs into a problem because his single similarity relation, R*, needs to do two conflicting things. First, it needs to help explain why particulars, including his theoretical posits, have properties. Second, it needs to help solve the difficulty of imperfect community. Unfortunately, it cannot do both. Defenders of Two-Dimensional Answer try to avoid this problem by dividing the explanatory work between distinct similarity relations, similarity$_1$ and similarity$_2$. However, now it is similarity$_2$ that needs to do double duty. On the one hand, similarity$_2$ needs to help explain why sets like \{\text{Firetruck, Nickel}\}, \{\text{Frisbee, Checker}\}, and \{\text{Frisbee, Coaster}\} share properties, and that explanation needs to include that \{\{\text{Firetruck, Nickel}\}, \{\text{Frisbee, Checker}\}\} and \{\{\text{Firetruck, Nickel}\}, \{\text{Frisbee, Coaster}\}\} are similar$_2$. On the other hand, similarity$_2$
needs to help explain why the members of sets like Worse News do not all share a sparse property, and that explanation needs to include something like the fact that \{\{Firetruck, Nickel\}, \{Frisbee, Checker\}\} and \{\{Firetruck, Nickel\}, \{Frisbee, Coaster\}\} are not similar. Unfortunately, it cannot do both.

Resemblance nominalists might try introducing even more primitive similarity relations to further divide the explanatory work, but that would only push the problem up another level. At least one of the similarity relations would still need to do double duty. So maybe the mistake was modeling Two-Dimensional Answer too closely on Rodriguez-Pereyra’s Complex Answer, and some more complicated two-dimensional account would serve resemblance nominalists better. But that does not seem very promising, either. If a two-dimensional account could be made to work, it would likely be even more objectionably artificial than Two-Dimensional Answer. Ultimately, resemblance nominalists are probably better off pursing a different strategy. Trying to solve the difficulty of imperfect community by appealing to the fact that various sets are not similar seems bound to conflict with a similarity-based account of those sets’ properties, undercutting the original idea behind resemblance nominalism: that things share properties because they are similar.
Chapter 5: Against Instantiation as Identity

1 Objections to Realism

Distinct things can be objectively similar.\textsuperscript{74} For example, my two favorite mugs are the same shade of red. Realists about universals explain this fact by saying that my mugs each instantiate the same universal, \textit{being scarlet}. In general, realists distinguish particulars, things like my mugs, from the universals that characterize them, and they use patterns of instantiation to explain patterns of similarity.

People sometimes object to realism about universals because of its primitive ideology. Some say it has \textit{too much} primitive ideology: accepting two primitive kinds of things, particulars and universals, is worse than accepting only one primitive kind of thing.\textsuperscript{75} Others say realism has \textit{mysterious} primitive ideology: instantiation, the connection between something and its universals, is obscure.\textsuperscript{76}

\textsuperscript{74} Here and throughout, I use “thing” broadly. Both particulars and universals are things.
\textsuperscript{75} See, for example, Campbell 1990: 17 and Ehring 2011: 1.
\textsuperscript{76} See, for example, Devitt 1980: 437 and Campbell 1990: 14–15.
Realists can avoid the first objection by denying that universals and particulars are primitive kinds of things; the concepts universal and particular can be analyzed using instantiation. Roughly, the idea is that something is a universal because it can be instantiated, or else it is a particular because it cannot be.\textsuperscript{77} However, saying this makes the second objection more pressing, since it spreads any obscurity with instantiation elsewhere.

Realists can avoid the second objection by giving an illuminating account of instantiation; by reducing instantiation to something more familiar, or at least explaining it in more familiar terms, realists make instantiation less obscure. Donald Baxter and, following him, David Armstrong try to do this using identity. Their idea is that things and their universals are partially identical. But, I argue, their accounts of instantiation, and any similar ones, are extensionally inadequate.\textsuperscript{78}

2 Features of Instantiation

Philosophical accounts can help us understand a concept, but only if they respect the concept’s central features. Otherwise, it is not clear what makes them accounts of the concept in question rather than of something else. Because of this, a concept’s central

\textsuperscript{77} The reduction fails if there are necessarily uninstantiated universals. For other potential problems with it, see MacBride 2005.

\textsuperscript{78} Mantegani (2013) also argues that their accounts fail, but our objections are independent. Mantegani argues that Baxter abandons realism for something like trope theory and that Armstrong either abandons realism, cannot distinguish particulars from universals, or has a version of realism that is explanatorily idle. For discussion, see Baxter 2013.
features are data that illuminating philosophical accounts must accommodate.

Instantiation has at least two such features. First, it is not reflexive. Generally, things do not instantiate themselves. My mug is not a universal and, so, is not a universal it instantiates. However, instantiation is also not irreflexive. Some universals, like \textit{being monadic}, instantiate themselves.

Second, instantiation is not symmetric. Generally, things do not instantiate everything that instantiates them. \textit{Being negatively charged} is monadic, but \textit{being monadic} is not negatively charged. However, instantiation is also not asymmetric. Some universals, like \textit{being a universal} and \textit{being monadic}, instantiate each other.

