ONTOLOGY, QUANTIFICATION, AND FUNDAMENTALITY

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A dissertation submitted to the

Graduate School—New Brunswick

Rutgers, The State University of New Jersey

in partial fulfillment of the requirements

for the degree of

Doctor of Philosophy

Graduate Program in Philosophy

Written under the direction of

Theodore Sider

and approved by

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New Brunswick, New Jersey

May, 2008

ABSTRACT OF THE DISSERTATION

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The *structuralist* conception of metaphysics holds that it aims to uncover the ultimate structure of reality and explain how the world's richness and variety are accounted for by that ultimate structure. On this conception, metaphysicians produce *fundamental theories*, the primitive, undefined expressions of which are supposed to 'carve reality at its joints', as it were.

On this conception, ontological questions are understood as questions about what there is, where the existential quantifier 'there is' has a fundamental, joint-carving interpretation. Structuralist orthodoxy holds that there is exactly one fundamental, joint-carving interpretation that an existential quantifier could have (cf. Sider 2008: §10).

This orthodox assumption could go wrong — either by there being too few fundamental-quantifier interpretations, or by there being too many. In this dissertation I examine the implications of these non-orthodox options. Someone who thinks there are too many fundamental-quantifier interpretations might think this means standard ontological debates are in some sense

defective of 'merely verbal', or she might think instead that the different quantifiers show that there are different 'ways' or 'modes' of being. I argue that the first option runs into problems with a certain sort of realism about logic, but that there is no general problem with the second option, despite its long-standing bad philosophical reputation. I also argue that realism about logic gives us reason to think the dispute between someone who thinks there are many 'modes of being' in this sense and someone who thinks there is just one is not itself verbal. Finally, I turn to the case in which there are no fundamental quantifiers, arguing that it brings with it a host of theoretical problems we could avoid with quantifiers.

Acknowledgements

This dissertation was developed on a chapter-by-chapter basis, and I toyed with the idea of doling out thanks in a similar manner. But (with the one or two obvious exceptions noted below), I decided against it: the helpful, insightful, and very often troublingly penetrating comments, conversations, and criticism from those mentioned below often improved and influenced my thinking about these topics in ways that go far beyond the individual chapters they were about.

So, without further ado, thanks to Geoff Anders, Josh Armstrong, Elizabeth Barnes, Karen Bennett, Sara Bernstein, Ross Cameron, Ben Caplan, Andrew Cortens, Matti Eklund, Carl Fierabend, Michael Glanzberg, Mark Heller, Hud Hudson, Jonathan Ichikawa, Brendan Jackson, Martin Jönnson, Jeff King, Kelby Mason, Kris McDaniel, Andrew McGonigal, Trenton Merricks, Carlos Montemayor, Mark Moffett, Iris Oved, Josh Parsons, Jonathan Schaffer, Michael Schweiger, Brad Skow, Brian Weatherson, Robbie Williams, and Stephanie Wykstra for helpful comments and criticism.

Kris McDaniel deserves special thanks in connection with chapter 3, both for convincing me there was an interesting position there to be defended and for helpful conversations, comments, and encouragement on that chapter. Thanks also to participants at the 2007 Inland Northwest and Bellingham Summer Philosophy Conferences, who saw earlier incarnations of chapter 3 and, in the process, provided helpful questions and comments.

Chapter 4 came into being as the result of an extended conversation with Jonathan Schaffer (begun at one of the aforementioned conferences), so

special thanks go also to him for pressing me on the issues discussed therein.

Of course, extra special thanks go to my committee — Ted Sider, Cian Dorr, John Hawthorne, and Dean Zimmerman — for their extensive efforts, help, and guidance (both philosophical and practical) throughout the process. Ted especially went above and beyond the call of duty, reading more drafts of each chapter than any human should have to stand and frequently helping me work through whatever snag I had most recently encountered. No one could ask for more in a dissertation director.

I'm sure there are many others whom I have forgotten: if you are among them, thanks to you, too, with apologies for my poor memory. But one whom I will *not* forget to thank here is my wife, Starr. Throughout the entire process, she unfailingly supported me, making time for my research demands, dealing with my sometimes absenteeism, putting up with me and my various dissertation-related stresses, and (against all rational expectations) seeming to even kind of like me. I certainly don't deserve such wonderful treatment, but I cannot express my gratitude at having had it.

Dedication

To Cami and Graham, with apologies for time spent thinking about meta-ontology when I should have been taking you to the park.

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Chapter 1

Introduction

'Metaontology', writes Ross Cameron (forthcoming), 'is the new black.' He is right, but for reasons that run deeper than mere philosophical fashion. Metaphysics has been suspect at least since Hume told us to consign it to the flames, but its reputation reached a new low when the logical positivists announced it finally 'eliminated' (Carnap 1959) once and for all. And even though metaphysics has crept back into philosophical acceptability once again, proving the positivist rumors of its death greatly exaggerated, lingering doubts still plague its practitioners. As metaphysical inquiry has intensified, so has the skeptical itch of these doubts. No wonder, then, if we have finally reached the point where we can no longer avoid scratching.

The itch is felt most by those metaphysicians asking *ontological* questions — questions about what there is. Carnap (1950) told us these questions were either trivial or unintelligible; the spirit, if not the letter, of his position has chafed a number of contemporary philosophers into agreement.[1] But many who think that ontological questions probe something interesting after all have tried to soothe the Carnapian inflammation with various salves. One particular treatment, *structuralism*, has become quite popular. It insists that metaphysics aims to uncover the ultimate structure of reality and explain

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[1]Including, for instance, Hilary Putnam (1980, 1987*a*,*b*, 2004), Eli Hirsch (2002*b*,*a*, 2005, 2007), Amie Thomasson (2008), David Chalmers (2008), and Stephen Yablo (1998, 2000*a*,*b*). Jaegwon Kim (1993: ix–x) and Ernest Sosa (1993: 619–625) have also made overtures in this direction, although it's not clear how far they want to extend their Carnapian sympathies.

how this structure accounts for everything else.[2] And it insists that asking after reality's ultimate structure *is* both intelligible and non-trivial. After all, physicists seem to be asking questions like this about the world[3] — and if they can do it, why can't we?

This dissertation is *not* a defense of structuralism. It is, rather, an investigation of a question that crops up when we decide to apply structuralism to our positivisitic itch. According to structuralists, metaphysical investigations ask after the ultimate structure of reality. 'And so', structuralists go on to say, 'ontological investigation asks after a certain chunk of reality's ultimate structure — the chunk we call "ontological".' But by saying this, structuralists smuggle in a fairly large assumption: that, buried in reality's ultimate structure, there is one unique ontological chunk. This assumption might be wrong. The ways in which it could be wrong, and what we ought to say about those ways if we are structuralists, comprise the subject-matter of this dissertation.

1.1   Two Presuppositions

All inquiry has to start somewhere, and all inquirers have to presuppose something in order to start asking questions. Since I am examining issues that arises primarily for structuralists, I simply presuppose the truth of structuralism — at least for the purposes of this dissertation.

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[2]Avowed structuralists include Ross Cameron (forthcoming, MS), Cian Dorr (2005, 2004: 155–158) Kit Fine (2001, 2005: 267–270), Theodore Sider (2008, 2001*a*,*b*: xvi–xxvi), and J. R. G. Williams (MS). Jonathan Schaffer (2008, MS) might also count, although his distinctive brand of structuralism does not lend itself naturally to the issues studied in this dissertation. See sections 2.1, 3.1.2, 3.2.2, and 4.1.1 for further discussion of structuralism. Note also that this meta-ontological 'structuralism' should be distinguished from the mathematical structuralism of, e.g., Resnik (1997) and Shapiro (1997), which holds that mathematics is interested *only* in structures. This meta-ontological view is 'structuralist' insofar as it thinks reality *has a distinguished structure* — but it need not insist that there is nothing more to metaphysics than structure.

[3]See, e.g., Tim Maudlin's (2007) discussion of derivative and non-derivative structure and ontology in various interpretations of quantum mechanics.

But I go further than that, presupposing a particular *form* of structuralism: the *fundamental theory* form. According to this form of structuralism, metaphysicians aim to produce *fundamental theories* — theories that are supposed to not only be true, but also to 'carve reality at its joints', in Plato's (*Phaedrus*, 265d–266a) phrase.

A theory carves reality at its joints by being written in the right kind of language — a *fundamental language*. The idea is that some expressions come closer to hitting the natural joints than others. 'Grue' cuts further from the joints than 'green' does, for instance.[4] And some expressions might cut along reality's joints perfectly (or almost perfectly, and no worse than any other expression does). Let's call those expressions *fundamental*. A fundamental language, then, is a language where every syntactically simple expression is fundamental, in this sense.[5] And a fundamental theory is a theory written in a fundamental language.[6]

The simple expressions of fundamental languages are supposed to carve nature at its joints — that is, they're supposed to latch on to fundamental structural features of reality. As such, fundamental theories don't just tell us what reality is like, but they also *show* us: by looking at the simple expressions the theory takes as primitive, we see what reality's ultimate structure consists in.

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[4]Here, and throughout this dissertation, I adopt the convention of individuating expressions by interpretation: the same bit of syntax, when differently interpreted, constitutes a 'different expression.' There are a few exceptions to this convention — for instance, when I prove certain meta-logical results (as in the Appendix, for instance), it is easier to adopt the meta-logical convention of treating 'languages' as syntactic entities. But, thus warned, it should be clear enough from context whether expressions are being individuaded by syntax or by semantics.

[5]See Sider (2008), where a similar idea is cast in terms of Lewisian (1983*a*) *naturalness*. Lewis (1983*a*: 42) is also relevant, although notice that Lewis there simply assumes the logical vocabulary unproblematic and focuses explicitly on the predicates.

[6]Or, at least, a theory which if it were written only in terms of its primitive, undefined expressions would be written in a fundamental language. For more on fundamental theories and languages, see sections 2.1.3, 2.2, 3.1.2, and 4.1.1.

Ontology, the structuralist tells us, is concerned with a particular sort of ultimate structure — the sort we call 'ontological'. So fundamental theories will talk about this structure by using some simple, joint-carving expression. But once she says all this, we can ask her two further questions. First, what do we mean by calling some structure 'ontological'? And second, just what sort of expressions should we expect to find a fundamental theory using to talk about this sort of structure?

Let's begin with the first question. As a very rough first pass, we might think of 'ontological' structure as the sort of structure that is well-represented by a pegboard with some rubber bands on it. Suppose I say

(1) Hernando smiled at every child.

Here's how you could physically represent the structure of what I said. First, get a pegboard. Then pick a certain peg to represent Hernando. Get some rubber bands to represent *being a child* — maybe you can make them all the same color, and then tell yourself, 'Remember, *this* color stands for *child*'. Pick some pegs to represent all the children, then hang rubber bands of that color on those pegs to represent those pegs as children. Finally, pick rubber bands of some other color to represent *smiling-at*, and stretch one of those rubber bands between each 'child' peg and Hernando's peg. *Voila* — you've got yourself a representation of the ontological structure (1) *prima facie* imparts to the world.[7,8]

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[7]The *prima facie* is important here, because the structuralist might leave it open that (1) is, at least in ordinary context, strictly and literally *true* but that nonetheless reality doesn't have that sort of ontological structure. Cf. van Inwagen (1990: 100–103) and sections 2.1.3 and 3.2.2.

[8]Admittedly, the pegboard-and-rubber-band analogy is not perfect. For one thing, it assumes all relations are symmetric and multigrade; this might be true (see Dorr 2004), but we ought not presuppose it in our meta-ontological reflections. Furthermore, it lends itself easily to the thought that the rubber bands are representing further *things* — properties — that the objects have. But in fact the rubber bands are only supposed to represent *that* certain things are children or that certain things smiled at certain other things. If we want to represent a

Ontological questions can thus be construed as questions about the ultimate pegboard-and-rubber-band-like structure of the world. (See also sections 3.1.1 and 5.1.) But we now have to answer the second question: how do we represent pegboard-like structure in a fundamental language? Some fundamental-language expression will have this job. Which one?

We might answer this question in different ways. If we are *neo-Tractarians*, we will say that pegboard structure is given, in the fundamental language, by names. In order to represent a certain ontological, pegboard-like structure, we use a name to pick out each of the pegs and then use predicates to stretch rubber bands between the so-picked-out pegs. Or if we are *neo-Meinongians*, we will say pegboard-like structure is given by a certain special *existence* predicate: to impart a certain pegboard structure to reality is to deploy an existence predicate in a certain way.[9]

But by far the most popular answer is *neo-Quinean*: in order to impart a certain ultimate pegboard structure, we use *quantifiers* — existential quantifiers — in the fundamental language. The existential quantifier, according to neo-Quineans, does the work of imparting pegboard-like structure to reality. (See also section 3.1.3.) Neo-Quineanism comprises the second presupposition of this dissertation.

There are different varieties of neo-Quineanism, though, so we must decide which one to presuppose. Quine himself thought that names were 'altogether immaterial to the ontological issue' (1948: 12). Accordingly, a *pure* neo-Quinean would think that, in order to impart ontological structure, names

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special class of things called 'properties', we need to hang a special property rubber band from some pegs. See chapter 3, note 2.

[9]'Neo-Meinongianism,' in this sense, is not necessarily the same view as the one called by that name in section 3.2.2.

aren't enough — *only* quantifiers can do it.[10] Few contemporary neo-Quineans are prepared to go this far: most of them *also* think that a fundamental language could impart pegboard structure using names.

The impure version of neo-Quineanism seems much more plausible; let's presuppose that one. For the purposes of the dissertation, though, this decision won't usually matter. Most of the issues raised here are of interest enough without dragging names into the picture; when they are dragged in (e.g. in section 3.5), they will be of interest mainly thanks to their inferential relations to quantifiers.[11]

1.2   The Positions to be Examined

According to the combination of (fundamental-theory style) structuralism and neo-Quineanism, ontologists aim to uncover the ultimate ontological structure of reality, and they then report on what that structure is like by the way they choose to deploy the quantifiers in their fundamental theory. Or, in simpler but more-or-less equivalent terms, ontologists aim to answer the question

(Q) What is there?

when 'there is' (and its interrogative cognate, 'is there') is the *fundamental* (existential) quantifier, from the fundamental language.

This characterization of ontology, though, smuggles in the following assumption:

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[10]Note that Quine himself was probably not a neo-Quinean, pure or otherwise. Neo-Quineanism is a doctrine which presupposes that it makes sense to talk about fundamental languages and the like. I doubt Quine would have had much truck with any of that. Neo-Quineanism is a Quine-inspired doctrine for structuralists.

[11]One place where it does matter is in chapter 5. I there examine the prospects for an 'ontology-free' metaphysic; a pure neo-Quinean might think such a metaphysic is easy if we simply get rid of quantifiers in favor of infinite conjunctions and disjunctions of names. But this pure neo-Quineanism move looks so dodgy that we might as well rule it out by *fiat* here.

(M) There is exactly one fundamental (existential) quantifier.[12]

Call this *Ontological Monism*: it is the orthodox view. As with any claim of unique existence, there are two ways it could go wrong: maybe there aren't enough fundamental existential quantifiers, or maybe there are too many.

If a good neo-Quinean structuralist says that there is no fundamental quantifier, then he says something fairly specific about reality's pegboard-like structure: there *isn't* one. Whoever says this insists that it's wrongheaded to think of the world being fundamentally built up out of things. Whatever kind of structure reality ultimately has, none of it is ontological, none of it is pegboard-like — none of it involves *things*. And whoever says this is an *Ontological Nihilist* — he says that the world has no ontology whatsoever.

(M) would also fail if, rather than no fundamental quantifier, there were many. But someone who says there are many fundamental quantifiers may be saying one of two things about reality's pegboard-like structure. Which thing she is saying depends on how many of these fundamental quantifiers she thinks a metaphysical theory needs to use. She might think that, if we leave one out, we miss some important information we could have gotten at if we had used them all.[13] Or she might think instead that we could write a metaphysical theory using just this quantifier or just that one, and nothing would be lost no matter which we chose.

If she thinks that we can pick and choose whichever quantifier we wish without missing out on any important information, then she thinks that, in a sense, there is no fact of the matter about which quantifier 'gets things right'.

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[12]The question itself, as well as (M) and the various ways of denying it below, will have to be finessed a bit if we think the fundamental language has both singular, first-order existential quantifiers and plural existential quantifiers (in the sense of Boolos 1984, 1985) — see section 3.1.4 below. As it turns out, the issue is forced on us only once (in section 2.3), and in that instance it is clear enough how the view under consideration is to be understood.

[13]See section 2.2.2 for a further discussion of the notion of 'missing out on some important information' at play here.