So instantiation is nonreflexive and nonsymmetric. An account that makes it reflexive or symmetric tells us that instantiation occurs somewhere it does not; one that makes it irreflexive or asymmetric tells us that instantiation does not occur somewhere it does. Either way, such accounts are extensionally inadequate. As a result, some identity-based accounts of instantiation fail. Identity is reflexive and symmetric, but instantiation is not, so instantiation is not identity. Instead, Baxter and Armstrong take instantiation to be a kind of partial identity. Armstrong’s accounts are simpler, so they are a good

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79 Instantiation is reflexive just in case everything instantiates itself.
80 Instantiation is irreflexive just in case nothing instantiates itself.
81 Instantiation is symmetric just in case everything instantiates everything that instantiates it.
82 Instantiation is asymmetric just in case nothing instantiates something that instantiates it.
83 Instantiation is nonreflexive just in case it is neither reflexive nor irreflexive; it is nonsymmetric just in case it is neither symmetric nor asymmetric.
place to start.

3 Intersecting Identities

High Street and Main Street are not identical; one runs north-south and the other runs east-west. However, they are not wholly distinct; the intersection at High and Main is a part of both. Armstrong suggests that the identity between a particular and its universals is like that:

\[
\text{particulars are ones running through many different universals, universals are ones running through many different particulars. A particular instantiating a universal is an intersection of the two sorts of oneness, a point of partial identity. (Armstrong 2004: 141)}\]

The analogy with intersecting streets takes us only so far. That kind of intersection is mereological overlap—a part of High Street is identical to a part of Main Street—but Armstrong says that the intersection of something and its universals is different, the same kind of overlap there is between a structured state of affairs and the particulars and universals that it is built from. Since mereology is the study of parts, Armstrong’s name for this kind of overlap, “non-mereological partial identity,” is somewhat misleading. It is better to think of it as a non-classical mereological partial identity, a kind of mereological overlap characterized by axioms other than those of classical

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84 Armstrong (2005) later changes his mind, suggesting instead that universals are parts of particulars, but particulars are not parts of universals. I focus here on his original account and discuss his later account in Section 4.
extensional mereology.85

Here is the idea. Just as mereological sums are complexes of parts, particulars and universals are complexes of a special kind of parts; in latter work, Armstrong (2006: 243) calls them constituents. Just as mereologically complex things can overlap by having a part in common, things with properties can intersect by having a constituent in common. Armstrong wants to understand instantiation as the sharing of a constituent, but the straightforward account,

(Intersection) $x$ instantiates $y$ just in case a constituent of $x$ is identical to a constituent of $y$,

fails. Identity is symmetric. So, if a constituent of $x$ is identical to a constituent of $y$, then a constituent of $y$ is identical to a constituent of $x$. Intersection makes instantiation symmetric rather than nonsymmetric and is, therefore, extensionally inadequate.

Armstrong (2004: 146) is aware of this problem, and he rejects Intersection for

(Categorical Intersection) $x$ instantiates $y$ just in case (i) a constituent of $x$ is identical to a constituent of $y$, (ii) $x$ is a particular, and (iii) $y$ is a universal.

But Categorical Intersection fails if it is read straightforwardly. (iii) ensures that nothing

85 Armstrong mentions one way that his notion is non-classical: some pluralities do not compose anything. (A plurality *composes* something just in case each of them is a part of it and each part of it overlaps at least one of them; one thing *overlaps* another just in case something is a part of the former and a part of the latter.) Another difference is that distinct things can have exactly the same proper parts. In correspondence with Armstrong, John Hawthorne points out further differences. See Armstrong 2004: 143. Since Armstrong also accepts a kind of parthood that satisfies the axioms of classical extensional mereology, Armstrong is a mereological pluralist. See McDaniel 2009.
instantiates a particular. (ii) ensures that nothing is instantiated by a universal. But if nothing instantiates a particular, then no particular instantiates itself; if nothing is instantiated by a universal, then no universal instantiates itself. So, on the surface, Categorical Intersection makes instantiation irreflexive rather than nonreflexive. It entails, for example, that being monadic does not instantiate itself, which is wrong. Similarly, if nothing instantiates a particular, then no particular instantiates something that instantiates it; if nothing is instantiated by a universal, then no universal instantiates something that instantiates it. So, on the surface, Categorical Intersection makes instantiation asymmetric rather than nonsymmetric. It entails, for example, that being monadic and being a universal do not instantiate each other, which is wrong.

Despite appearances, Armstrong thinks that Categorical Intersection lets universals instantiate universals, since he takes some universals also to be particulars (1978b: 133–166; 2004: 146). What we normally think of as particulars are first-order particulars, and they instantiate first-order universals; first-order universals that instantiate something are second-order particulars, which instantiate second-order universals, and so on.
Accepting this view strengthens the objections from Section 1. If Armstrong takes each subsequent order to be primitive, then he does comparatively worse with respect to ideological economy; if he analyzes them in terms of instantiation, then any obscurity with instantiation infects comparatively more of his ideology. But set those worries aside. Categorical Intersection fails even with higher-order particulars, since it entails that a universal instantiates itself if it instantiates anything, which is wrong. For example, *being negatively charged* instantiates *being monadic*. It follows from Categorical Intersection that *being negatively charged* is a particular with at least one constituent, namely the one it shares with *being monadic*. Since identity is reflexive, this constituent is identical to itself. So,

P1 there is a constituent of *being negatively charged* that is identical to a constituent of *being negatively charged,*
P2 being negatively charged is a particular, and

P3 being negatively charged is a universal.

It follows from P1-P3 and Categorical Intersection that being negatively charged instantiates itself, which is wrong. Being negatively charged is not, itself, negatively charged. Categorical Intersection is extensionally inadequate.

Realists can avoid this counterexample by saying things instantiate only distinct universals:

(Categorical Proper) Intersection $x$ instantiates $y$ just in case (i) a constituent of $x$ is identical to a constituent of $y$, (ii) $x$ is a particular, (iii) $y$ is a universal, and (iv) $x \neq y$.

But that restriction is too strong. Categorical Proper Intersection stops anything from instantiating itself, making instantiation irreflexive rather than nonreflexive. Instead, realists might say that things instantiate only universals of the same order:

(Ordered Intersection) $x$ instantiates $y$ just in case (i) a constituent of $x$ is identical to a constituent of $y$, (v) $x$ is an $n$-order particular, and (vi) $y$ is an $n$-order universal.

But that restriction is too weak. Ordered Intersection still faces counterexamples. For example, being larger than instantiates being dyadic, so it follows from Ordered Intersection that being dyadic has at least one constituent, namely the one it shares with being larger than. Since identity is reflexive, this constituent is identical to itself, so

P4 there is a constituent of being dyadic that is identical to a constituent of being
dyadic.

Furthermore, being larger than is a second-order particular, so being dyadic is a second-order universal. A second-order universal that instantiates something is a third-order particular, and being dyadic instantiates at least being a universal and being monadic, so

P5 being dyadic is a third-order particular.

Finally, some third-order particulars also instantiate being dyadic, e.g. Armstrong’s relation of nomic necessitation and Lewis’s relation of comparative naturalness, so

P6 being dyadic is a third-order universal.

It follows from P4-P6 and Ordered Intersection that being dyadic instantiates itself, which is wrong. Being dyadic is a one-place property of two-place relations; it is not, itself, a two-place relation. Ordered Intersection is extensionally inadequate.

Realists might respond by denying that being dyadic and other problematic universals exist, but that would need independent motivation to avoid seeming ad hoc.

86 For an early account of nomic necessitation, see Armstrong 1983. For an early account of comparative naturalness, see Lewis 1983b. Both relations are third-order particulars, since they are second-order universals that instantiate something. They are second-order universals, since they are instantiated by some pairs of first-order universals.

87 Other counterexamples to Ordered Intersection include being triadic, being a relation, having exactly seven parts, having exactly seven constituents, being transitive, being symmetric, being reflexive, and maybe being complex if it is not, itself, complex. Ordered Intersection incorrectly entails that each of these universals instantiates itself.

88 One possible motivation appeals to the claim that a universal exists only if it is not had essentially by each of its instances. The thought behind this claim is that universals had essentially by each of their instances would not do any philosophical work, since any work they do could be done instead by appealing to their instances’ essential natures. This sort of sparse realism explains some similarities by appealing to the possession of an essential nature rather
Besides, we should not deny that the problematic universals exist, since they do good explanatory work: being dyadic helps explain the objective similarity between, and our ability to recognize new examples of, dyadic relations no worse than being scarlet helps explain the objective similarity between, and our ability to recognize new examples of, scarlet things. If those explanatory demands lead someone to accept being scarlet, then they should lead her to accept being dyadic, too. The demands are the same in both cases.

Instead, realists might deny that being dyadic, the second-order universal, and being dyadic, the third-order universal, are identical. Maybe higher orders introduce distinct copies of lower-order universals rather than merely reclassifying them. If so, then my argument equivocates. However, this reply would be unsatisfying, too. First, it is not how Armstrong understands orders:

*Having just M parts*, where M is determinate, for instance, seems to be a potential property both of first-order particulars and of first-order universals. I cannot see any reason to deny that there is identity of property here. (Armstrong 1978b: 142, original italics)

If *having just M parts* is a property both of first-order particulars and of first-order universals, then it is both a first- and a second-order universal. Armstrong’s early work than to the instantiation of a universal. A realist who accepts that sort of theory might avoid my objection to Ordered Intersection, but she does comparatively worse with respect to ideological economy—essential natures on her view cannot reduce to collections of universals, since not all of the required universals exist—and she sacrifices the unified explanation of similarity available to more abundant versions of realism. Thanks to an anonymous referee for *Philosophical Studies* for helpful comments on this point.
takes the different orders to merely classify universals, not proliferate them, and his later work suggests no change of mind.