Rather, she thinks, the choice of which quantifier to use is in a way like the choice of whether to measure in feet or in meters, or whether to talk about modality in terms of what is necessary or what is possible (see sections 2.2 and 4.1.2). Picking one or the other is simply getting at the same information in a different (but equally fundamental) way. Anyone who thinks this is an *Ontological Variantists* — she thinks that we have a choice about how to 'carve the world up' into object-sized bites. Each choice corresponds to a different fundamental quantifier, and none of these choices is any metaphysically better than any other.

But someone who thinks there are multiple fundamental quantifiers might instead think we have to use them all to say everything there is to say. In this case, she doesn't think choosing a quantifier is just choosing a different way to carve reality. She thinks instead that the world has *multiple, separate ontologies* — that it has multiple, independent, pegboard-like structures. Anyone who thinks this is an *Ontological Pluralists* — she thinks that there are different 'ways' or 'modes' of being, each of which corresponds to a different fundamental quantifiers.

So there are four positions: orthodox Ontological Monism and the three heterodox alternatives, Ontological Nihilism, Ontological Variantism, and Ontological Pluralism. (See figure 1.1.) The purpose of this dissertation is to examine the three heterodox positions. In chapter 2, I examine the prospects of Ontological Variantism with respect to *defection* in ontology — insisting that ontological disputes tend to be trivial if coherent at all. I argue that if we couple our structuralism with a certain picture of logic we have good reason to reject Ontological Variantism. In chapter 3 I look at Ontological Pluralism, examining several arguments against it and finding none of them ultimately convincing. Finally, in chapter 5, I look at what it would take to make Ontological Nihilism ultimately tenable. I argue that certain attempts some have

Figure 1.1: Table of Positions

How many fundamental quantifiers?

- none → Ontological Nihilism
- exactly one → Ontological Monism
- lots → How many do we need to use?
  - one → Ontological Variantism
  - all → Ontological Pluralism
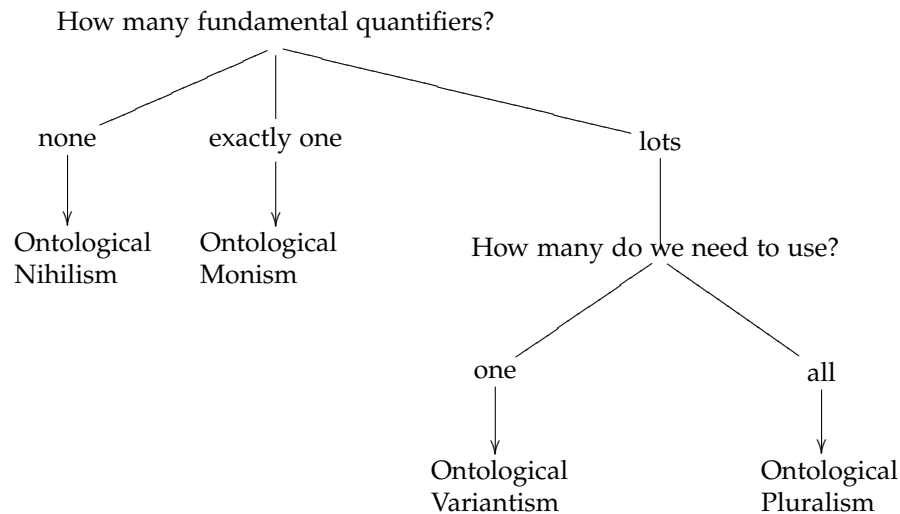
suggested (which appeal to Quine's (1960*a*, 1971) predicate-functor languages) don't work, and that attempts which do work come at some very high costs.

As you probably noticed, I skipped chapter 4. It is possible to combine Ontological Variantism and Ontological Pluralism by insisting that there are multiple, equally good fundamental theories, one which uses just one existential quantifier and another which uses many. In chapter 4, I consider this view and argue that we can reject it in roughly the same way (for roughly the same reasons and given roughly the same presuppositions) as we did Ontological Variantism in chapter 2.

We could in principle also combine Ontological Nihilism with Ontological Variantism, holding that there are multiple, equally good fundamental theories, one which uses no quantifiers and another which uses one or many. (Chalmers 2008 is suggestive of something along these lines.) This would be another interesting position to examine, and it would be nice to know whether the argumentative strategy deployed in chapters 2 and 4 would work there as well. However, as will become clear in chapter 5, the proponent of Ontological Nihilism has not yet told us enough about what a Nihilist fundamental

language would look like to enable us to make the comparison. Investigation of a Nihilistic hybrid will have to wait until we have a better grasp on the logical contours of a viable Nihilistic theory.

Before we begin, a note about the chapters is in order. Each, with the possible exception of chapter 4, has been written so as to stand alone. As such, each is intended to be readable to anyone not familiar with the material in any of the others. In order to make this possible, there is a bit of chapter-by-chapter redundancy, especially when it comes to spelling out some of the basic tenets of structuralism. The repetitions are not gratuitous, though: each chapter presents just that material pertinent to the arguments contained therein. Chapter 5, for instance, contains almost no discussion of structuralism or fundamental theories. Although I examine Ontological Nihilism here in order to see how it fares as a candidate fundamental theory, even those who reject structuralism may wonder what, if any, sense can be made of the thought that there is nothing at all. Chapter 2, on the other hand, discusses structuralism at length — the issues raised there are specifically predicated upon an assumption of structuralism. Furthermore, each 'repeated' discussion of a view or thesis focuses on different aspects of that view or thesis, highlighting the parts most relevant to the position examined in its chapter.

With that understood, let's get to examining the positions.

Chapter 2

Ontological Variantism

Metaphysicians often argue about what there is. Some claim that there are things of such-and-such a kind: numbers or holes or merely possible objects or what-have-you. Others deny that there is anything of that kind. Each side adduces considerations to support their contention, and ontological dispute ensues.

Some philosophers think that (a significant number of) these disputes are defective. According to these philosophers, there is no unique, metaphysically privileged way to 'carve up' reality into object-sized bites. Rather, we can choose to carve the world into objects in a number of different ways, none of which is any better, metaphysically speaking, than any other. We could choose to speak in a way that would make the claims of one of the debaters come out true, or we could choose to speak in a way that would make the other's claims come out true. But once we've settled the question about how we're speaking, no interesting metaphysical issue remains. As a result, there is no deep fact of the matter as to who is right in these debates: either 'there are' means something different in the parties' mouths, in which case they're speaking past each other, or the meaning of 'there are' means the same thing in everyone's mouth thanks to metaphysically boring socio-linguistic factors. Either way, the debate is metaphysically shallow.[1]

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[1]See Carnap (1950), Putnam (1987*a*,*b*, 2004), Kim (1993: ix–x), and Hirsch (2002*a*,*b*, 2005, 2007) for this style of defection. Sosa (1993: 619–625), Yablo (1998), Chalmers (2008), and Thomasson (2008) also endorse versions of the defectiveness thesis, although it is less clear how well their reasons for defecting fit the 'different-ways-of-talking' mold described in the

Call the claim that (at least a significant number of) ontological debates are misguided for something like this reason the *defectiveness thesis*. And call proponents of this thesis *defectors*. In this chapter, I look at one way to resist defection. In section 2.1, I argue that we can resist one argument for defection by adopting a particular, *structuralist* conception of metaphysics. In section 2.2, we see how a defector can press his case from within the structuralist conception. Then in sections 2.3 and 2.4 I argue that, given a certain picture of the interrelation between logic and metaphysics which I call *:ogical realism*, structuralists can resist this in-house defection. Of course, the debates might still be defective, if the structuralist and logical realist theses on which the proposed resistance relies turn out to be false. But both theses are plausible and have yet to be refuted, and so we can conclude that ontological debaters have principled reasons to think their debates are metaphysically deep after all.

2.1 Two Conceptions of Metaphysics

2.1.1 The Ordinarian Conception and Defectiveness

One reason to defect comes from a particular, *ordinarian* view of metaphysics.

In their workaday, pre-reflective lives, people say all sorts of things. According to the ordinarian, metaphysical inquiry asks merely which of these pre-reflective utterances of people on the street are true. Once we have answered that question, metaphysics is done.

If metaphysics is only about discovering the truth-values of ordinary utterances, then ontology must be only about discovering the truth-values of ordinary utterances of the form 'There are Fs'. And this, thinks the ordinarian

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text.

defector, can be settled by sociology and linguistics, without appealing to any of the *recherché*, a priori considerations ontologists often invoke.

Consider, for instance, the debate about what kinds of composite objects there are. Some ontologists — *compositional nihilists* — say that there are none.[2] Others — *organicists* — say that the only composite objects are living things.[3] Still others, *universalists*, say that for any things whatsoever, no matter how scattered or gerrymandered they may be, there is a composite object made up of just those things.[4] And so on.

The ordinarian can't understand this dispute. Suppose we discover (as seems likely) that, whenever we are around particles arranged in a certain, fairly well-defined way, we are inclined to say 'There is a table here,' and whenever we aren't around particles arranged in that way, we say 'There is no table here'. Then the ordinarian will think that, on any reasonable story of how sentences get their truth-conditions, the sentence 'There is a table here' will be true if and only if some particles present are arranged in that particular way. Since *all* parties in the composition debate agree that particles are sometimes arranged in this way — since all parties agree that there are sometimes particles 'arranged tablewise', as it were[5] — the ordinarian thinks they all ought to agree, on boring socio-linguistic grounds, that sometimes 'There is a table here' is true. As a result, the ordinarian doesn't understand what the nihilist and the universalist could be disagreeing about when one says 'There are no tables' and the other says 'Yes, there are.' And the ordinarian can't understand why the debates proceed in the way they do: why does the

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[2]Cf. Rosen and Dorr (2002).

[3]E.g., Peter van Inwagen (1990). Trenton Merricks (2001) defends a similar, *causalist* view, sometimes confused with organicism, according to which the only composite objects are ones that have causal powers that go beyond the causal powers of their parts acting in concert.

[4]See, e.g., Sider (2007*b*) and Van Cleve (2007).

[5]See van Inwagen (1990: 108–109) for a discussion of 'arranged tablewise' and similar locutions.

universalist appeal to the sorts of a priori arguments found in the literature to establish that there are tables when a simple socio-linguistic observation suffices?

2.1.2 The Structuralist Conception

These observations lead the ordinarian to conclude that the composition debate is bankrupt. But we can naturally — and more charitably — conclude that the debaters aren't engaged in the ordinarian project. They are interested in something *other* than the truth-value of 'There are tables' and the like as uttered by people on the street.[6]

If we do not think of metaphysics along ordinarian lines, how should we think of it? The *structuralist* conception is the most viable alternative. It holds that the goal of metaphysics is to *uncover the ultimate structure of reality*, and explain how that ultimate structure grounds all of the other facts.[7]

To get the feel for the structuralist conception, consider a familiar debate from the metaphysics of modality. David Lewis (1986*b*) famously tried to reduce modal talk — talk about what could and couldn't be the case — to talk about what is or isn't the case in various disconnected spacetimes. He is a *reductivist* about modality. Others, however, insist against Lewis that any reduction of the modal to the non-modal is a mistake (cf. Plantinga 1987, Stalnaker MS). They are *primitivists* about modality: modal notions should be taken as primitive and irreducible, not to be analyzed away by anything intrinsically non-modal.

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[6]Cf. van Inwagen (1990: 100–103); Dorr (2005: §7; 2007: 32–36).

[7]'Structuralism' in this sese should be distinguished from the mathematical structuralism of e.g. Shapiro (1997) and Resnik (1997). Structuralists about mathematics holds that uncovering mathematical structure is all there is to the mathematical project. Structuralists about metaphysics holds that uncovering metaphysical structure is *one important part* of the metaphysical project; but they may still think that there are interesting metaphysical projects beyond the investigation of structure.

The disagreement between Lewis and the primitivist does not seem to be about the truth-values of claims made by ordinary folk in ordinary circumstances. Both agree, for instance, that ordinary utterances of 'There could have been talking donkeys' are true and ordinary utterances of 'There could have been round squares' are false. Rather than disagreeing about the truth-values of these utterances, they disagree about *how* these ordinary truths get made true. They disagree about the ultimate analyses of these claims. Lewis thinks the ultimate story about why ordinary modal truths are true rests on what's going on in disconnected spacetimes. The primitivist thinks instead that the ultimate story about ordinary modal truths involves an irreducible appeal to what is and isn't possible.

Their disagreement, in fact, sounds like a disagreement about reality's ultimate structure. The primitivist thinks that facts about what could or couldn't be the case are written in to the very fabric of the universe, as it were: modality is part of reality's ultimate structure. If we are to 'carve nature at its joints', in Plato's (*Phaedrus*, 265d–266a) phrase, we need to make one cut along a primitively modal joint. Lewis, on the other hand, disagrees: ultimately, all facts about what could or couldn't have been are built up out of more basic, non-modal facts. Lewis thinks reality has no primitively modal joint to it.

The disagreement between Lewis and the primitivist appears incompatible with the ordinarian conception of metaphysics. But an ordinarian might try to undermine this appearance: even if both parties agree on the truth-values of ordinary *modal* claims, he says, perhaps they disagree about the truth-values of some other claims ordinary people might make.

An ordinarian's best chance is to locate this disagreement in what the two parties say about disconnected spacetimes. After all, Lewis says,

(1) There are disconnected spacetimes,

and his foes disagree. Can't *this* be the ordinary claim the parties were arguing about all along?

Although most primitivits *do* deny (1), few think that it captures the heart of their disagreement with Lewis. They will say:

> Suppose that there *are* these disconnected spacetimes, filled the way Lewis says they are with talking donkeys and the like. Suppose even that, for every way our spacetime could have been, there is a disconnected spacetime that is that way. Even if all this were true, we could not *analyze* possibility as truth in a disconnected spacetime. Maybe there is indeed a disconnected spacetime in which there are talking donkeys; nonetheless, that's not *why* there could have been talking donkeys. That there could have been talking donkeys is itself a brute fact, not to be further explained or analyzed.[8]

We understand what the primitivist is complaining about, whether we agree with him or not. But there is nothing in the ordinarian conception of metaphysics that underwrites our understanding. Lewis and the realist disagree about claims involving technical philosophical vocabulary, such as 'analysis' and 'brute fact'. And these technical expressions are just those which tell us about reality's ultimate structure: the 'brute facts' are facts about reality's ultimate structural features, and the 'analyses' are the explanations of how more basic structural features account for less basic ones. The debate is, at heart, about the structure of reality — not about the truth-values of ordinary utterances.[9]

According to structuralists, this modal debate is paradigmatic of metaphysical dispute in general. Metaphysical debates are about, or are predicated

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[8]See, e.g., Plantinga (1979: 114–120, 1987: 209–213), Salmon (1988: 239–240), and cf. Divers and Melia (2002, 2006). Cf. also Kripke (1972: 45 fn. 13), where the objection isn't that there are no suitable objects to be Humphrey's counterpart but rather that Humphrey just doesn't care whether some similar person in a disconnected spacetime won an election or not.

[9]A canny ordinarian might insist that 'The sentence "there could have been talking donkeys" is true because "there are talking donkeys in a disconnected spacetime"' is itself an ordinary utterance. In one sense, I am inclined to agree — but it is a sense that undermines ordinarian defection. See note 15 below.

on debates about, which of reality's features are the ultimate structural ones. When one metaphysician analyzes an expression *A* in terms of expressions *B*, *C*, ..., she says that the *B*, *C*, ... features are more structurally basic than *A*. In other words, she says that *B*, *C*, ... carve reality closer to its joints than *A* does. These are *metaphysical* analyses, rather than *conceptual* ones: they plumb not the structure of our conceptual scheme, but rather the structure of reality itself.[10] And a metaphysician's *primitive* expressions — the expressions she refuses to analyze — are supposed to correspond to the ultimate structural joints in nature.

Structuralists see metaphysicians as offering us what we might call *fundamental theories*: theories which aim not only to be true, but to be *metaphysically perspicuous*,[11] mirroring the structure of reality in the theory and thereby showing us where the joints in nature are. And they do this by using primitive, undefined expressions that correspond to these joints, these ultimate structural features. The primitivist who refuses to analyze the modal operators thereby tells us that reality has a fundamentally modal joint in it; the reductivist, who eschews 'primitive modality', tells us that it does not.

Metaphysical debates tend to be about fundamental theories. These debates can be about what expressions ought to show up in those theories (as is the debate between Lewis and the primitivist). But they could also be about which sentences ought to be in the fundamental theories. That is, both parties might agree that *these* are the expressions that correspond to fundamental structural features — that carve at the joints — but they might disagree about which sentences made with these expressions are true. (This is the sort of debate a modal primitivist who endorses S5 would have with, say, Nathan Salmon (1986) who holds that the correct modal logic must be weaker than

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[10]Dorr (2004: 155–158, 2005: 261–266); cf. also Fine (2001) and Sider (2008).

[11]Cf. Hawthorne and Cortens (1995: §5).

S4.) But critical to the structuralist conception is that metaphysical debates are, in general, somehow to be understood as debates about what the fundamental theory is like.