Second, realists have a good reason not to proliferate universals like that. When a first- and a second-order universal are dyadic, they are dyadic in exactly the same way; they are exactly similar in that respect. Insofar as realists explain exact similarity in terms of sharing a single universal, they should say that being dyadic, the third-order particular, and being dyadic, the third-order universal, are identical. Otherwise, multiple universals would do the same explanatory work. Realists should not sacrifice ontological economy and the unity of their explanations to help illuminate instantiation. The cost would be too high.

4 Enfolding Identities

Maybe realists need a different strategy. In later work, Armstrong gives another account of how particulars and universals intersect:

universals are to be thought of as a special sort of part of the particulars that instantiate them. ... ‘Partial identity’, I now think, is a somewhat misleading phrase. Particulars enfold their universals—and that is a sort of partial identity—but universals do not enfold their particulars. (Armstrong 2005: 274)

Armstrong’s talk of enfolding seems only figurative. I am not part of my bathrobe, in any literal sense, when it enfolds me. The important difference concerns what the special parts—or constituents, as Armstrong (2006: 243) later calls them—are. On the previous
account, both particulars and universals are complexes of constituents. On this account, universals are the constituents: particulars are complexes of universals, but universals are not complexes of particulars. This is supposed to help Armstrong avoid the objection that his previous account allows for no local contingency. 89

Armstrong never explicitly revises his account of instantiation in light of this change, but the straightforward account,

\[(\text{Enfolding}) \ x \text{ instantiates } y \text{ just in case } y \text{ is a constituent of } x,\]

fails. In general, things do not instantiate their constituents. Movements are plausibly constituents of musical works, but musical works do not instantiate movements. 3 is plausibly a constituent of \(<3, 5>\), but the ordered pair does not instantiate 3. An electron is plausibly a constituent of the structured proposition expressed by “this electron is negatively charged,” but the proposition does not instantiate an electron.

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89 The change does not actually help. The objection, raised independently by Peter Simons (2005) and Kris McDaniel (2005), goes like this. Suppose that this apple is nutritious and \textit{being nutritious} is a universal. The apple might have not existed, but its nonexistence would not be a small, local matter if Armstrong’s original account is right. If the apple did not exist, then \textit{being nutritious} would not exist either, since the apple and \textit{being nutritious} are partially identical. At best, some diminished counterpart of \textit{being nutritious} would exist instead. But, if \textit{being nutritious} did not exist, then none of the nutritious things would exist either, since \textit{being nutritious} is partially identical to each of them. Likewise, no property of anything nutritious would exist, nor would anything that instantiates those properties, and so on. Armstrong’s new account is supposed to help stop the nonexistence of a single particular from spreading globally in this way. However, it does not. All the work is done by Armstrong’s claim that removing from existence a particular does not also remove from existence its constituents. It does not matter whether the constituents are universals, as with the new account, or merely common parts, as with the old account. The objection relies on a version of mereological essentialism that Armstrong rejects, and it is this rejection, not a new view about what the constituents are, that lets him reply to Simon’s and McDaniel’s objection.
And, according to Armstrong (2004: 141–142), particulars and universals are constituents of states of affairs, but nothing instantiates a particular. Enfolding is extensionally inadequate.

Realists might try rejecting Enfolding for

(Categorical Enfolding) $x$ instantiates $y$ just in case (i) $y$ is a constituent of $x$ and (ii) $y$ is a universal.

Categorical Enfolding avoids the previous counterexamples, since (ii) ensures that nothing instantiates a particular, but it faces similar ones involving universals. Being *hydrogen* is plausibly a constituent of the structural universal *being methane*, but *being methane* is not hydrogen.\(^90\) *Being negatively charged* is plausibly a constituent of $<$*being negatively charged, being positively charged*>, the proposition expressed by “this electron is negatively charged,” and this electron’s being negatively charged, but the ordered pair, proposition, and state of affairs are not negatively charged.\(^91\) Categorical Enfolding is extensionally inadequate.

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\(^90\) For an early account of structural universals, see Armstrong 1978b: 68–71. For discussion, see Lewis 1986c.

\(^91\) Armstrong (1978a: 114; 1997: 123–126) distinguishes between a thick and a thin conception of particulars and identifies the former, particulars thought of along with all of their non-relational properties rather than abstracted from them, with states of affairs. So Armstrong might be willing to accept that some states of affairs are negatively charged, since he thinks that some states of affairs *are* electrons, at least if we understand electrons in a certain way. However, this electron’s being negatively charged is not the state of affairs that Armstrong identifies with the electron, since it does not include all of the electron’s non-relational properties. So Armstrong’s views about thick particulars give no independent reason to think that this electron’s being negatively charged is, itself, negatively charged.
Realists might instead use Armstrong’s account of higher-order particulars to make a stronger restriction:

(Ordered Enfolding) $x$ instantiates $y$ just in case (i) $y$ is a constituent of $x$, (iii) $x$ is an $n$-order particular, and (iv) $y$ is an $n$-order universal.

Ordered Enfolding avoids some of the previous counterexamples. It does not entail that being methane instantiates being hydrogen, since being methane is a second-order particular but being hydrogen is not a second-order universal. But $<\text{being negatively charged, being positively charged}>$, the proposition expressed by “this electron is negatively charged,” and this electron’s being negatively charged are all first-order particulars, and being negatively charged is a first-order universal, so Ordered Enfolding still entails that the former instantiate the latter. Ordered Enfolding is also extensionally inadequate.

Instead of trying to add restrictions to avoid counterexamples, realists might reject structural universals and deny that things like musical works, ordered pairs, propositions, and states of affairs have constituents. Or realists might allow (possibly non-classical) composition in those cases but say that the kind of partial identity there is between something and its universals is different, not to be confused with those other kinds of partial identity. If so, then realists avoid the counterexamples, but Enfolding becomes a lot less illuminating.

Enfolding makes instantiation less mysterious only if we understand being a
constituent of better than we understand instantiation, and denying that things like musical works, ordered pairs, structured propositions, structural universals, and states of affairs have constituents (in the intended sense) erodes whatever independent understanding we might otherwise have had. If Enfolding requires a special type of partial identity, one not shared by other things that seemingly have constituents, then it is not well suited to make instantiation less obscure; explaining the special, nonreflexive, nonsymmetric tie of instantiation in terms of a special, nonreflexive, nonsymmetric tie of partial identity makes modest progress at best.

Since I cannot see how to avoid the problems from Sections 3 and 4, I think accounts like Armstrong’s, ones that take instantiation to be a kind of partial overlap, fail.\footnote{Armstrong gives other accounts of instantiation. Some, for example the one in Armstrong 1978a: 112, seem like early versions of the accounts already discussed. Others, for example those in Armstrong 1989: 96–97 and 2010: 32–33, are substantially different. However, those accounts do not take instantiation to involve a partial identity between particulars and universals, so they are beyond the scope of my argument.} In the next section, I argue that Baxter’s account, and ones like it, also fail.

5 Cross-Count Identities

Baxter’s account of instantiation centers around his concept of cross-count identity. Although cross-count identity is primitive,\footnote{See Baxter 2013: 294.} it can be characterized in a fairly robust way.\footnote{See Turner 2014 for a helpful discussion of cross-count identity in another context, including an attempt to formally regiment it.} To start, imagine a cabin in the woods. The cabin is surrounded by a single small
forest; the cabin is surrounded by 1,000 individual trees. If someone asks how many things surround the cabin, then we can say one thing surrounds it, when we are counting forests, or many things surround it, when we are counting trees, and both answers are equally correct. Yet it seems incorrect to say that 1,001 things surround it: many trees plus one forest. Why?

Maybe because saying that counts things twice over; the single forest is the many trees. If we think this, then we might think that there are strictly 1,000 things surrounding the cabin but we can count them, when speaking loosely, as one thing. Or we might think that there is strictly one thing surrounding the cabin but we can count it, when speaking loosely, as 1,000 things.

There is another option, one that Baxter prefers: take both ways of speaking to be strict, but take numerical identity, and so cardinality, to be relative to a standard of counting what is real, or a count. On this view, how many things surround the cabin is relative to a count, but multiple counts are correct. Many trees surround the cabin, a single forest surrounds the cabin, but many trees and a distinct forest do not surround the cabin, since the trees are the forest in a different count. Saying this requires accepting a kind of many-one identity, but it is a comparatively well-behaved kind;

95 See Baxter 1988a and 1988b. In conversation, Baxter told me that he now prefers to say existence as one is relative to a count, not that existence is relative to a count. This is because each count exhausts reality: if something exists on a count, then it exists on all counts, although how many things it exists as might vary across counts.
nothing is identical to many things relative to a single count, but something in one count can be identical to many things in a different count. One forest and many trees can be identical across different counts, or *cross-count identical*.

Cross-count identity is not numerical identity.\textsuperscript{96} Numerical identity and distinctness are always relative to a count, and they hold only between things in the same count. Cross-count identity and distinctness hold only between things in different counts. But cross-count identity is a kind of identity in that it makes sense to say some things are the same if they are cross-count identical.\textsuperscript{97} At a minimum, I take this to entail that cross-count identity is symmetric; the trees cannot be (collectively or individually) the same thing as the forest without the forest being the same thing as the trees, since sameness is symmetric.

Baxter’s idea is that particulars and their universals are cross-count identical. A particular is its many universals, and a universal is its many particulars, relative to different, equally correct counts. On this view,

[u]niversals are still real. They are as real as particulars. In fact they are particulars, strictly identical in a different count. (Baxter 2001: 456,

\textsuperscript{96} Underwood 2010 disagrees. He prefers taking cross-count identity to be a kind, or “dimension,” of numerical identity and dropping Baxter’s use of counts. Underwood gives an account of instantiation using multiple, primitive kinds of numerical identity. However, Underwood’s account explicitly makes instantiation asymmetric rather than nonsymmetric. (See Underwood 2010: 269.) He can avoid this problem by accepting higher-order particulars and introducing still further primitive kinds of numerical identity, but this would strengthen the worry that realism has too much primitive ideology.