2.1.3 The Structuralist and Defectiveness

The structuralist conception of metaphysics is attractive. But how does it help us escape the ordinarian's argument for defection?

That argument, put more precisely, runs as follows:

(i) Unless the ontological question can be settled only by appeal to a priori, *recherché* metaphysical argument, the ontological debate is defective.

(ii) The ontological question is just whether ordinary uses of 'There is a chair here' are ever true.

(iii) Given the way we use our words, any decent theory of interpretation will make an ordinary use of 'There is a chair here' true in any situation where there are particles arranged chairwise.

(iv) Therefore, unless whether there are ever particles arranged chairwise can only be settled by a priori, *recherché* metaphysical arguments, the ontological debate is defective.

(v) That there are sometimes particles arranged chairwise can be settled without a priori, *recherché* metaphysical arguments.

(vi) Therefore, the ontological debate is defective.

Premise (i) all but follows from a definition of 'defectiveness'. Premise (ii) is fueled by ordinarianism. Premise (iii) is an interpretative hypothesis about which we will say more below. (iv) follows uncontroversially from (i)–(iii), and (vi) follows from (iv) and (v).

A committed ontologist might try to save the debate by denying (v). But, in fact, nobody wants to; and it is hard to see how such a denial could ever be plausible. So the ontologist ought to balk somewhere around premises (ii) and (iii).

Denying (iii)

Much of the literature on this argument has focused on premise (iii). And, in that literature, structuralism has had some small role to play in fueling (iii)'s denial.

Structuralists think that an existential quantifier can have a special sort of meaning: one that carves reality at its ontological joints. There might be a number of potential interpretations of 'there are' — all unified, perhaps, in that they all behave inferentially like existential quantifiers — but one of them is privileged: it corresponds to a joint in nature, a basic structural feature of reality.[12] It shows us which ontological facts are written into the fabric of reality the way that 'POSSIBLY', according to the modal primitivist, shows us which modal facts are written into the fabric of reality.

Theodore Sider (2001*a*,*b*: xvi–xxiv) argues against (iii) by appeal to a certain meta-semantical picture. That picture incorporates a Lewisian (1984, 1983*a*: 45–55) *eligibility* constraint on interpretation: expressions should be interpreted in a way that makes them, *ceteris paribus*, more fundamental. Sider argues that the joint-carving interpretation of 'there are' is very fundamental indeed — so fundamental that, despite how we might use it, the Lewisian eligibility constraint means that utterances of 'there are' in ordinary language have this fundamental interpretation.

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[12]Cf. Sider (2001*a*, 2008).

But, Sider's argument continues, we have no guarantee that this metaphysically privileged meaning for 'there is' is one that delivers a truth when combined with the semantic value of 'a chair here' in the presence of particles arranged chairwise. So if the eligibility constraint guarantees that ordinary tokens of 'there is' are given this metaphysically privileged interpretation, there will be no guarantee that ordinary uses of 'There is a chair here' will be true in the presence of particles arranged chairwise. But Lewis's interpretative theory, with its eligibility constraint, is a decent theory of interpretation. (Even stronger, according to the argument: it is *true*.) So (iii) is wrong.

Sider's denial of (iii) can be resisted. Eligibility may very well constrain interpretation, but these constraints will be balanced against other interpretative constraints, such as charity: interpretations should make people speak truths more often than not, and make their falsehoods reasonable and understandable.[13] We consistently and confidently assert 'There is a chair here' in the presence of particles arranged chairwise. This provides tremendous pressure from charity to make these utterances true. In order for an uncooperative joint-carving interpretation to make them false, the pressure from eligibility must be very strong indeed.[14] But if eligibility is this powerful, how do we ever manage to use expressions that *don't* have highly fundamental meanings? Why doesn't every use of a predicate latch on to a feature of fundamental physics or metaphysics, for instance, if every use of a quantifier has to latch on to the fundamental quantificational interpretation?

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[13]Better yet, interpretations — especially if they are interpretations of mental as well as linguistic content — should make people's behavior rational (Lewis 1974: 112–114) and tend to maximize what they know (Williamson 2004: 139–147).

[14]Hirsch (2005: 90–97, 2007: 377).

Denying (ii)

These considerations may lead some to shy away from Sider's rejection of (iii), but it is probably too early to issue a final verdict. Further reflections on meta-semantics may strengthen Sider's structuralist-style argument against (iii), or may reveal other, structuralist-independent problems with (iii).

But a structuralist need not await this verdict before deciding whether she must defect; she can resist defection even while the jury is out. For she has reason to rule that, if (iii) is true, (ii) isn't.

Suppose (iii) is right. The structuralist should then grant that ordinary utterances of 'There is a chair here' tend to be true in the presence of particles arranged chairwise. But she can resist the defectiveness thesis by denying (ii), saying that the disputes weren't about ordinary utterances in the first place. Rather, they were about the truth-values of sentences of the form ⌜There are Fs⌝ *when 'there are' has a fundamental interpretation*.[15]

An ordinarian will likely wonder: 'Given the (trivial) truth of "There is a chair here" in the presence of particles arranged chairwise, why think tokens of this sentence uttered by debating ontologists are any different?'

But there is good evidence for this interpretative asymmetry. For instance, as noted above, in ordinary contexts speakers are very confident when

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[15]She could also simply *concede* to the defector, grant that our ontological debates have thus far been defective, and then begin a *new* debate with her opponent about whether there schmare chairs, where 'there schmare' is stipulated to be a new existential quantifier with a fundamental interpretation (see Sider 2008: §11). The ordinarian's reply is effectively that, in this case, we just won't know what 'there schmare' *means* and so have no way to understand the new debate (see Hirsch 2007: 377–378, Korman 2007: §4). But the ordinarian can only say this if the 'technical' vocabulary of, e.g., 'true because of . . . ' doesn't count as ordinary (see note 9 above). Otherwise the structuralist can define 'there schmare Fs' as follows. First, introduce a 'bigger' quantifier, 'there are*', such that 'there are* Fs' is true if and only if, if T had been the case, there would have been Fs, where T is the 'biggest' theory in the debate (e.g., universalism in the composition debate). (Cf. Dorr 2005: §§3–4.) Then we can define 'there schmare Fs' as 'there are* Fs and this is not true because of anything other than that there are* Fs'. If the ordinarian thinks that 'true because of' is part of our native linguistic endowment, he will have no grounds for complaint.

they utter 'There is a chair here' in the presence of particles arranged chair-wise. If a friend joins us at our dinner table and we say 'There is an extra chair here; have a seat,' neither we nor our friend will waste time wondering whether there is in fact a chair in addition to the chairwise-arranged particles. If we have chair-like experiences, we take it for granted that the situation warrants assertion of 'There is a chair here.' This confidence comprises part of the pressure against Sider's eligibility-inspired denial of (iii).

On other hand debating ontologists are not similarly confident when they make similar sorts of claims. Even those who believe that careful consideration establishes that there are chairs and thus reject the nihilist and organicist positions are willing to seriously entertain 'There is not a chair here' in the presence of particles arranged chairwise. The debaters are *cautious*: even those who think utterances of 'There is a chair here' are warranted think them warranted only thanks to the presence of particles arranged chairwise *plus* certain non-trivial metaphysical theses. In ordinary situations, people are disposed to retract their assertions of 'There is a chair here' only when they come to believe that the situation is not one in which there are particles arranged chairwise. In philosophical situations, however, ontological debaters are disposed to retract their assertions also if they come to believe certain high-level, theoretical claims.

So ordinary speakers and ontologists have different linguistic dispositions with respect to 'there is'. This fact suggests they use it with different linguistic intentions. The ordinary speaker intends to use 'There is a chair here' so that it takes nothing more than the presence of particles arranged chairwise for it to be true. But the ontologist uses it in a cautious way, suggesting that she thinks there is more to its truth than the mere presence of these particles. If she is thinking of her 'there are' as the joint-carving corollary of the ordinary expression, latching on to the fundamental ontological

structure of reality, there is good reason for her to be cautious: there is no guarantee that the *fundamental* quantifier, when attached to 'is a chair here', will produce a truth. It will take argument — investigation into the fundamental structure of reality — to discover the contours of this joint-carving quantifier, and only the results of this investigation will determine whether or not that fundamental-quantifier claim is true.

Further evidence for the structuralist's interpretation of the debates comes from the sorts of considerations philosophers invoke in ontological arguments. For instance, a number of philosophers insist that the world's ontology is not arbitrary (e.g. van Inwagen 1990: 66–69; Merricks 2001: 41–42; Van Cleve 2007: 333) or anthropocentric (e.g., van Inwagen 1990: 124–127; Sider 2001*b*: 156–157; Hawthorne 2007: 270-271). There is no good reason to think that our ordinary use of 'there is' isn't arbitrary or anthropocentric; on the other hand, there is very good reason to think that reality's fundamental structure isn't. So these philosophers' insistences make the most sense if we understand the 'ontology' in question as what is given by the *fundamental* existential quantifier — as what is to be found in the ultimate ontological structure of reality.

These considerations suggest that all along the ontological question has been about paradigmatically *philosophical* utterances of 'There is a chair' and the like — utterances in which 'There is' is to be interpreted as a fundamental quantifier. So if (iii) is right and the truth-values of ordinary sentences using 'there is' are unaffected by the contours of the fundamental quantifier, then the debates never were about these ordinary sentences. If the structuralist accepts (iii), she thus ought to reject (ii). Structuralists can, and should, resist the charge of defectiveness led by the ordinarian camp.[16]

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[16]Cf. van Inwagen (1990: 101) and Dorr (2007: 32–36). Hofweber (2005) also argues that the best interpretation of ontology is not ordinarian, although his arguments do not commit him

2.2 Defectiveness for Structuralists

But perhaps a defecting charge can be mounted from within the structuralist camp itself. The basic idea behind defecting, recall, is that there are many equally good ways to 'divide reality' into objects. Each of these ways corresponds to a different interpretation of the existential quantifier — if we want to divide reality into chair-sized bits, we use an existential quantifier 'There is$_1$' that attaches to 'a chair here' to yield truths in the presence of particles arranged chairwise. If we don't want to divide objects into chair-sized bits, we use an existential quantifier 'There is$_2$' that always yields falsehoods when attached to 'a chair here'.

The structuralist responded to the ordinarian defector by saying that one of the possible existential quantifiers we could use is metaphysically special, corresponding to an ontological structural feature of reality. But what if *both* of these quantifiers were equally metaphysically special? Then the defector can grant that ontology asks after the truth of 'There is a chair here' when 'There is' has a fundamental interpretation, but insist that the debate is still defective: there are multiple fundamental interpretations for 'There is' that yield different answers to this question, and therefore no way to distinguish either party of the debate as being uniquely right.[17]

2.2.1 Notational Variants

To see what the structuralist defector is getting at, consider again the primitivist about modality from section 2.1.2. He takes the fundamental theory to use primitive modal operators. Since, as is well-known, the standard modal operators 'POSSIBLY' and 'NECESSARILY' are, with the help of a negation,

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to the structuralist interpretation.

[17]Compare Sider's (2007*a*: 208–209) interpretation of Hirsch's brand of defection.

interdefineable, this philosopher need not insist that the fundamental theory takes *both* of these as primitive. He might think instead that there are two theories which are equally good candidates for the fundamental theory and better than any other candidate. One has an undefined 'POSSIBLY' operator, and the other has an undefined 'NECESSARILY' operator. Each theory, this philosopher thinks, is every bit as metaphysically perspicuous as the other. They just each represent reality's single modal joint in a slightly different way. One gets at this joint via possibility, and the other via necessity. But such a philosopher is still a primitivist about *modality*: he thinks that any fundamental theory has a primitive modal operator, even though he grants that they may differ about which one it is.

We might describe this philosopher as thinking that there are two fundamental theories that are *notational variants* of each other. One uses a primitive possibility operator and defines a necessity operator in terms of it; the other uses a primitive necessity operator and defines a possibility operator in terms of it. But neither is any less fundamental than the other, and both are more fundamental than any third theory.

Two theories are notational variants of each other, in this sense, exactly when (a) they are equally expressive and (b) they are equally fundamental. If one theory can say more than another, their differences cannot be mere differences in notation. But furthermore, the two theories had better be equally fundamental. Our color theory is not a notational variant of the one that uses the Goodmanian predicates 'grue' and 'bleen'. The two theories may be expressively equivalent, but one of them, by dint of its gruesome predicates, does a poorer job of showing us where nature's joints are than the other does.

2.2.2 Metaphysical Analysis and Expressive Equivalence

What do we mean here by 'expressive equivalence'? On the one hand, the equivalence in question ought to be more than mere *intensional* equivalence. That is, there should be room for the structuralist to think that not every necessary truth is expressively equivalent to every other. On one intuitively reasonable understanding of 'expressive equivalence', for instance,

(2) $7 - 3 = 4$

is not equivalent to

(3) $\sqrt{4} = 2$.

But if 'expressive equivalence' means intensional equivalence, these sentences, being necessary truths, will be equivalent.

The required understanding of 'expressive equivalence' needs to be finer-grained than mere intensional expressive equivalence — it needs to be some sort of *hyperintensional* equivalence.[18] But we must be careful about what we mean by 'hyperintensional' here. Sometimes, 'hyperintensional' is just used to mean 'more fine-grained than intensional.' But sometimes it is used more precisely, where sentences ϕ and ψ are said to be hyperintensionally equivalent if and only if they have the same syntactic (or perhaps deep logical) structure, and the corresponding nodes of these structures each have the same interpretation.[19]

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[18]A metaphysician might want it to be a *consequence* of his theory that sentences are equivalent, in the relevant sense, exactly when they are intensionally equivalent. But if it is to be a consequence of his theory rather than a terminological stipulation, he will need to at least recognize the epistemic possibility of finer-grained equivalences. It is in this sense that we say the relevant sense expressive equivalence is hyperintensional: we do not rule out, at the beginning, that intensionally equivalent sentences might be inequivalent in the relevant sense.

[19]Cf. Carnap (1956: 56–59).

This reading of 'hyperintensional equivalence' will be too strong: $\ulcorner\sim$POS-SIBLY: $\sim\phi\urcorner$ and $\ulcorner$NECESSARILY: $\phi\urcorner$ have different syntactic structures and so cannot be hyperintensionally equivalent in this sense. But we want a notion of expressive equivalence that can countenance these two as equivalent but (2) and (3) as inequivalent; as such, we will need something of intermediate strength between these two.[20]

Structuralists can naturally take the kind of expressive power looked for here to be explicitly tied to reality's ultimate structure. To see how, consider two mathematical platonists. One has been convinced by Paul Benacerraf (1965) that the natural numbers are not identical to any particular sets and concludes, on that basis, that in addition to the sets, there are some particular non-sets, the *numbers*, in the platonic realm. Call him the *numericist*. Another, however, thinks he has independent grounds to reject Benacerraf's arguments and identify the natural numbers with the sets used in the von Neumann construction; call him the *Neumannian*.

Figure 2.1: The von Neumann Construction

number	set-theoretic definition
0	$\varnothing$
1	$\{\varnothing\}$
2	$\{\varnothing, \{\varnothing\}\}$
3	$\{\varnothing, \{\varnothing\}, \{\varnothing, \{\varnothing\}\}\}$
$\vdots$	$\vdots$
$n+1$	$n \cup \{n\}$

These two theorists disagree about the structure of reality. The Neumannian thinks that all of reality's abstract-structure is set-theoretic, whereas the numericist thinks there is extra, intrinsically numerical abstract structure.

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[20]See Hawthorne (2006*b*) for an in-depth discussion of intensional and hyperintensional equivalence and the role they play in defecting.

And these theorists will naturally take different attitudes towards the following sentences:

(4) $2 < 3$

(5) $\{\emptyset, \{\emptyset\}\} \subset \{\emptyset, \{\emptyset\}, \{\emptyset, \{\emptyset\}\}\}$

The Neumannian will think that (4) and (5) are expressively equivalent: since the numbers *just are* the von Neumann ordinals (and since the greater-than relation just is the inclusion relation), these are saying the same thing, albeit in different ways, about what reality is like. On the other hand, even though the numericist may very well think that both (4) and (5) are necessary truths, he also thinks that these are saying something very different about different parts of reality. (5) is saying something about the set-theoretic part of reality; (4) is saying something about its (distinct, by his lights) numerical part.

The easiest way to make sense of this structure-dependent conception of expressive power makes use of the notion of metaphysical analysis discussed above (section 2.1.2; see also Dorr 2005: §14 for further discussion of the relationship between metaphysical analysis and expressive equivalence). When we say that ϕ is a metaphysical analysis of ψ we say, in effect, something like ⌜It's being the case that ϕ *just is* it's being the case that ψ⌝.[21] When Lewis (1986*b*) analyzes ⌜POSSIBLY: ϕ⌝ as ⌜In some maximal disconnected space-time, it is true that ϕ⌝ he is not giving a *conceptual* analysis. He is not saying anything about the structure of our conceptual scheme. He is saying, rather, something about the structure of the world: that *what it is* for ϕ to be possible

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[21]Putting things this way makes the structuralist's ideology itself hyperintensional. (Fine 2001 presents an explicitly hyperintensional structuralist ideology.) Note, however, that we could eliminate the hyperintensionality by semantic ascent: to say that ϕ is a metaphysical analysis of ψ is (more or less) to say that ϕ and ψ, as interpreted, make the same claim, but ϕ makes it in a more metaphysically perspicuous way. (Sider 2008: §8 outlines a structuralist ideology more in keeping with this semantic ascent method.)

just is for ϕ to be true in some maximal disconnected spacetime. He is giving a metaphysical analysis.

The Neumannian thinks that '$\{\emptyset, \{\emptyset\}\}$' is a metaphysical analysis of '2', '$\{\emptyset, \{\emptyset\}, \{\emptyset, \{\emptyset\}\}\}$' is a metaphysical analysis of '3', and '$\subset$' is a metaphysical analysis of '$<$'. So by his lights, (5) is a metaphysical analysis of (4). He thus thinks that to say (4) just is to say what (5) says, albeit in a less metaphysically perspicuous way. And *that* is why he thinks the two claims are expressively equivalent.

On the other hand, the numericist denies that there are any metaphysical analyses that would let us transform (5) into (4) or *vice versa*. So, unlike the Neumannian, he thinks that neither of these 'say the same thing' — they each talk about a different portion of reality's ultimate structure. That is why he thinks they are not expressively equivalent.

We might call this notion of expressive equivalence *metaphysical equivalence*. If we help ourselves to the idea of a metaphysical analysis, we can define this notion as follows: ϕ and ψ are metaphysically equivalent if and only if one can be transformed into the other by exchange of metaphysical analysans and analysandum.[22]

2.2.3 Analyses and Primitiveness

In general, when we talk about 'primitive' expressions, we are talking about expressions that cannot be analyzed. Since they cannot be gotten rid of in favor of any metaphysical analysis, they carve reality at its joints, showing us its ultimate structure. So in general we identify primitiveness with fundamentality: the primitive expressions are all and only the fundamental ones.

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[22]See Dorr (2004: 157–158, 2005: §§14, 16). Dorr points out that a full account of this sort of equivalence will need to make special provisions for names and semantically defective predicates (e.g., 'phlogiston'), but we can ignore those details for our purposes here.

But the relationship between primitiveness and fundamentality may be slightly looser than this. Consider the following two claims:

(6) It's being the case that POSSIBLY: ϕ just is its being the case that $\sim$NEC-ES -SARILY: $\sim\phi$.

(7) It's being the case that NECESSARILY: ϕ just is its being the case that $\sim$POSSIBLY: $\sim\phi$.

Each of these claims sounds plausible. But if they are both accepted, then — given what we mean by 'metaphysical analysis' — 'POSSIBLY' and 'NECES-SARILY' will each admit of metaphysical analyses of each other. So if 'primitive' means 'admits of no metaphysical analysis', *neither* of these expressions will be primitive.

Nonetheless, someone who holds that 'POSSIBLY' and 'NECESSARILY' are inter-analyzable, but not metaphysically analyzable by any *other* expression, sounds like a realist about modality who simply thinks there's no good answer to the question: 'Which is more fundamental: necessity or possibility?' This theorist should respond: 'Each is completely fundamental — each is just a different expression of the same modal joint in nature.' So there is some pressure to say that at least some non-primitive expressions can still be fundamental. They just need to be expressions that can further analyze the expressions that analyze them.

Let's be more precise. Say that ϕ *properly* analyzes ψ iff ϕ is a metaphysical analysis of ψ but ψ is not a metaphysical analysis of ϕ. If ϕ and ψ analyze each other, then they are *improper* analyses of each other. Likewise, we can say that an expression is *properly* primitive if and only if it has no metaphysical analysis whatsoever (proper or improper), and say that it is *improperly* primitive if and only if its only analyses are improper analyses.

Now we can say that the fundamental expressions are those that are *improperly* primitive. (Note that every properly primitive expression is also improperly primitive, but not *vice versa*.) And we can give a precise definition of the notational variance discussed in section 2.2.1: theories T_1 and T_2 are notational variants in this sense if and only if every sentence in each theory not contained in the other is an improper metaphysical analysis of some sentence contained in the other.

2.2.4 Notational Defection

Not every structuralist is going to think about things in precisely the way outlined above. However, the structuralist who helps herself to these notions has a way to defect: she can insist that there are two fundamental theories, T_1 and T_2, which use different but inter-analyzable existential quantifiers, 'there is$_1$' and 'there is$_2$', and which are notational variants of each other. Furthermore (this structuralist defector says), when you attach 'there is$_1$' to 'a chair here' in the presence of particles arranged chairwise, you get a truth; and when you attach 'there is$_2$' to 'a chair here', you get a falsehood (whether there are particles arranged chairwise around or not). So even if we grant that arguing about 'what there is' assumes that 'there is' has a fundamental interpretation, since this interpretation could be either 'there is$_1$' or 'there is$_2$', and since these expressions differ in the way 'POSSIBLY' and 'NECESSARILY' do, debating about whether or not there are chairs is just like debating about whether it's necessary that P or instead just not possibly false that P — defective.

Of course, structuralists don't have to buy into all of the metaphysical-analysis machinery described above in order to defect in something like the proposed manner. But if they do, they need to contend at least that there are two equally fundamental interpretations 'there is' could get, and they do need to allow that, in the intuitive sense outlined above, neither of the theories

gotten by plugging in this interpretation for 'there is' is expressively impoverished compared to the other. Otherwise the foe of defection can simply insist that, equal fundamentality notwithstanding, one interpretation is to be rejected because it leaves some information out. So, at a minimum, the defector must say the following: there are (at least) two theories, with different existential quantifiers 'there is$_1$' and 'there is$_2$', that are equally fundamental (and no less fundamental than any other) and equally expressive (and no less expressive than any other). If structuralists want to resist defecting from within, that is the thesis they must combat.

2.3 Logical Realism to the Rescue

They may combat this sort of defection with a thesis I call *Logical Realism*, which insists that logic and metaphysics are tightly tied. Let me explain.

2.3.1 Structuralism and Logic

One of the pressing issues in the philosophy of logic is: just what *is* logic, anyway? What does it mean to call a certain expression a 'logical truth' or to say that one expression 'follows logically' from another? These concepts seem to have some pre-theoretical content, but it is an open question as to just what this content is.

Structuralism fits naturally with a certain answer to this open question: logic is the study of the interrelations of the most general structural features of reality, and concepts like 'logical truth' or 'logical consequence' are about these structural interrelations.

Think of it this way. In a fundamental language, each simple expression corresponds to a fundamental structural feature of reality. So when we string these expressions together to create sentences, we in essence try to stick bits

of these fundamental features together in certain ways. But it's natural to think that some of these very general structural features just don't fit together right: when you write down $\ulcorner \phi \,\&\, {\sim}\phi \urcorner$, for instance, you're trying to stick the features corresponding to '$\sim$' and '$\&$' together in a way they just won't go.

If this is how we're thinking about logic, we will gloss, say, logical falsehood as a property had by sentences that try to stick round structural pegs into square structural holes. They try to hook very general structural features together in a way that doesn't work. And, if this is right, then since logic and metaphysics are both about the fundamental structure of reality, logic and metaphysics are tightly tied together.

The structuralist, who thinks there is a fact of the matter as to what reality's ultimate structure is like, may very well think there is also a fact of the matter as to how bits of this structure can fit together.[23] But if there is a fact of the matter as to how these general features fit together, and logical falsehoods (at least in the fundamental language) just are the sentences that try to put these features together in a way they can't go, then there will be a fact of the matter as to which sentences (of that fundamental language) are the logical falsehoods. And, of course, if there is a fact of the matter as to which sentences are logical falsehoods, then there will be a fact of the matter as to which ones are logical truths and so on. Call this view *Logical Realism*.

Notice, in passing, that this conception of logical truth is not in any direct tension with various definitions of logical truth. It just denies that those definitions are *analyses* of logical truth. We have a pre-theoretical conception of what it is to be a logical truth, and the various definitions are to help us properly model how logical truth does its thing. So, insofar as we think that

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[23]Admittedly, structuralists don't *have* to think this: they may, for instance, have no problem about fundamentality talk but find modal talk troublesome. Then they may think there's a fact of the matter about what the structure of the world *is*, and how bits of that structure *are* attached to each other, but refuse to understand any talk about whether or not certain features *could* fit together in a certain way. Thanks to Ted Sider for pressing me on this.

thus-and-so a definition of logical truth is adequate (truth in all models, truth for all uniform substitutions of non-logical symbols, etc.), that means we think that the thus-and-so conception correctly tracks how the general structural features of reality can and can't fit together. Likewise, questions about what the 'correct logic' is like can be thought of as questions about the interrelations among reality's ultimate structural features.

2.3.2   Logical Realism and Notational Variance

Suppose Logical Realism, and suppose that theories T_1 and T_2 are notational variants in the sense of section 2.2.2. Then, for every sentence ϕ in L_1 (the language of T_1), there will be some sentence ψ in L_2 (the language of T_2) that has the same content as ϕ. And ϕ and ψ will count as metaphysical analyses of each other. But the idea behind a metaphysical analysis is that you are somehow expressing the *same* claim about reality's structure, although you're doing it in a different way. So if ϕ were a logical truth — if it said that reality's most general structural features are put together in a way they can't fail to be put together — then since ψ makes the same claim about the same features (albeit in a different way), ψ should be a logical truth also. And — since the analyses here runs in both directions — the converse should hold, too. So if T_1 and T_2 are notational variants, there should be a way of going back and forth between sentences of L_1 and L_2 that preserves logical truth.

Let a *translation scheme* be a function that takes us from sentences of each language to sentences of the other. A translation scheme *t preserves logical truth* if and only if t takes logical truths of either language to logical truths of the other language. The thesis of Logical Realism, then, places this constraint on notational variance:

(LR) If T_1 and T_2 are notational variants, then there is a translation scheme t

between their respective languages that preserves logical truth.

Notice that certain intuitive candidates for notational variance meet this criterion. For instance, the modal primitivist translated between her necessity-using language and her possibility-using language by replacing every instance of 'NECESSARILY' with '$\sim$POSSIBLY: $\sim$' and every instance of 'POSSIBLY' with '$\sim$NECESSARILY: $\sim$'. But the logic of these expressions, coupled with the logical equivalence of $\ulcorner\sim\sim\phi\urcorner$ and ϕ, guarantee that this translation always takes us from logical truths to logical truths.[24]

The question is whether the defector can find a translation scheme that meets this criterion. The defector thinks that there are two languages — L_U and L_N — with quantificational expressions '$\exists_U$' and '$\exists_N$' which can be analyzed in terms of each other. Furthermore, the interpretation of '$\exists_U$' in L_U is such as to make the universalist's theory U come out true, and the interpretation of '$\exists_N$' in L_N is such as to make the nihilist's theory N come out true. Both theories are equally fundamental, and so (says the defector), the debate between universalists and nihilists is defective. But if (LR) is right, then there must be a translation scheme between these two languages that preserves logical truth. And if a structuralist can argue there is no such translation scheme, she can resist the charge of defectiveness.

2.3.3   The Argument: A First Pass

Here is the basic idea. The compositional nihilist insists that, although there are particles arranged chairwise, there are no chairs. The universalist replies that there are chairs in addition to particles arranged chairwise. And the defector claims that the dispute is merely notational: there is a fundamental language in which

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[24]Notice that, so long as we're consistent about it, this will hold whether 'logical' truths are included to count the truths of modal logic or merely the truths of quantificational logic.

(8) There are particles arranged chairwise but no chairs,

is true, and another in which

(9) There are particles arranged chairwise and there are chairs,

is true. The only difference between the theories comes from a difference in the interpretation of their respective 'there are's: the nihilist's has a meaning that makes (8) come out true but (9) come out false, and the universalist's has a meaning that makes (9) true but (8) false.

More precisely, the defector insists that there are languages L_U and L_N that are alike except that they have different quantifiers, where in L_N

(10) There are$_N$ particles arranged chairwise but there are$_N$ no chairs,

is true, and in L_U

(11) There are$_U$ particles arranged chairwise and there are$_U$ chairs,

is true.[25] The debate is defective, according to the defector, because we could choose to use either language and no choice would be any better, metaphysically speaking, than the other.

Bur if (LR) is right, then in order for the defectiveness charge to stick, there must be a translation scheme between L_U and L_N that preserves logical truth. What might this scheme look like?

One thing that the defector knows — in fact, one of the things that makes him suspect the debate is defective in the first place — is that the two parties always agreee about where the particles are and how they are arranged. So the defector will want to translate the universalist's sentence

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[25]'There are$_N$' and 'there are$_U$' are irreducibly *plural* quantifiers (cf. Boolos 1984, 1985). But plural quantifiers in general are tightly connected to their singular duals, so when the defector re-interprets the parties' singular existential quantifiers, he re-interprets their plural ones in a way that preserves these tight ties. Where'er the singular quantifiers go, there the plural ones go, too.

(12) There are$_U$ particles arranged chairwise,

into the nihlist's

(13) There are$_N$ particles arranged chairwise.

Now consider the universalist's sentence

(14) There are$_U$ chairs.

According to the defector, this sentence is true. But since the nihilist must able to express anything the universalist can, there must be some sentence the nihilist can utter using 'there are$_N$', that is equivalent to this one. And the most likely candidate is

(15) There are$_N$ particles arranged chairwise.

But now consider the universalist's

(16) There is$_U$ a chair if and only if there are$_U$ particles arranged chairwise.

Again, the defector insists that (16) expresses a truth. So, given the way we translated the universalist's (12) and (14) into the nihilist's idiom, and assuming that we translate of truth-functional claims as the truth-function of the translation of their parts, (16) will go over into

(17) There are$_N$ particles arranged chairwise if and only if there are$_N$ particles arranged chairwise.

But (17) is, of course, a *logical* truth, and (16) is not. So the translation scheme between the two parties does not preserve logical truth. Given logical realism, then, the two theories are not notational variants of each other.

2.3.4 The Argument Generalized

The above argument relies on a particular translation scheme; defectors will no doubt object that it works only because I have chosen a fairly uncreative translation schemes, not because the universalist's and nihilist's theories aren't really notational variants of each other. So let's see if we can give a general argument that there is no logical-truth-preserving translation of the sort the defector needs.

The argument will run as follows: if L_U and L_N are notational variants of each other, then there is a translation scheme that satisfies certain constraints ((LR) included). But no translation scheme meets these conditions; therefore, U and N aren't notational variants of each other.

Of course, showing that U and N aren't notational variants does not undermine the defector's *general* claim, which says only that *quite a few* ontological debates are defective. But defectors often make this particular debate their paradigm of ontological defectiveness (see, e.g., Putnam 2004, 1987*a*; Hirsch 2002*a*,*b*); as such, if we can show that *it* isn't defective, we do quite a lot. Furthermore, a successful argument that the composition debate isn't defective can serve as a template for arguing that other ontological debates aren't defective, either. So it's worth seeing just what it will take to get such an argument off the ground.

Before we give the argument itself, we need to take care of some preliminary considerations. First, we need to specify just what the theories U and N *are.* It will then be helpful, in passing, to specify a few important sentences that we will use in the argument. And finally, we will specify just what conditions (other than (LR)) a translation scheme ought to meet if it is to plausibly underwrite defection.

The Theories Specified

Let's imagine that the dispute commences in a language with both singular and plural quantifiers, logical predicates of identity ('=') and the plural among ('≺': 'John ≺ the Beatles' means that John is among (or one of) the Beatles), and a single non-logical predicate 'P' that means *is a (proper) part of*. 'P' takes singular (i.e., not plural) terms as arguments, and plural quantification is indicated by dual variables ('*xx*', '*yy*', and so on).

The nihilist's theory is very simple: it consists of the single sentence

(N) $\forall x \sim \exists y(x\text{P}y)$.

The universalist's theory, on the other hand, comprises a number of claims. In order to state them, we'll use the following abbreviations:

(IP) *Improper part:* '*x*IP*y*' abbreviates '*x*P*y* ∨ *x* = *y*'.

(O) *Overlap:* '*x*O*y*' abbreviates '$\exists w(w\text{IP}x \ \& \ w\text{IP}x)$'

(F) *Fusion:* '*y*F*xx*' abbreviates '$\forall z(z \prec xx \supset z\text{IP}y) \ \& \ \forall z(z\text{IP}y \supset \exists w(w \prec xx \ \& \ w\text{O}z))$.