\textsuperscript{97} See Baxter 2013: 293.
If we accept this view of particulars and universals, then a neat account of instantiation becomes available:

instantiation is cross-count partial identity. To be more specific it is cross-count partial identity between a ‘this’ and a ‘such’. A ‘this’ is something that is. A ‘such’ is a way that something is ... A particular is a ‘this’ that is not a ‘such’ for anything. A universal is a ‘such’, though it can be a ‘this’ for a higher-order universal—one instantiated by universals. (Baxter 2001: 460)

In other words, Baxter proposes

(Cross-Count Identity) $x$ instantiates $y$ just in case (i) $x$ is cross-count identical to $y$, and (ii) $y$ is a universal.

However, realists who accept Cross-Count Identity face a dilemma. Either there are no cross-count identities between universals or there are some. If there are none, then Cross-Count Identity entails that universals do not instantiate anything. If particulars

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98 Baxter goes on to qualify this identification using his theory of aspects: universals are particulars insofar as the particulars are the same way, relative to a different count. Baxter takes something insofar as it is some way to be an aspect of it, where aspects of something are numerically identical to it (and each other) but can, nevertheless, qualitatively differ from it (and from each other). For Baxter’s theory of aspects, see Baxter 1999 and 2013.

99 Baxter’s use of “partial” here seems to be in recognition of the fact that particulars usually instantiate multiple universals and universals are usually instantiated by multiple particulars. The cross-count identity is partial in virtue of the fact that the “particular and universal are not wholly identical across the count. Some aspects of each are not aspects of the other” (2001: 456).

Elsewhere, Baxter states his account of instantiation explicitly in terms of aspects. See, for example, Baxter 2001: 453 and Baxter 2013: 293. For simplicity, I will talk about particulars and universals being cross-count identical rather than talk about their aspects being cross-count identical. Nothing turns on this choice; particulars and universals are cross-count identical just in case an aspect of one is cross-count identical to an aspect of the other.
cannot be instantiated, as a consequence of (ii), then they do not instantiate themselves; if universals do not instantiate anything, then they do not instantiate themselves. So Cross-Count Identity makes instantiation irreflexive rather than nonreflexive if there are no cross-count identities between universals. It entails, for example, that being monadic does not instantiate itself, which is wrong. Similarly, if particulars cannot be instantiated, again, as a consequence of (ii), then they do not instantiate something that instantiates them; if universals do not instantiate anything, then they do not instantiate something that instantiates them. So Cross-Count Identity makes instantiation asymmetric rather than nonsymmetric if there are no cross-count identities between universals. It entails, for example, that being monadic and being a universal do not instantiate each other, which is wrong. Cross-Count Identity would be extensionally inadequate.

Suppose instead that there are some cross-count identities between universals. Relative to one count, a higher-order universal is a single thing; relative to a different count, the same universal is its many instances, each of which is also a universal counted as one. There are two problems with this picture. First, realists would be committed to the bad kind of many-one identity. Many-one identity is acceptable only if nothing is both many and one relative to a single count. If a universal is many relative to count \(_1\) and one relative to count \(_2\), then count \(_1\) and count \(_2\) must be distinct. In general, this is no problem: a universal that instantiates something would be one, relative to a count on
which it is a single, higher-order particular and many, relative to a distinct count on
which it is the many higher-order universals it instantiates. However, some universals are
among the many universals they instantiate, since they instantiate themselves. Such
universals would be both many, relative to some count $c$ on which they are the many
higher-order universals they instantiate, and one, also relative to $c$, since they are one of
the many higher-order universals that they instantiate. Relative to a single count, $c$, the
universal would be both many, qua things it instantiates, and one, qua thing
instantiated, which is inconsistent. Nothing is both many and one relative to a single way
of counting what there is.

Realists might try rejecting Cross-Count Identity for

(Ordered Cross-Count Identity) $x$ instantiates $y$ just in case (i) $x$ is cross-count
identical to $y$, (iii) $x$ is an $n$-order particular, and (iv) $y$ is an $n$-order universal

and say that higher orders proliferate universals, introducing numerically distinct copies
of lower-order universals rather than merely reclassifying them. If so, then my argument
has a false premise. No universal would be one of the many universals it instantiates, so
no universal would be both many and one relative to a single count, and disaster would
be avoided. However, as I argued in Section 3, realists have a good reason not to say that
higher orders proliferate universals. When, for example, a first- and a second-order
universal are monadic, they are monadic in exactly the same way; they are exactly
similar in that respect. Insofar as realists explain exact similarity as the sharing of a
single universal, they should say that *being monadic*, the third-order particular, and *being monadic*, the third-order universal, are numerically identical. Otherwise, multiple universals would do the same explanatory work. Realists should not sacrifice ontological economy and the unity of their explanations to help illuminate instantiation. The cost would be too high.