Note that these abbreviations are *not* expressions of the universalist's language, but rather expressions we use in our metalanguage to make the axioms a bit easier to read. The theory *U* should be thought of as the somewhat longer and more unwieldly sentences gotten by expanding the abbreviations here — sentences which have no non-logical predicates other than 'P'.[26]

With these abbreviations, the universalist's theory is:

(AS) *Asymmetry*: $\forall x \forall y(x\text{P}y \supset \sim y\text{P}x)$.

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[26]We could have instead introduced three more predicates and turned these abbreviation schemes into further axioms of *U*. But the technical arguments given below are somewhat simpler if both parties have only one predicate in their languages, so it is helpful to proceed this way.

(T) *Transitivity*: $\forall x \forall y \forall z ((x\mathrm{P}y \ \& \ y\mathrm{P}z) \supset x\mathrm{P}z)$.

(WS) *Weak Supplementation*: $\forall x \forall y (x\mathrm{P}y \supset \exists z(z\mathrm{P}y \ \& \sim\!z\mathrm{O}x))$.[27]

(UC) *Universal Composition*: $\forall xx \exists y (y\mathrm{F}xx)$.[28]

Our universalist also endorses one more thesis. It is not thrust upon him by his universalism, but we will assume that he believes it nonetheless. It is the *atomist* thesis, which denies that the world is everywhere divisible. It says that the world is instead ultimately built up out of *mereological atoms*, simple, partless things.

(A) $\forall x (\exists y(y\mathrm{P}x) \supset \exists y(y\mathrm{P}x \ \& \sim\!\exists z(z\mathrm{P}y)))$.

And it is important that we consider a universalist who endorses this thesis. The defector insists the universalist's theory is a notational variant of the nihilist's, in which case there is some way to translate every claim consistent with the universalist's theory into some claim consistent with the nihilist's. It is well known, though, that claims about 'atomless gunk' — objects with proper parts each of which has further proper parts — resist such a translation.[29] If the universalist's theory entails the negation of all claims that say the world is 'gunky', though, then the defector can translate these claims into ones inconsistent with nihilism, and defection will still have a chance of succeeding. As we want to undercut this sort of defection in what follows, we do best to stack the deck in its favor now and assume that the universalist endorses (A).

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[27]Incidentally, (AS), (T), and (WS) are consequences of (N), although only because (N) entails that their antecedents are always false.

[28]This axiomatization comes from Simons (1987: 37) but with 'F' modified as suggested in Hovda (forthcoming). See Casati and Varzi (1991: ch. 3), Simons (1987: chs. 1–2) for in-depth discussions of classical mereology and Hovda (forthcoming) for an important correction.

[29]Cf. Sider (1993, 2001*b*: 179–180).

The defector thinks that there is a fundamental language on which the nihilist's theory is true, and that there is another fundamental language on which the universalist's theory is true. And these fundamental languages differ, he says, only in their quantifiers: the nihilist-friendly one, L_N, uses a quantifier '$\exists_N$' and the universalist-friendly one, L_U, uses another, '$\exists_U$'.[30] And so the nihilist's theory N should be understood as consisting of the result of replacing each '$\exists$' (or '$\forall$') in (N) with '$\exists_N$' (or '$\forall_N$'), and the universalist's should be understood as consisting of the result of replacing each '$\exists$' (or '$\forall$') in the various axioms with '$\exists_U$' (or '$\forall_U$').

Interpreting the Logical Realism Constraint

The expression 'logical truth' carries with it a sort of ambiguity: it might specify a particular *semantic* property (the property we tend to associate with truth in all models, for instance), or it might instead specify a particular *syntactic* property (derivability from certain axioms, say). In first-order languages, completeness results guarantee that these two won't come apart, and the ambiguity is harmless.

But we have chosen to cast the debate in terms of a higher-order language — the language of plural quantification. And this language admits of no complete axiomatization, which means the two types of logical truth *do* come apart. So what shall we focus on?

The logical realist constraint is motivated by two thoughts: first, that the various simple expressions of a fundamental language correspond to reality's ultimate structural features; and second, that what we were getting at with 'logical truth' was something to do with how those structural features can and

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[30]More precisely, they each use two such quantifiers — a singular one and a plural one — but that can be left implicit in what follows. And of course they also have the dual universal quantifiers, which we can assume are defined from the existential ones in the usual way.

can't fit together. This thought is a largely *semantic* thought: it is concerned more with how the meanings of simple expressions interrelate and less with whether a complete description of these interrelations is codable by a finite set of axioms. So we ought to interpret 'logical truth' semantically — as the property logicians often call 'validity' and the property captured (or so I will assume) by truth in all models of a language.

In this case, logical truths should be the *semantic* logical truths, or the *validities*. So we can capture the logical realist constraint as follows. Think of a translation scheme between languages L_1 and L_2 as a pair of functions $\langle f, g \rangle$ where $f : L_1 \to L_2$ and $g : L_2 \to L_1$. Then we understand t's *preserving logical truth* as

(i) $\models \phi$ iff $\models f(\phi)$, and

(ii) $\models \psi$ iff $\models g(\psi)$.

On this interpretation, (LR) says that, if N and U are notational variants, the translation scheme under which they are notational variants preserves logical truth in this sense.

Two Useful Kinds of Sentences

Before going on, it will be useful to introduce two kinds of sentences and some notation for them. The first kind are *counting sentences* — sentences that say that there are exactly n things, for some positive integer n. In this case, we will use the symbol '$\mathrm{E}n$' for the counting sentence that says there are exactly n things, e.g.:

(E1) $\exists x \forall y (x = y)$

(E2) $\exists x \exists y (x \neq y \ \& \ \forall z (x = y \lor x = z))$

(E3) $\exists x \exists y \exists z (x \neq y \;\&\; x \neq z \;\&\; y \neq x \;\&\; \forall w (w = x \lor w = y \lor w = z))$

and so on.

We can clean up the notation a bit with a few extra symbols. Let Φ^n be the formula open in n variables, $x_1, \ldots, x_n$:

$$x_1 \neq x_2 \;\&\; \ldots \;\&\; x_1 \neq x_n \;\&\; \ldots \;\&\; x_{n-1} \neq x_n$$

and let Ψ^n be the formula open in those same n variables plus another, y:

$$y = x_1 \lor \ldots \lor y = x_n.$$

The idea is that, for every $i, j \leq n$, if $i < j$, $\ulcorner x_i \neq x_j \urcorner$ is in Φ^n, and $\ulcorner y = x_i \urcorner$ is in Ψ^n for every $i \leq n$. Using these abbreviations, we can symbolize the counting sentence for any n as

(En) $\exists x_1 \ldots \exists x_n (\Phi^n \supset \forall y (\Psi^n))$.

We will also want some sentences that count how many mereological atoms there are. We can construct these sentences using just logical vocabulary and the parthood predicate, following the pattern above. Here, we use 'An' to stand for the atom-counting sentence that says that there are n atoms:

(A1) $\exists x (\sim \exists v (v \mathrm{P} x) \;\&\; \forall y (\sim \exists v (v \mathrm{P} y) \supset x = y))$

(A2) $\exists x \exists y (\sim \exists v (v \mathrm{P} x) \;\&\; \sim \exists v (v \mathrm{P} y) \;\&\; x \neq y \;\&\; \forall z (\sim \exists v (v \mathrm{P} z) \supset (x = y \lor x = z)))$

(A3) $\exists x \exists y \exists z (\sim \exists v (v \mathrm{P} x) \;\&\; \sim \exists v (v \mathrm{P} y) \;\&\; \sim \exists v (v \mathrm{P} z) \;\&\; x \neq y \;\&\; x \neq z \;\&\; y \neq x \;\&\; \forall w (\sim \exists v (v \mathrm{P} w) \supset (w = x \lor w = y \lor w = z)))$

and so on. And we can symbolize, in general, the counting sentence An as

(An) $\exists x_1 \ldots \exists x_n (\sim \exists z (z \mathrm{P} x_1) \;\&\; \ldots \;\&\; \sim \exists z (z \mathrm{P} x_n) \;\&\; \Phi^n \;\&\; \forall y (\sim \exists z (z \mathrm{P} y) \supset \Psi^n))$.

Of course, neither the E*n*s nor the A*n*s, as defined, are sentences of L_U or L_N, since they use the quantifier '∃' rather than '$∃_N$' or '$∃_U$'. But as above we can transform E*n* (or A*n*) into a sentence of L_U, E*n*$_U$ (A*n*$_U$), or a sentence of L_N, E*n*$_N$ (A*n*$_N$) by a uniform substitution of those languages' quantifiers for the 'neutral' one used here.

Further Constraints on the Translation Scheme

The notational defector insists that N and U are notational variants. Thus, there must be a translation scheme between L_N and L_U; and if we endorse (LR), we will insist that it preserve logical truth.

But not just any logical-truth-preserving translation scheme between L_U and L_N makes them notational variants. For instance, even though it (trivially) preserves logical truths, the identity translation scheme, which simply swaps '$∃_U$' for '$∃_N$', clearly won't do. The translation scheme is supposed to take us from claims the universalist thinks are true to ones the nihilist thinks are true, and vice versa; the universalist thinks that '$∃_U x ∃_U y (x P y)$' is true, but the nihilist thinks that '$∃_N x ∃_N y (x P y)$' is false.[31] The identity translation would thus translate things the universalist takes to be true into things the nihilist takes to be false, so it isn't the scheme we're looking for.

In fact, the universalist thinks that, whatever else may be the case, universalism is true. And the nihilist thinks that, whatever else may be the case, nihilism is true. So the natural way to guarantee that a translation scheme from L_U to L_N takes us from claims the universalist endorses to claims the nihilist endorses is by making it translate the universalist's theory into the nihilist's theory and vice versa. More precisely, let U be the conjunction of (AS), (T), (WS), (UC), and (A); and let N be (N). Then:

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[31]Assuming, of course, that the universalist doesn't think that there is exactly one object.

Theory-Preservation: If *U* and *N* are notational variants under a translation scheme $\langle f, g \rangle$, then $f(\mathrm{U}) \mathrel{\vDash\!\!\!\dashv} \mathrm{N}$ and $g(\mathrm{N}) \mathrel{\vDash\!\!\!\dashv} \mathrm{U}$.[32]

The second constraint has to do with what happens if we translate a sentence in one direction and then translate the result back in the other. When we translate a sentence, we shouldn't change its content. But if translating the sentence into the target language and then translating it back into its original language changes its logical properties, it looks as though something has gone awry along the way.[33] So we should expect the translation of a translation of a sentence to be logically equivalent to the sentence we started out with. In other words:

Recoverability: If *U* and *N* are notational variants under $\langle f, g \rangle$, then

(i) $\phi \mathrel{\vDash\!\!\!\dashv} g(f(\phi))$, and

(ii) $\psi \mathrel{\vDash\!\!\!\dashv} f(g(\psi))$.

There are two more constraints that we will assume for the argument. The constraints don't follow from the mere fact that the defector says *U* and *N* are notational variants, but they are justified by how the defector thinks about this alleged variance. The defector looks at the universalist and the nihilist and says,

> These fellows agree on a metaphysically and empirically important common denominator: *the mereological atoms*. They both agree about where those atoms are, how many of them there are, and so on. They simply disagree on whether or not an arbitrary selection of those atoms is to count as a 'further thing' or not. But this disagreement is notational: we could give '∃' an interpretation — a fundamental interpretation —

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[32]The symbol '$\mathrel{\vDash\!\!\!\dashv}$' stands for mutual entailment: $\phi \mathrel{\vDash\!\!\!\dashv} \psi$ iff $\phi \vDash \psi$ and $\psi \vDash \phi$. We will also call this 'logical equivalence', which seems apt given our semantic reading of 'logical truth'.

[33]We may be inclined to balk at this thought when it comes to names: perhaps 'a = a' expresses the same content as 'a = b' when 'a' and 'b' name the same thing, even though one is a logical truth and the other isn't. But since we are imagining a disagreement between two parties using a name-free language, we can ignore this wrinkle here.

that would make N true by refusing to count those atoms as a 'further thing'. Or we could give it a different fundamental interpretation that would make U true and thereby decide to count any arbitrary selection of atoms as a 'further thing'. It is *this* leeway — leeway in what fundamental interpretation we give to '∃' — that makes N and U notational variants of each other.

The defector's speech suggests two more constraints. One comes from the thought that both parties agree about the number and distribution of the mereological atoms. This thought suggests that when each party says 'There are n mereological atoms', they say the same thing: they're expressing the same proposition, and it's one about which they agree.

Since all we can do with atoms in the minimalist languages L_U and L_N is count them, we can cash out the defector's thought as:

Atomic Constancy: If U and N are notational variants under a translation scheme, then for any natural number n, $f(\mathrm{A}n_U) \mathrel{=\!\mid} \mathrm{A}n_N$ and $g(\mathrm{A}n_N) \mathrel{=\!\mid} \mathrm{A}n_U$.

The second constraint suggested by the defector's speech comes from what he identifies as the *source* of the defectiveness. He insists that the notational variance is thanks to our ability to provide the quantifiers with different interpretations. But it is no part of the bargain that he gets to re-interpret the truth-functional constants, too. In other words, he should grant that both parties mean the same thing by, say, '∼' and '&'. But in this case, we can assume

Conservatism: If U and N are notational variants under t, then

    (i) $t(\ulcorner\sim\phi\urcorner) \mathrel{=\!\mid} \ulcorner\sim t(\phi)\urcorner$, and

    (ii) $t(\ulcorner\phi \mathbin{\&} \psi\urcorner) \mathrel{=\!\mid} \ulcorner t(\phi) \mathbin{\&} t(\psi)\urcorner$.

Here's the idea. Suppose the universalist utters $\ulcorner\phi \mathbin{\&} \psi\urcorner$. Each of ϕ and ψ expresses a proposition — P and Q, say — in his mouth. And $\ulcorner\phi \mathbin{\&} \psi\urcorner$ will

express a proposition R that is the result of combining P and Q with the semantic value of '&'. But according to the defector, $f(\phi)$ and $f(\psi)$ express P and Q in the nihilist's mouth, too. Then, if '&' has the same semantic value in the nihilist's mouth as it does in the universalist's, $\ulcorner f(\phi) \mathbin{\&} f(\psi) \urcorner$ ought to express R also. But since the translation function f is supposed to preserve propositions expressed, $f(\ulcorner \phi \mathbin{\&} \psi \urcorner)$ ought to express R also — in which case the two ought to be logically equivalent. (Similar remarks apply for '$\sim$' and the function g, of course).

Note that, given the interdefineability of the various truth-functional constants, the preservation of '$\sim$' and '&' under translation will let us derive similar clauses for all the truth-functional constants. So Conservatism essentially allows us to move between the translation of a truth-functional sentence and the truth-function of the translations of its parts.

Three Facts About Logic

The argument relies on three meta-logical results, two of which need one more bit of notation. For any sentence ϕ, let $\phi^\dagger$ be the result of replacing each instance of $\ulcorner x P y \urcorner$ in ϕ with $\ulcorner x \neq x \urcorner$. The theorems we need are:

Theorem 1: For any ϕ of L_N, $\mathrm{N} \models \phi$ iff $\models \phi^\dagger$.

Theorem 2: For any n, $\mathrm{E}n_N \mathbin{\dashv\vdash} \mathrm{A}n_N^\dagger$.

Theorem 3: For any ϕ containing only logical vocabulary (that is, quantifiers, truth-functional connectives, singular and plural variables, and predicates '$\prec$' and '='), if ϕ is consistent, ϕ is true on some finite model.

To prove Theorem 1, note first that, for any model $M = \langle D, I \rangle$, $M \models \mathrm{N}$ iff $I(\mathrm{P}) = \varnothing$. This is obvious since N is equivalent to $\forall x \forall y \sim (xPy)$. So $\mathrm{N} \models \phi$ iff ϕ is true on all models where $I = \varnothing$. But on models where $I(\mathrm{P}) = \varnothing$, for

any variables x and y assignment g, $\langle g(x), g(y) \rangle \in I(\text{P})$ iff $g(x) \neq g(x)$. A suitable induction thus shows that ϕ is true on these models iff $\phi^\dagger$ is true on these models. So $\phi^\dagger$ is true on all models of N iff ϕ is true on all models of N. But $\phi^\dagger$ has no non-logical symbols, and N only places constraints on the interpretation of the non-logical symbols. So if $\phi^\dagger$ is true on all models of N iff it is true on all models whatsoever. QED.

To prove Theorem 2, recall our definition of an atomic counting-sentence above:

(An_N) $\exists_N x_1 \ldots \exists_N x_n (\sim\exists_N z(z\text{P}x_1) \,\&\, \ldots \,\&\, \sim\exists_N z(z\text{P}x_n) \,\&\, \Phi^n \,\&$

   $\forall_N y(\sim\exists_N z(z\text{P}y) \supset \Psi^n))$.

In this case, by substituting $\ulcorner z \neq z \urcorner$ for $\ulcorner z\text{P}y \urcorner$, we get the following for A$n_N^\dagger$:

(A$n_N^\dagger$) $\exists_N x_1 \ldots \exists_N x_n (\sim\exists_N z(z \neq z) \,\&\, \ldots \,\&\, \sim\exists_N z(z \neq z) \,\&\, \Phi^n \,\&$

   $\forall_N y(\sim\exists_N z(z \neq z) \supset \Psi^n))$.

But the sentence $\sim\exists_N z(z \neq z)$ is a logical truth; and if ϕ is a logical truth, $\phi \,\&\, \psi$ and $\phi \supset \chi$ are equivalent to ψ and χ, respectively. So we get that A$n_N^\dagger$ is equivalent to

(E$_n$) $\exists_N x_1 \ldots \exists_N x_N (\Phi^n \,\&\, \forall_N y(\Psi^n))$.

QED.

For Theorem 3, we note first that, in monadic second-order logic (i.e., second-order logic that only allows quantification into one-placed predicate positions), if ϕ contains only one-placed predicates (plus the identity predicate, '='), then if ϕ is true on any model it is true on some finite model (see Ackermann 1954: 24–33). But it is well-known that we can interpret monadic second-order logic as the logic of plural quantification (Boolos 1985); the result thus holds for plural quantificational logic as well. And if it holds for

sentences where the only non-logical predicates are one-placed, it holds likewise for sentences with only logical predicates.

We will also use one straightforward fact about †-sentences:

Straightforward Fact: If ϕ is a certain truth-functional compound (conjunction, negation, etc.) of ψ and χ, then $\phi^\dagger$ is the same sort of truth-functional compound (conjunction, negation, etc.) of $\psi^\dagger$ and $\chi^\dagger$.

This straightforward fact should be clear: $\phi^\dagger$ is just the result of uniformly replacing one sort of atomic (open) sentence with another. But nothing about how we do this depends on where the truth-functional connectives are, so it would make no difference whether we turned ϕ and ψ into a truth-functional compound first and then did the atomic-sentence replacing, or if we did the replacing first and then turned the result into the compound. Either way we get the same result.

The Argument

At last, the argument itself. Consider the sentence

(I) $\exists_U xx \forall_U y (y \prec xx \supset \exists_U z(z \prec xx \,\&\, zPy))$.

This sentence says that there are$_U$ some things each one of which is a proper part of one of the others. Since U makes proper parthood transitive and asymmetric, this sentence will be true on a model of U only if the model has an infinite domain. But it is a well-known feature of classical mereology that any model of it with n atoms has 2^n elements in it, so any model of U with a finite number of atoms in it also has a finite domain. Thus, any universalistic model of I must have an infinite number of atoms.

I is consistent with U, so the translation of I into L_N, $f(\text{I})$, must be consistent with N. And since I, combined with U, entails that there are infinitely

many atoms, $f(\text{I})$ will thus need to also entail, when combined with N, that there are infinitely many atoms.

But there is no sentence of L_N that can do this. In (first-order and) plural logics, in order to create a sentence true only on infinite domains, you must use at least one relational predicate. (Cf. Theorem 3 above.) L_N has exactly one relational predicate — 'P'. But N essentially throws this predicate away by forcing 'P' to be empty. So N thus deprives itself of the resources it would need to be able to say that there are infinitely many atoms. I therefore entails something that its translation, can't, and so no translation scheme can preserve logical truth between these two.

More precisely: let M be any model. Then if $M \models \text{U}$ and $M \models \text{I}$, M has an infinite number of atoms. Thus, for every natural number n, $\text{A}n_U$ will be false on M. But this holds for *every* model M, so we can argue, for every natural number n:

  (i) $\text{U \& I} \models \sim\text{A}n_U$

  (ii) $\models (\text{U \& I}) \supset \sim\text{A}n_U$ by model-theoretic truth-definitions

  (iii) $\models f((\text{U \& I}) \supset \sim\text{A}n_U)$ by (LR)

  (iv) $\models (f(\text{U}) \mathbin{\&} f(\text{I})) \supset \sim f(\text{A}n_U)$ by Conservatism

  (v) $\models (\text{N} \mathbin{\&} f(\text{I})) \supset \sim\text{A}n_N$ by Preservation and Constancy

  (vi) $\text{N} \models f(\text{I}) \supset \sim\text{A}n_N$ by model-theoretic truth-definitions

  (vii) $\models (f(\text{I}) \supset \sim\text{A}n_N)^\dagger$ by Theorem 1

  (viii) $\models f(\text{I})^\dagger \supset \sim\text{A}n_N^\dagger$ by the Straightforward Fact

  (ix) $f(I)^\dagger \models \sim\text{A}n_N^\dagger$ by model-theoretic truth-definitions

  (x) $f(I)^\dagger \models \sim\text{E}n_N$ by Theorem 2

So $f(\mathrm{I})^\dagger$ entails $\sim\mathrm{E}n_N$, for every n. Thus $f(\mathrm{I})^\dagger$ is either inconsistent or is true only on models with infinite domains. But $f(\mathrm{I})^\dagger$ has only logical predicates in it (because the language L_N has no non-logical predicates other than 'P', and we got rid of those with the †), so by Theorem 3, $f(\mathrm{I})^\dagger$ must be inconsistent. So we argue:

(i) $\models \sim f(\mathrm{I})^\dagger$

(ii) $\mathrm{N} \models \sim f(\mathrm{I})$ by Theorem 1

(iii) $\models \sim(\mathrm{N}\ \&\ f(\mathrm{I}))$ by model-theoretic truth-definitions

(iv) $\models g(\sim(\mathrm{N}\ \&\ f(\mathrm{I})))$ by (LR)

(v) $\models \sim(g(\mathrm{N})\ \&\ g(f(\mathrm{I})))$ by Conservatism

(vi) $\models \sim(\mathrm{U}\ \&\ \mathrm{I})$ by Preservation and Recoverability

(vi) says that U & I is inconsistent. But U & I *is* consistent — we have a contradiction. There is thus no translation that meets all the restrictions.

2.4 Further Moves for Defectors

If the argument of the previous section goes through, Logical Realism leaves no room for structuralists to defect about this debate. So structuralist defectors will want to find something wrong with the argument. How might they do this?

2.4.1 Reject a Constraint

The defector might simply reject the Logical Realist requirement. It is, I happily admit, an unargued-for dogma. I can see no compelling reason why a

structuralist *should* reject it, though, and so I can see nothing but dialectical stalemate if the defector goes down that path.

Could a defector plausibly reject some other constraints? A rejection of theory-preservation and atomic constancy risks undermining the intuitive appeal for defecting in the first place. The debates *do* seem a bit defective, and they seem defective because it feels like everyone agrees with what the 'ground level' looks like — everyone agrees about where the particles are and what they're doing. And everyone agrees that whatever is there (if there is anything at all there) supervenes on these particles. But they disagree about what these supervenience relations look like. The defector thinks neither side has a monopoly on the truth: both side's supervenience relations provide equally good ways of 'carving up' the superstructure that sits on the ground-level stuff.

The theories N and U just are the theoretical encodings of these alleged supervenience relations. If both theories are 'equally good ways' of carving something up, then the translation scheme should reflect that by translating them into each other. And if the parties all agree on the 'ground level' — the atoms — then this agreement ought to be encoded by translating counts of atomic sentences to counts of atomic sentences.

This isn't to say that a defector couldn't nonetheless insist that the debate is defective thanks to the presence of a logical-truth preserving scheme that *doesn't* honor Theory-Preservation or Atomic Constancy. But if he does, he can't give the usual intuitive explanation for the defectiveness of the debate, which makes it hard to see why we should believe him.

What else could go? Recoverability I regard as unimpeachable; but conservatism, perhaps, could be impeached. Sider (2007*a*: 217–218) has suggested that, in light of certain arguments (e.g., those of Matti Eklund (2007: 386–389), John Hawthorne (2006*b*: 58–61) and Timothy Williamson (1988)), defectors

ought to consider the predicates and names of the debating parties' languages utterly incommensurable. That is, for no predicates or names e in L_U and d in L_N should we be able to say, 'e has the same semantic value as d does.'

A defector might take this line to the extreme, insisting that the languages should be *utterly* incommensurable: none of the debating parties' expressions can be said to have the same semantic value. If that were the case, the argument I gave for recoverability above wouldn't go through: it relied on thinking that '&' had the same interpretation in both L_N and L_U. If no two expressions across these languages have the same interpretation, then '&' surely can't.

If a structuralist defector makes this defense, he puts himself in a much weaker position.[34] He wants to motivate the possibility of a *structuralist* defection with paradigms like the necessity/possibility duality discussed in section 2.3.2. The idea is that there is some single structural feature reality has — a modal feature in one case, and an ontological feature in the other — but we can get at it in different, equally metaphysically perspicuous ways. But when *every expression in the language* is up for grabs, it's hard to think that this is thanks to part of reality's fundamental structure being expressible in different ways. It sounds instead as though reality just *has* no fundamental structure. And structuralists shouldn't be faulted if they aren't impressed by this sort of defection.

2.4.2 Enrich the Languages

So rejecting the constraints doesn't look very promising. A second route of resistance complains that we defeated defection only by carefully picking the

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[34]An ordinarian defector, by contrast, might have good reason to adopt this approach.

terms of the debate. We characterized the universalist and the nihilist as debating in a language with only one non-logical predicate, 'P'. But *real* nihilists and universalists don't restrict themselves in these ways: they are more than happy to talk about particles being arranged chairwise and so on. So a defector may very well insist that if we considered the sorts of theories *real* nihlists and universalists are apt to use, we wouldn't be able to run the sort of argument we just ran.

As it stands, the argument above fails if L_U and L_N have more predicates than just the logical ones. In particular, if L_N has extra predicates, there is no guarantee that $f(\mathrm{I})^\dagger$ has only logical symbols and so Theorem 3 gives us no reason to think it can't entail $\sim\!\mathrm{E}n_N$ for every natural number n.

But enriching the language won't help the defector in the long run, and for two reasons. First, given a plausible extension of Atomic Constancy, the original argument can be re-created using the extended language. And second, the enriched languages allow us to cook up other sentences, such as the Geach-Kaplan sentence, that the defector will have a hard time translating; structuralists can use these sentences to further argue that the debates aren't defective.

Let's look at each of these problems in detail. But first, let's see just how we should think about the enriched languages — and how we should think about Atomic Constancy once the languages are thus enriched.

How to Enrich the Languages and Extend Constancy

We extend the languages by giveing them more predicates. These predicates come in two flavors: those which, like 'are arranged chairwise', can apply to atoms, and those which, like 'is a chair', apply only to composites. So we can put each of the additional predicates into one of two sets: ATOMIC, which contains predicates of the first sort, and COMPOSITE, which contain predicates

of the second. Call the languages thus extended L_N^* and L_U^*.

The Universalist and Nihilist each have something to say about these new predicates. In particular, they want to say that those in Composite can only be satisfied by composite objects. (More precisely, they want to say that those in Composite can be satisfied by a variable assignment only if some of the things assigned to the variables are composite.) They can thus add to their theories, for each predicate $\Pi \in$ Composite, the axiom

(CE) *Composite Exclusion:* $\forall x_1 \ldots \forall x_n \forall yy_1 \ldots \forall yy_m(\Pi x_1, \ldots, x_n, yy_1, \ldots, yy_m \supset$
$(\exists z(zPx_1) \vee \ldots \vee \exists z(zPx_n) \vee \exists z \exists w(w \prec yy_1 \ \& \ zPw) \vee \ldots \vee \exists z \exists w(w \prec$
$yy_m \ \& \ zPw))$[35]

The Universalist and Nihilist will also want to say *other* things about the predicates, too — the Universalist, for instance, will want an axiom that ensures that if some things are arranged tablewise, they compose a table. So let U^* and N^* be the Universalist and Nihilist theories thus enriched with all the instances of (CE) and whatever other trappings the Universalist or Nihilist feel they need.

The Universalist and Nihilist agree, presumably, about what the atoms are doing. This suggests that if one party endorses a sentence only about atoms, we should translate it into the other party's corresponding sentence only about atoms.

But what does it take for a sentence to be 'only about atoms'? We might think, at first glance, that a sentence needs to merely use only predicates in Atomic to be only about atoms. But this is not quite right; a predicate gets to be in Atomic so long as it *can* be satisfied by atoms. But it might be

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[35]For convenience, we adopt the convention that predicates with both singular and plural argument places put all the singular places first and the plural ones after. And of course, as before, we must add the right sort of subscript to the quantifiers before we can include these axioms in the respective theories.

satisfiable by composites, too. For instance, Atomic might contain a predicate like 'are next to each other'. But not everything a Universalist will say with this predicate should be translated into the corresponding Nihilist claim; if a Universalist thinks that 'There are$_U$ things next to each other' is true only because two houses are next to each other, we ought not translate his claim into L_N^* as 'There are$_N$ things next to each other.'

If we restrict our attention to sentences talking about *atoms* satisfying Atomic predicates, though, we do better. That is, call a sentence *only about atoms* iff (a) all of its quantifiers are explicitly restricted to atoms, and (b) the only predicates it uses are those in Atomic (except for the 'P' it uses when doing the restricting).

More precisely, say that a sentence is *atom-friendly* iff the only non-logical predicates it uses are those in Atomic. Then a sentence is *only about atoms* iff it (or a sentence logically equivalent to it) can be gotten from an atom-friendly sentence by making the following substitutions (with the proper subscripts added to the quantifiers):

(Sub) $\ulcorner \forall x \ldots \urcorner \rightarrow \ulcorner \forall x (\sim \exists y (y P x) \supset \ldots) \urcorner$

$\quad\quad \ulcorner \forall xx \ldots \urcorner \rightarrow \ulcorner \forall xx \forall z ((z \prec xx \supset \sim \exists y (y P z)) \supset \ldots) \urcorner$

$\quad\quad \ulcorner \exists x \ldots \urcorner \rightarrow \ulcorner \exists x (\sim \exists y (y P x) \ \& \ \ldots) \urcorner$

$\quad\quad \ulcorner \exists xx \ldots \urcorner \rightarrow \ulcorner \exists xx (\forall z ((z \prec xx \supset \sim \exists y (y P z)) \supset \ldots) \urcorner$

Now we can extend atomic constancy as follows:

Extended Atomic Constancy: If U^* and N^* are notational variants under a translation scheme $\langle f, g \rangle$, then where ϕ_U and ϕ_N are sentences only about atoms that differ only in that the quantifiers all have U subscripts in ϕ_U and N subscripts in ϕ_N, $f(\phi_U) \mathrel{\vDash\mkern-2mu\dashv} \phi_N$ and $g(\phi_N) \mathrel{\vDash\mkern-2mu\dashv} \phi_U$.

Note that this extension entails the weaker Atomic Constancy from above: a counting sentence En is atom-friendly, and the corresponding atomic counting

sentence A*n* is (equivalent to) the sentence gotten from E*n* by making the substitutions in (Sub).

Problem 1: The Original Argument can be Resurrected

Here's the basic idea behind the first problem: just as Universalism and Nihilism don't say how many atoms there are, they don't say how those atoms are arranged, either. And it is no part of these theories *per se* that *any* of the predicates in Atomic are satisfied by anything. The theories are about the conditions under which objects compose further things, and perhaps about the kinds of further things composed when those objects are certain ways. But the theories don't themselves say *that* objects are ever arranged these ways.

In this case, each theory should be consistent with a sentence that says, in effect, that none of the atoms satisfy any of the Atomic predicates. And by Extended Atomic Preservation, the translation scheme will take sentences of this sort into each other. But these sentences essentially make the additions to the language *irrelevant*. So by conjoining the sentence I from above with one of these sentences, we ensure that whatever work it does — such as entailing that there are infinitely many things — is done thanks to what the theory says about 'P'. Since U (and thus U^*) can use 'P' alone to say there are infinitely many things and N (and N^*) can't, the problem remains.

To make the argument precisely, we need a few new definitions and observations.

First, for any sentence ϕ, let $\phi^{\ddagger}$ be the result of replacing every non-logical atomic predication with $\ulcorner x \neq x \urcorner$ (where x is the first variable ocurring in the predicate) or $\ulcorner \exists z(z \prec xx \,\&\, z \neq z) \urcorner$ if the predicate takes only plural arguments.

Second, we let Ω_U (Ω_N) be a sentence only about atoms that says that the predicates in Atomic are not satisfied by any atoms. More precisely, for

every predicate $\Pi \in$ Atomic with n singular places and m plural places, let Ω^Π be the sentence

$$(\Omega^\Pi) \quad \sim(\exists_U x_1 \ldots \exists_U x_n \exists_U yy_1 \ldots \exists_U yy_m(\Pi x_1, \ldots, x_n, yy_1, \ldots, yy_m)),$$

a sentence which essentially ensures that Π has an empty extension. Let $\Omega^{\Pi+}$ be the sentence that results by restricting the quantifiers in Ω^Π to atoms in the way described above, and let Ω_U be the conjunction of each of the $\Omega^{\Pi+}$s.[36] Finally, let Ω_N be the result of replacing each U subscript in Ω_U with N. It should be clear that Ω_U and Ω_N are only about atoms, and that they entail that none of the Atomic predicates are satisfied by atoms.