Besides, there is a second problem with saying that there are cross-count identities between universals: there are either too many or not enough of them. Consider, for example, *being negatively charged* and *being monadic*. If they are not cross-count identical, then there are too few cross-count identities; Cross-Count Identity would entail that *being negatively charged* does not instantiate *being monadic*, which is wrong. But, if *being negatively charged* is cross-count identical to *being monadic*, then there are too many cross-count identities. Cross-count identity is symmetric, since it is a type of sameness and sameness is symmetric. So, if *being negatively charged* is cross-count identical to *being monadic*, then *being monadic* is cross-count identical to *being negatively charged*. Since *being negatively charged* is a universal, Cross-Count Identity would entail that *being monadic* instantiates *being negatively charged*, which is wrong. Either way, Cross-Count Identity is extensionally inadequate. It entails that instantiation between universals is symmetric rather than nonsymmetric.

Defenders of Cross-Count Identity might try denying that cross-count identity is
symmetric, but that would be a mistake. The point of Cross-Count Identity was to make instantiation more intelligible by explaining it in terms of the more familiar concept of identity. If cross-count identity is not symmetric, then it is a kind of identity in name only. Explaining the primitive, nonsymmetric tie of instantiation in terms of a primitive, nonsymmetric tie of cross-count identity does little to make instantiation less mysterious. The strength of Baxter’s account lies in its use of a familiar concept of identity, one similar enough to numerical identity that it can help us understand more obscure concepts, and this similarity to numerical identity is lost if we deny that cross-count identity is symmetric.

It is no use rejecting specific universals, like being monadic or being negatively charged. The problem is general, so defenders of Cross-Count Identity need a general reply: either say that universals do not instantiate anything by denying any cross-count identities between universals counted as one or say that instantiation for universals is symmetric. However, neither of these replies would be very satisfying. Denying any instantiation between universals jeopardizes the entire realist project. Instantiation between universals serves the same explanatory purpose that instantiation between a particular and a universal serves, so it is hard to deny the former after accepting the latter. There are objective similarities between universals, too.

Saying that instantiation for universals is symmetric also jeopardizes the realist
According to realism, there is a correspondence between instantiation and objective similarity. However, we have instantiation without objective similarity if instantiation between universals is symmetric: being monadic would instantiate being negatively charged despite lacking any similarity to electrons with respect to charge and lacking the causal profile of something negatively charged. Even worse, some universals would have incompatible properties: being monadic would instantiate both being negatively charged and being positively charged; being a universal would instantiate every universal, including both being exactly 3 kilometers long and being exactly 3 centimeters long. These consequences are too unpalatable. We would do better to avoid them and find a different way to illuminate instantiation.

Since I cannot see how to avoid all of these problems, I think accounts like Baxter’s, ones that take instantiation to be cross-count identity, fail. Realists are better off finding another way to illuminate instantiation.


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Appendix A: Displayed Propositions, Sets, and Schemata

This appendix contains a list of all the displayed propositions, sets, and schemata that appear throughout this dissertation, organized alphabetically and by the chapter that they appear in.

1 Introduction
No named propositions, sets, or schemata are displayed.

2 A Convenient Modal Truth
(1) It is true of the tallest actual thing that it might have been taller.

(2) Whatever is the longest-lasting thing in the world, it might have lasted longer.

(3) The fastest ever thing might have been faster yet.

(4) The longest actual mereological simple might have been longer.

(Necessary Condition) For any $x, y$, if $y$ is taller than $x$, then $x$ and $y$ stand in some spatiotemporal relation (are spatiotemporally related).
(Plurality) There exists a vast plurality of worlds, each isolated from the rest.

(Proxy Sufficient Condition) For any \( x, y, y \) longer than \( x \) if there is a \( w \) and a \( z \) such that (i) \( x \) and \( w \) exactly resemble with respect to length, (ii) \( y \) and \( z \) exactly resemble with respect to length, and (iii) \( z \) is longer than \( w \).

(Regional Sufficient Condition) For any \( x, y, y \) longer than \( x \) if there is a region \( w \) and a region \( z \) such that (i) \( x \) exactly occupies \( w \), (ii) \( y \) exactly occupies \( z \), and (iii) \( z \) is longer than \( w \).

(Simple Sufficient Condition) For any \( x, y, y \) taller than \( x \) if a proper part of \( y \) exactly resembles \( x \) with respect to height.

(Sufficient Condition\textsubscript{1}) For any \( x, y, y \) taller than \( x \) if there is a \( z \) such that (i) \( z \) is part of \( y \), (ii) \( y \) is taller than \( z \), and (iii) \( z \) and \( x \) exactly resemble with respect to height.

(Sufficient Condition\textsubscript{2}) For any \( x, y, y \) longer-lasting than \( x \) if there is a \( z \) such that (i) \( z \) is a temporal part of \( y \), (ii) \( y \) lasts longer than \( z \), and (iii) \( z \) and \( x \) exactly resemble with respect to duration.