Here are a few meta-logical facts:

Theorem 1*: $N^* \cap \{\Omega_N\} \models \phi$ iff $\models \phi^\ddagger$.

Theorem 2*: For any n, $En_N \dashv\vdash An_N^\ddagger$.

Straightforward Fact*: If ϕ is a certain truth-functional compound (conjunction, negation, etc.) of ψ and χ, then $\phi^\ddagger$ is the same sort of truth-functional compound (conjunction, negation, etc.) of $\psi^\ddagger$ and $\chi^\ddagger$.

The proof of Theorem 2* and the Straightforward Fact* are identical to the proofs of Theorem 2 and the Straightforward Fact. The proof of Theorem 1* is the same in essentials, but the details are slightly different. We start by noting that all of the extensions of non-logical predicates in any model of N^* and Ω_N are empty. ($N^* \models N$, and N ensures that the extension of 'P' is empty, and this plus (CE) ensures that each predicate in Composite are empty.) Since Ω_N is true on the model, predicates of Atomic are satisfied only if some of them are in the extension of 'P'; but since 'P' is empty, this means that all of the

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[36]I assume there are only a finite number of predicates in Atomic. I do not, however, assume that U^* or N^* are finitely stateable. Perhaps if there are an infinite number of predicates in Atomic, some generalization of (LR) along the lines of Consequence Preservation below can be used to resurrect the argument — but matters are tricky here.

predicates in ATOMIC are empty, too. From this it follows that $N^* \, \& \, \Omega_N \models \phi$ iff $N^* \, \& \, \Omega_N \models \phi^{\ddagger}$. But, since $\phi^{\dagger}$ contains only logical expressions, it can only put cardinality constraints on models. And since $N^* \, \& \, \Omega_N$ place no cardinality constrains on models, it follows that $N^* \, \& \, \Omega_N \models \phi^{\ddagger}$ iff $\models \phi^{\ddagger}$.

We need to make one more adjustment before going on: there is no guarantee that the theories U^* and N^* will be able to say with a finite number of sentences everything they want to say using their new predicates. So there is no guarantee that there will be any sentences equivalent to either of these theories.

In this context, it makes no sense to think of Theory Preservation as a constraint that says that a sentence equivalent to U^* will be translated as a sentence equivalent to N^* — for there may be no such sentences. However, it *does* make sense to think that the core idea behind Theory Preservation, combined with the idea behind the Logical Realism constraint, will generate the following constraint on notational variance:

Consequence Preservation: If U^* and N^* are notational variants under $\langle f, g \rangle$,

Then $U^* \models \phi$ iff $N^* \models f(\phi)$ and $N^* \models \phi$ iff $U^* \models g(\phi)$.

In the argument below, 'Preservation' should be understood as 'Consequence Preservation'.

For the argument, we consider the conjunction of I and Ω_U, which is consistent with U^* and, when combined with that theory, and entails the negation of $\mathrm{A}n_U$ for every n. The argument then runs:

(i) $U^* \cap \{\Omega_U \, \& \, \mathrm{I}\} \models \sim\!\mathrm{A}n_U$

(ii) $U^* \models (\Omega_U \, \& \, \mathrm{I}) \supset \sim\!\mathrm{A}n_U$ by model theoretic truth-definitions

(iii) $N^* \models f((\Omega_U \, \& \, \mathrm{I}) \supset \sim\!\mathrm{A}n_U)$ by Preservation

(iv) $N^* \models (f(\Omega_U) \, \& \, f(\mathrm{I})) \supset \sim\!f(\mathrm{A}n_U)$ by Conservatism

(v) $N^* \models (\Omega_N \ \& \ f(\mathrm{I})) \supset {\sim}\mathrm{A}n_N$ by Extended Constancy

(vi) $N^* \cap \{\Omega_N\} \models f(\mathrm{I}) \supset {\sim}\mathrm{A}n_N$ by model-theoretic truth-def's

(vii) $\models (f(\mathrm{I}) \supset {\sim}\mathrm{A}n_N)^{\ddagger}$ by Theorem 1*

(viii) $\models f(\mathrm{I})^{\ddagger} \supset {\sim}\mathrm{A}n_N^{\ddagger}$ by the Straightforward Fact*

(ix) $\models f(\mathrm{I})^{\ddagger} \supset {\sim}\mathrm{E}n_N$ by Theorem 2*

So, as before, $f(\mathrm{I})^{\ddagger}$ entails ${\sim}\mathrm{E}n_n$ for every n, and it contains only logical expressions, so it must (by Theorem 3) be inconsistent. Thus:

(i) $\models {\sim}f(\mathrm{I})^{\ddagger}$

(ii) $N^* \cap \{\Omega_N\} \models {\sim}f(\mathrm{I})$ by Theorem 1*

(iii) $N^* \models {\sim}(\Omega_N \ \& \ f(\mathrm{I}))$ by model-theoretic truth-definitions

(iv) $U^* \models g({\sim}(\Omega_N \ \& \ f(\mathrm{I})))$ by Preservation

(v) $U^* \models {\sim}(g(\Omega_N) \ \& \ g(f(\mathrm{I})))$ by Conservatism

(vi) $U^* \models {\sim}(\Omega_U \ \& \ f(g(\mathrm{I})))$ by Extended Constancy

(vii) $U^* \models {\sim}(\Omega_U \ \& \ \mathrm{I})$ by Recoverability

So the conjunction of I and Ω_U must be inconsistent with U^*. But it isn't; thus no translation scheme meets the constraints.

Problem 2: The Geach-Kaplan Argument

Not only does enriching the language not help, but it may very well *hurt* the defector. As Gabriel Uzquiano (2004) has pointed out, if the languages include predicates for composites, then the universalist will be able to construct sentences that the nihilist won't be able to translate. Just as the Geach-Kaplan sentence

(GK) Some critics admire only one another,

cannot be given a first-order characterization (see Boolos 1984), it also can't be given a characterization by quantifying plurally over the particles that compose the critics. (GK) is regimented using plural quantifiers as

(18) $\exists xx(\forall y(y \prec xx \supset y$ is a critic$)$ & $\forall y \forall z((y \prec xx$ & y admires $z) \supset (y \neq z$ & $z \prec xx)))$.

But the standard translations of sentences the universalist says into ones the nihilist will accept takes singular quantification over composites and turns it into plural quantification over atoms. It is not at all clear how, if at all, the defector could translate (GK) into something that quantifies, even plurally, over atoms; as singular quantifiers go to plural, the plural ones need to do something 'plurally plural' (cf. Hazen 1997) simulating the effect of sets of sets of things the way plural quantification simulates the effect of sets of things.

Suppose this is right. Suppose, that is, that there is no sentence ϕ of L_{U^*} only about atoms such that $U^* \models \phi \equiv GK_U$, where GK_U is the universalist's rendition of the Geach-Kaplan sentence. Then we have a problem, for $f(GK_U)$ *will* be equivalent, given N^*, to a sentence only about atoms, and so the translation scheme will not preserve logical truth after all.

Let's be more precise. First, note the following:

Nihilistic Equivalence: For any sentence ϕ of L_N^*, there is a sentence ψ only about atoms such that $N^* \models \phi \equiv \psi$.

If ϕ is inconsistent with N^*, any logically contradictory sentence only about atoms (such as $\ulcorner \exists_N x(\sim\exists_N y(yPx)$ & $x \neq x)\urcorner$) will serve for ψ. So suppose that ϕ is consistent with N^*. Let $\hat{\phi}$ be the sentence gotten by replacing each instance of a predicate in Composite with a predication of self-distinctness (as we did in the construction of ‡-sentences, only this time we leave the Atomic

predicates alone.) Let M be any model of N^*. In M, then, the extensions of all the COMPOSITE predicates are empty (thanks to (CE)). Note that ϕ differs from $\hat{\phi}$ only in that wherever ϕ has a predicate empty on the model thanks to (CE), $\hat{\phi}$ has a predicate empty on the model thanks to the reflexivity of identity. A suitable induction thus shows that $\hat{\phi}$ is true on M if and only if ϕ is; thus, ϕ and $\hat{\phi}$ are true on just the same models of N^*. Now let ψ be the result of replacing every quantifier in $\hat{\phi}$ with its restriction to atoms as given by (Sub) above. Every model of N^* on which $\hat{\phi}$ is true is one on which the extension of 'P' is empty, so it is one where restricting the quantifiers to, or expanding them from, things that don't satisfy $\ulcorner \exists y(yPx) \urcorner$ does not change truth-value. Hence, $N^* \models \phi \equiv \psi$. QED.

Atomic Equivalence, though, spells Geach-Kaplan style problems for the defector. Since GK_U is consistent with U^*, its translation into L_N^*, $f(\mathrm{GK}_U)$, must be consistent with N^*. But then there is a ψ only about atoms such that:

(i) $N^* \models f(\mathrm{GK}_U) \equiv \psi$ $\hspace{2cm}$ by Nihilistic Equivalence

(ii) $U^* \models g(f(\mathrm{GK}_U) \equiv \psi)$ $\hspace{2cm}$ by Preservation

(iii) $U^* \models g(f(\mathrm{GK}_U)) \equiv g(\psi)$ $\hspace{2cm}$ by Conservatism

(iv) $U^* \models GK_U \equiv g(\psi)$ $\hspace{2cm}$ by Recoverability

By Extended Constancy, $g(\psi)$ must be a sentence only about atoms. But Uzqiano's point is that there *is* no sentence only about atoms equivalent, even given U^*, to GK_U. Once again we have a reductio: there is no translation scheme that meets the constraints structuralist defectors need.

2.4.3 Enrich the Logics

A third option insists that the argument goes through only because we were too stingy about the sort of logic we helped ourselves to. If we instead enriched the universalist's and nihilist's languages with, say, a quantifier that meant 'there are infinitely many. . .', or full second-order quantification (instead of the merely monadic type provided by plural quantification), or infinite conjunctions, disjunctions and/or blocks of quantifiers, we would not be able to run the argument.

I suspect this is the most promising line of resistance for a structuralist who wants to defect without rejecting Logical Realism. Exploring the viability of defecting about the composition dispute against any background logic a defector may choose would go well beyond the scope of this chapter. We can, however, make a few cursory remarks.

First, it isn't enough to simply *announce* that there will be a logical-truth-preserving translation scheme between the debaters' languages when some particularly strong background logic is in play. There are a number of reasons we may think this is obvious. One of the clearest is the well-known equivalence of models of classical atomic mereology and the structure of power-set algebras: every model of classical mereology with κ atoms is isomorphic to the algebra gotten from the power set of a cardinality-κ set (but without $\varnothing$). The singletons of the power set stand in for the atoms and the subset relation stands in for the parthood relation. But in that case (goes the thought), set theory settles everything: every fact about the mereological structure of the world is settled by facts about power sets. In this case, if the background logic is strong enough to encode all set-theoretic structure, then, after the universalist specifies the cardinality of the atoms (which the nihilist can do too), won't the logic settle everything else?

In reply: no. Or, at least, it isn't obvious that this is so. It turns out that there are some properties a power-set algebra (and hence the world, if it obeys classical mereology) could have or fail to have that aren't settled by set theory plus the cardinality of atoms (at least given the continuum hypothesis; see Jech and Shelah 1996).[37] If the logic is strong enough, as second-order logic surely is, then the universalist may be able to form two different, mutually exclusive sentences, P and Q, which use no non-logical predicates other than 'P' and which do not have their truth-values settled by the cardinality of the atoms plus the background logic.

If the universalist can do this, the defector will be hard-pressed to find a translation scheme that preserves logical truth. Suppose P and Q are both compatible with there being κ atoms. Let $E\kappa_U$ be the universalist's sentence saying that there are exactly κ atoms. Then $\ulcorner E\kappa_U \mathbin{\&} P \urcorner$ and $\ulcorner E\kappa_U \mathbin{\&} Q \urcorner$ are individually consistent with universalism but jointly inconsistent with it. And so, by the constraints on the translation scheme, $\ulcorner E\kappa_N \mathbin{\&} f(P) \urcorner$ and $\ulcorner E\kappa_N \mathbin{\&} f(Q) \urcorner$ will be individually consistent but jointly inconsistent with nihilism. But given the way nihilism plus the number of atoms straightforwardly settles everything else, it is hard to see what $f(P)$ and $f(Q)$ could possibly be. $f(P)$ and $f(Q)$ have no non-logical predicates in them other than 'P', and nihlism ensures that it is empty.[38] So $f(P)$ and $f(Q)$ can do nothing but constrain the cardinality of the domain — which, given nihilism, has

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[37]For the curious: a set of things is *countably closed* iff every countable chain in it — every linearly ordered countable subset of it — has a lower bound. Jech and Shelah proved, in essence, that ZFC plus the continuum hypothesis does not settle whether, if a boolean algebra is countably closed, every countably closed subset that forms a complete boolean algebra is itself countably closed. Since every boolean algebra can be embedded into some power-set algebra, then if there are enough atoms, there will be some potential property of the world and its mereological structure not settled by ZFC plus the continuum hypothesis.

[38]I'm assuming once again that the language only has the non-logical predicate 'P'. If it didn't, it would be easy to find such a $f(P)$ and $f(Q)$. But in this case we could simply use a trick like the one in the argument of section 2.4.2 to make sure there was nothing left for $f(P)$ and $f(Q)$ to disagree about.

already been fixed by Eκ_N.

Second, even if enriching the logics gets the defector around the argument of section 2.3.4, the Geach-Kaplan argument may still remain. If the extra logical resources are given to the debaters along with plural quantifiers, the universalist will still be able to formulate Geach-Kaplan-style sentences about composites, and it is not clear how the defector will translate these into the nihilist's language.

Making the languages infinitary looks like the defector's best bet here. There are infinitely many arrangements of atoms that the universalist would think sufficient for there being some critics who only admire each other; the translation scheme could then translate GK$_U$ as the infinite disjunction of the specifications of each of these ways. But the universalist will have access to these infinitary resources as well, and will thus be able to construct infinitary sentences involving plural quantification over composites. As far as I can tell, it is open whether each of these sentences will admit of some translation into infinitary quantification over simples. That is, it is open that for some infinitary 'super-Geach-Kaplan' sentence SGK$_U$, no (plural and infinitary) sentence ϕ just about atoms is such that $U^* \models \text{SGK}_U \equiv \phi$. If so, then the Geach-Kaplan argument will go through for SGK$_U$, extra logical resources notwithstanding.

Third, some defectors may feel these logic-enriching proposals let too much in. Of course, some defectors think *all* ontological disputes are defective. Others, however, think that even though something is awry in certain ontological disputes, other disputes — like the dispute between nominalists and platonists about numbers or sets — are just fine. Eli Hirsch (2005: 82–84), for instance, suggests that the debate about the existence of sets isn't defective because there is no way to translate contingent claims about what sort of sets exist into nominalist-friendly claims contingent in the same way. If we have a strong enough background logic, though — and infinitary and second-order

logics are incredibly strong — then there may well be ways to translate the claims of the nominalists and the platonists (see Shapiro 1991: Part II for details on the expressive resources of second-order logic and how they relate to set theory).[39]

But finally — and to my mind, most importantly — the defector can't simply decide to enrich the logics of the debating parties because *the parties themselves get to decide which logics they think are appropriate*. Logical Realism holds that metaphysical questions about the ultimate structure of reality are closely tied to questions about what is or isn't 'logic'. To call a some technical apparatus 'logic', on this conception, is to say that it correctly tracks one of reality's important and general structural features. But this itself is a metaphysical claim. If a certain debate can only be shown to be defective if all parties are happy with, say, full second-order logic, and if none of the parties are happy with full second-order logic, then it is hard to see how *their* debate is defective. Perhaps some *other* debate, between other parties who make pairwise similar claims about mereology but very different claims about what logic is like, is defective — but that shouldn't make the debaters with the weaker logic think *they're* doing anything wrong. Rather than convincing us that where we thought there were two positions there was really only one, the defector will only at best show us that where we thought there were two positions, there were really three: the nihilist, the universalist, and the friend of very powerful logic.

As it turns out, most parties to the composition debate tend to draw the line at plural quantification. (Peter van Inwagen, for instance — who is not a compositional nihilist but comes very close — explicitly endorses plural

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[39]It's worth noting that Hirsch is an ordinarian, and so his reasons for defecting aren't constrained in the same ways as the defector I imagine here. Nonetheless, at least some structuralist defectors may feel like Hirsch; and if they do, they will need to be careful about how freely they hand out expressively powerful logics to debaters.

quantification (1990: 22–28) and explicitly rejects (any other sort of) second-order quantification (2004: 123–124).) And, as I argued in section 2.1.3, we ought to regard these parties as structuralists. The argument of section 2.3 thus ought to convince us that at least their debates are not defective. Asking after the defectiveness of other debates, between a very few (and perhaps fictional) parties who endorse stronger logics than these, might thus be thought academic enough that we can safely set it aside for now.