(Sufficient Condition\textsubscript{3}) For any \( x, y, y \) faster than \( x \) if there is a \( z \) such that (i) \( z \) is a temporal part of \( y \), (ii) \( y \) travels further than \( z \), and (iii) \( z \) and \( x \) exactly resemble with respect to distance traveled.

(Sufficient Condition\textsubscript{4}) For any \( x, y, y \) longer than \( x \) if there is a \( z \) such that (i) \( z \) is part of \( y \), (ii) \( y \) is longer than \( z \), and (iii) \( z \) and \( x \) exactly resemble with respect to length.

3 The Worlds Are Enough

(Analogical Recombination) Any part of the pluriverse has a duplicate that exists with, and a duplicate that exists without, a duplicate of any part of the pluriverse occupying a distinct spatiotemporal or analogously spatiotemporal position, in any arrangement of suitable size and shape.

(Co-Located Bosons) Possibly, bosons can be co-located.
(Configuration Space) Possibly, something is located in configuration space.

(External Recombination) Any part of the pluriverse has a duplicate that exists with, and a duplicate that exists without, a duplicate of any part of the pluriverse occupying a distinct position in a space unified by natural external relations, in any arrangement of suitable size and shape.

(Plaid Kangaroos) Possibly, there are plaid kangaroos.

(Plurality) There exists a vast plurality of worlds, each isolated from the rest.

(Rich Plurality) There exists a vast plurality of worlds, each isolated from the rest, rich enough in number and variety that Lewis’s analyses in terms of it are extensionally adequate.

(Separation) Son is such that, possibly, it is not co-located with another boson.

(Squishing) Bo is such that, possibly, it is co-located with another boson.

4 Similarity and Revenge

(Bad News) \{x : x \text{ is either round and red, or round and wooden, or red and wooden}\}

(Central Schema) 「Something has the property being F just in case (and because) it is similar to the Fs.」

(Complex Answer) 「the Fs」, as it occurs in Central Schema, can be replaced by any expression that refers to the members of a maximal similarity set that also has the following feature: the pairs of its members are, themselves, collectively similar to each other, and the pairs of the pairs of its members are collectively similar to each other, and so on.

(General Insight) Things are qualitatively similar just in case they have the same property.
(Hereditary Similarity) Similarity$_2$ holds between $n$-order hereditary pairs $x$ and $y$ just in case $x$ and $y$ share an $n$-order hereditary property of the kind that Rodriguez-Pereyra is interested in.

(Pairwise) Some things are collectively similar just in case they are pairwise similar.

(Primitive) It is a primitive fact whether or not some things are collectively similar.

(Simple Answer) If the Fs, as it occurs in Central Schema, can be replaced by any expression that refers to the members of a maximal similarity set.

(Sparse Similarity) Similarity$_1$ holds between particulars $x$ and $y$ just in case $x$ and $y$ share a sparse property.

(Two-Dimensional Answer) If the Fs, as it occurs in Central Schema, can be replaced by any expression that refers to the members of a maximal similarity$_1$ set that also has the following feature: the pairs of its members are, themselves, collectively similar$_2$, and the pairs of the pairs of its members are collectively similar$_2$, and so on.

(Worse News) $\{x : x$ is either round, red, wooden, and glossy; or round, red, wooden, and chipped; or round, red, glossy, and chipped; or round, wooden, glossy, and chipped; or red, wooden, glossy, and chipped\}$

5 Against Instantiation as Identity

(Categorical Enfolding) $x$ instantiates $y$ just in case (i) $y$ is a constituent of $x$ and (ii) $y$ is a universal.

(Categorical Intersection) $x$ instantiates $y$ just in case (i) a constituent of $x$ is identical to a constituent of $y$, (ii) $x$ is a particular, and (iii) $y$ is a universal.

(Categorical Proper Intersection) $x$ instantiates $y$ just in case (i) a constituent of $x$ is identical to a constituent of $y$, (ii) $x$ is a particular, (iii) $y$ is a universal, and (iv) $x \neq y$. 

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(Cross-Count Identity) \( x \) instantiates \( y \) just in case (i) \( x \) is cross-count identical to \( y \), and (ii) \( y \) is a universal.

(Enfolding) \( x \) instantiates \( y \) just in case \( y \) is a constituent of \( x \).

(Intersection) \( x \) instantiates \( y \) just in case a constituent of \( x \) is identical to a constituent of \( y \).

(Ordered Cross-Count Identity) \( x \) instantiates \( y \) just in case (i) \( x \) is cross-count identical to \( y \), (iii) \( x \) is an \( n \)-order particular, and (iv) \( y \) is an \( n \)-order universal.

(Ordered Enfolding) \( x \) instantiates \( y \) just in case (i) \( y \) is a constituent of \( x \), (iii) \( x \) is an \( n \)-order particular, and (iv) \( y \) is an \( n \)-order universal.

(Ordered Intersection) \( x \) instantiates \( y \) just in case (i) a constituent of \( x \) is identical to a constituent of \( y \), (v) \( x \) is an \( n \)-order particular, and (vi) \( y \) is an \( n \)-order universal.