Chapter 3

Ontological Pluralism

According to *ontological pluralism*, there are different ways, kinds, or modes of being. Aristotle may have espoused it when he claimed that being is said in many ways (*Metaphysics* IV.2). Perhaps Bertrand Russell endorsed it when he said that the relation *to the north of* does not exist in the same sense that London does (1912: 98). Insofar as students in their first philosophy class have a particular view in mind when they say that what it is for there to be a number is very different than what it is for there to be a coffee cup, this is that view.

Ontological pluralism has a prestigious history. Not surprisingly, philosophers disagree about who in fact held it, but the accused include such notable figures as Aristotle, Aquinas, Descartes, Russell, Moore, and Heidegger.[1] But it has not fared well at the hands of analytic philosophers in the past half-century or so, historical notoriety notwithstanding. What little attention it has received has been largely derisive. There are a few exceptions. Gilbert Ryle (1949) may have defended a version of the view when he said that we say something different about bodies when we say that bodies exist than we do about minds when we say that minds exist. More recently, Kris McDaniel

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[1]Michael Frede (1987: 84–86), for instance, ascribes the view to Aristotle; Herbert McCabe (1976: 90–91) to Aquinas; Calvin Normore (1986: 235–238) to Descartes; and Kris McDaniel (2008) to Heidegger. And we should perhaps understand Russell's (1912: 98–100) and Moore's (1903/1953: 110-113) distinction between 'existence', which concreta have and abstracta lack, and 'being', which abstracta have and concreta lack, as a version of ontological pluralism. See McDaniel (2008: §§1–2 and ff) for further discussion of ontological pluralism's pedigree.

(2008) has given his own (more plausible, in my estimation) defense of ontological pluralism. But despite these lone voices crying in the wilderness, most contemporary analytic philosophers do not think ontological pluralism is a going concern. And it isn't just that most of the philosophical population *disagrees* with the view. It is, rather, that most of the philosophical population seems to think the view untenable, perhaps unthinkable, and almost certainly devastatingly refuted.

From whence comes this refutation? We ought to back up widespread dismissal of a view with serious argument. If ontological pluralism deserves the sort of treatment it has been getting at the hands of contemporary analytic philosophers, it must be because we have a solid argument or two against it. Yet, insofar as I can see, there is no such argument.

In this chapter, after describing the view in further detail, I consider all of the arguments against it that I can think of. As we will see, none of them succeed. Insofar as these arguments represent the best we foes of pluralism can come up with, we do not have nearly as strong a case as we seem to think.

3.1 Ontological Pluralism

3.1.1 Pegboards

Ontological pluralism, I said, holds that there are different modes, or ways, or kinds of being. Many find this claim obscure. Perhaps we can start to dispel this obscurity with a bit of picture thinking.

Metaphysics, at its heart, aims to uncover the ultimate structure of reality. Some of this structure is *ontological*: it has to do with what there is. We can think of 'ontological structure' as the kind of structure we could represent by a pegboard covered with rubber bands. When we say that there are some

negatively charged particles, we say that some of reality's pegs have the 'negatively charged' rubber band hanging from them. And when we say that an electron orbits a proton, we say that there is an 'orbits' rubber band stretched between one peg with an 'electron' band on it and another with a 'proton' band on it.[2]

Many metaphysicians recognize a deep distinction between what they call 'ontological categories'. They hold that there is a fundamental difference between concreta and abstracta, or between objects and events, or between possibilia and actualia, for instance. But most philosophers who make these distinctions think they can make them just by talking about different *kinds* of things — by hanging different rubber bands on different pegs. Some pegs get the 'concrete' rubber band, others get the 'abstract' rubber band, and from the perspective of reality's ontological structure the distinction between these categories is no different than the distinction between, say, positively and negatively charged particles.

Ontological pluralists think that the cleft between some of these categories runs deeper than that. It is not just that some things are different than others, but rather that some things exist in *different ways* than others. According to ontological pluralists, thinking of reality as having a single ontological structure — a single pegboard — is a mistake. And thinking of ontological categories as divisions within this single structure is likewise a mistake. Rather, reality has multiple ontological structures — multiple, independent pegboards — with, say, the abstract things on this one and the concrete things on that one. So, as a first pass, we can gloss ontological pluralism as the thesis

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[2]Note that the rubber bands do not themselves represent other things — properties and relations — but rather they represent *that* certain things are or are related to each other in various ways. If you think that whenever something is red it instantiates a property, *redness*, you don't represent this just by having a 'red' rubber band, but rather by saying that, every time something has a 'red' rubber band hanging from it, there is also an 'instantiates' rubber band stretching between it and another peg with the 'property of redness' rubber band on it.

that any accurate depiction of reality's ultimate structure depicts it as having multiple ontological structures.

3.1.2 Fundamentality

Our first-pass gloss is rough, in part because we have not said much about what an 'accurate depiction of reality's ultimate structure' is supposed to be. Metaphysicians may search for reality's ultimate structure, but what they *produce* are metaphysical theories. So how do these theories — the actual output of metaphysical theorizing — relate to the picture we just painted?

Note that metaphysical disputes are often not about *which* claims of ordinary folk are true, but rather about *why* these claims are true. Consider, for instance, the old debate between idealists and realists. Both sides agree that there are tables, chairs, trees, planets, etc. And both sides agree that sentences such as 'there are tables, chairs, trees, planets, etc.' are strictly and literally true. They disagree only about the proper *analysis* of these claims — about *how* reality makes these claims true. The realist insists the claims are true thanks to the arrangements of mind-independent bits of matter; the idealist insists that they are true thanks to the bundling of various ideas in people's minds.

What do the parties disagree about, then? Not about whether sentences of the form 'there are tables, chairs, etc.' are true, but rather about whether such sentences do a good job of displaying reality's ultimate structure. According to realists, if you want to describe reality's ontological structure, you cannot do much better than saying 'there is a table over there'. But according to idealists, although such a description is true, it is less than ideal — if you really want to capture the metaphysical facts of the matter, you ought to say 'ideas conjoined in a table-like manner are manifest whenever I do thus-and-such.' In short, although the two parties agree about which descriptions of

reality are *true*, they disagree about which are more *metaphysically perspicuous* — about which do a better job of displaying reality's ultimate structure.[3]

It should not be too hard to see how otherwise equivalent descriptions might differ in metaphysical perspicuity. Let's suppose, for the sake of illustration, that the quark colors of particle physics are fundamental. If I want to describe a certain quark to you, I might use either of two descriptions:

(1) The quark is inside region R and is green.

(2) The quark is inside region R and is grue,

where 'grue' means 'green and inside region R or blue and outside region R'.[4] Either way I speak truly, and either way you are in a position to know how the quark will react to certain sorts of experiments. But (1) does better than (2) in telling us *what the quark is like*. Intuitively, (1) tells you *how the quark is*, whereas (2) only gives you information about some gerrymandered property the quark has, although you can use that information to figure out how the quark is. (1) tells you in a more direct manner what the quark is like than (2) does. (1) is, in short, more metaphysically perspicuous than (2).

Wherein does this difference in (1) and (2) consist? In terminology David Lewis (1983*a*, 1984) has made famous, it consists in 'green's being more *natural* that 'grue' — in 'green's carving the beast of reality, in Plato's phrase,[5] closer to the joints than 'grue' does. 'Green' picks out a *fundamental* (so we suppose) property of quarks; 'grue' does not.

Call expressions that 'carve reality at the joints', that pick out reality's ultimate structural features, *fundamental*.[6] Let a *fundamental language* be a language where every simple expression is fundamental, and call a theory a

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[3]Cf. Hawthorne and Cortens (1995: §5).

[4]Cf. Goodman (1979/1983).

[5]*Phaedrus* 265d-266a.

[6]We're here following Theodore Sider (2008) who argues that we ought to extend Lewis's

fundamental theory if and only if it uses only expressions of a fundamental language.

Metaphysicians of course intend to produce true theories. But they intend more than just this. They want their theories, or at least the central cores of their theories, to be *fundamental*: written in a language where every simple expression corresponds to a structural feature of reality. They intend to produce metaphysically perspicuous theories, theories which accurately depict reality's ultimate structure.

In this case, ontological pluralism is the thesis that the true fundamental theory depicts the universe as having multiple ontological structures. Naturally, this thesis makes sense only if it makes sense to talk about metaphysically perspicuous descriptions and carving nature at its joints. After all, if no descriptions are metaphysically perspicuous, then there is no such thing as a 'fundamental theory'. Some theories will be true; some will be false; and that will be that.

So a pluralist will be committed to the coherence of these notions. But her commitment is weaker than some might think. She need not claim that there is a *unique* fundamental theory: she may allow that reality can be described in a number of ways, none of which is any more metaphysically perspicuous than the others. Nor need the pluralist claim that we have much in the way of epistemic access to these fundamental theories. She need not claim that science is bound, or even likely, to discover which theory accurately describes reality. And she need not say that metaphysics has a good shot at getting it right either.[7] She must claim merely this: that not all true theories in fact carve nature at its joints; at least some of them are more metaphysically

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'naturalness' account of fundamentality, which focuses on meanings for predicates (i.e., properties and relations), to expressions of all semantic types. The idea of using Sider's extension of naturalness to characterize pluralism comes from McDaniel (2008); cf. note 9 below.

[7]Cf. Bennett (2008).

perspicuous than others, whether or not we can tell which ones they are. For, in order to be a pluralist, she need only insist that any metaphysically perspicuous theory — whether or not we can identify it as such — will represent reality as having multiple ontological structures.

Some may think that even this much fundamentality is too much to make sense of. But I think we can, and should, make sense of these notions, so I am not persuaded by any objection to ontological pluralism along these lines. I think you ought to agree, and for reasons entirely independent of anything to do with ontological pluralism. If it makes sense to ask whether modality is 'really' quantification over worlds, or whether mental properties are 'really' physical properties, or whether material objects are 'really' just collections of sense-data — indeed, if metaphysics is to make any sense at all — we will need some way to understand the 'really'.[8] We will need to distinguish which truths describe the world as it 'really' is, and which ones describe it somehow misleadingly. So we will need to make sense of at least this much fundamentality.

If you still find this fundamentality-talk troublesome, take my arguments as conditional instead: *if* it makes sense to talk about theories that carve nature at the joints, then ontological pluralism has been wrongfully neglected.

3.1.3 Depicting Ontological Structure

So ontological pluralists say that any fundamental theory will depict reality as having multiple ontological structures. We can bring this claim into clearer focus if we can get a better grip on what it is for a theory to depict reality as having 'multiple ontological structures'.

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[8]Cf. Fine (2001), Lewis (1983*a*), and Sider (2008).

Depicting Single Ontologies

Before asking how metaphysical theories will depict *multiple* ontological structures, we ought to ask how they can depict any ontological structure *at all*. Setting pluralism aside, how will a fundamental language say that reality has thus-and-so a pegboard-and-rubber-band structure?

The most popular answer stems from the Quinean (1948) marriage of quantification and ontology. Ontology studies what there is, and the existential quantifier is the symbol that means *there is*. So a fundamental theory will depict the world as having thus-and-so an ontological structure by *saying* that it does, and it will say that it does using quantifiers.

Let *neo-Quineanism* be the view that a fundamental theory will represent the world's ontological structure with quantifiers. It is not the only option. The early Wittgenstein (1921), for instance, thought that the most perspicuous description of reality's ontological structure would analyze quantifiers in terms of names. Accordingly, *neo-Tractarianism* holds that the fundamental theory represents ontological structure through (and only through) names.

But most working metaphysicians seem to at least tacitly accept neo-Quineanism. More importantly, it seems to underlie at least one reason we don't hear much about ontological pluralism these days. As Zoltán Szabó puts it:

> The standard view nowadays is that we can adequately capture the meaning of sentences like 'There are *F*s', 'Some things are *F*s', or '*F*s exist' through existential quantification. As a result, not much credence is given to the idea that we must distinguish between different kinds or degrees of existence. (2003: 13)

The thought, I take it, is that in order to distinguish between different kinds of existence, we need some way to mark the distinctions between different ontological structures. But if the existential quantifier gives us ontological

structure, then — since there is only one of those — we have no way to make the needed markings.

Depicting Multiple Ontologies

But why think that there is only one existential quantifier? We should rather interpret the claim that there are different kinds of being, or that being is said in many ways, as the claim that there are different existential quantifiers in the fundamental language — one for each 'mode' or 'way' of being. If to be is to be ranged over by an existential quantifier, then there could be different ways to be if the fundamental language has, say, two existential quantifiers, '$\exists_1$' and '$\exists_2$'. One way to be is to be ranged over by '$\exists_1$'; another is to be ranged over by '$\exists_2$'. '$\exists_1$' is used to describe one ontological structure; '$\exists_2$' describes the other. And a fundamental theory will represent the world as having different ontological structures by using these different existential quantifiers. We can thus respect the marriage of being and quantification like good neo-Quineans and still make sense of the idea that there are different ways, modes, or kinds of being.[9]

We can make sense of pluralism even if we reject neo-Quineanism. Pluralism says that the fundamental language must *somehow* mark off differences in ontological structure. It must represent reality as having multiple pegboards. But pluralism need not insist that the fundamental language do this with quantifiers. A neo-Tractarian pluralist, for instance, could insist that a fundamental language needs to use two different kinds of names: one kind for abstracta, say, and one kind for concreta. According to her, there is no single fundamental semantic category of *names*, but rather two distinct, name-like

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[9]We thus arrive at the characterization McDaniel (2008: §4) gives of ontological pluralism: 'Each of the special restricted quantifiers which represent [the ontological pluralist's] postulated ways of existence cuts reality at the joints; they are the fundamental quantifier expressions.'

semantic categories. Of course, if she wants to avoid ambiguity, she will mark this difference syntactically: perhaps she will write the names for abstracta in a different color, or with a different font, or in some other noticeably different way than the names for concreta. But a distinction will be marked between representations of distinct pegboard structures.

But even though pluralism is consistent with other views about the relationship between language and ontology, I want to focus on the neo-Quinean version here. First, as neo-Quineanism has the weight of orthodoxy behind it, nobody can accuse a defense of pluralism predicated on it of relying on a non-standard thesis about how to represent ontology. Second, neo-Quineanism's main rival, neo-Tractarianism, faces some well-known difficulties.[10] And third, as I see it, we can simply say more about the combination of pluralism and neo-Quineanism than we can about the combination of it and neo-Tractarianism. I know some standard arguments against the neo-Quinean version of the view, and can think of a few other non-standard ones. But I have no idea how to argue for or against the view that the fundamental language must have two different categories of names.

Sorting

A neo-Quinean ontological pluralist insists that the fundamental language uses multiple quantifiers. She can incorporate these quantifiers into her fundamental language in one of two ways. First, she could use a *multi-sorted language*: a language where each variable and name is assigned a specific 'sort', and each position of each predicate may only take an argument of a specified sort. In this case, we just couldn't formulate certain claims. For instance, if '$\exists_1$' were a type-1 quantifier supposed to range over concreta and 'is prime'

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[10]It does not seem to allow for contingently existing objects, for instance; see Russell (1986: lecture 5) and Hazen (1986).

were a type-2 predicate restricted to abstracta, then a sentence of the form $\ulcorner\exists_1 x(x$ is prime)$\urcorner$ would not be well-formed.[11] Either the variable x would be the sort that '$\exists_1$' can bind, in which case it could not be an argument for 'is prime', or it would be the sort allowed as an argument for 'is prime', in which case '$\exists_1$' could not bind it.

Alternatively, our pluralist could use a *single-sorted* language. Such languages place no sorting restrictions on their predicates and terms. Each quantifier may bind any variable it likes, and any variable or name may appear as an argument of any predicate.

An ontological pluralist might prefer multi-sorted languages for a number of reasons. For instance, they help respect the intuition that a sentence such as

(3) The number seven is red,

is not just false but meaningless, since the multi-sorted rendering of (3) is syntactically ill-formed.[12]

But I am going to defend single-sorted pluralism, and for two reasons. First, although some pluralists may like multi-sorted languages, not all will. Imagine a pluralist who has two ontologies: one consisting of sets, and the other consisting of non-sets. Such a pluralist may very well want sets to have both other sets and non-sets as members. She will therefore need a set membership predicate '$\in$' that can take variables assigned to concreta as well as variables assigned to sets as its first argument. But a multi-sorted language

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[11]A word on notation: italicized symbols are metasyntactic variables ranging over symbols of the commonly associated type. (We assume the object language has no italicized expressions.) '$\exists$', for instance, ranges over existential quantifiers, and 'x' ranges over variables. 'F' is a functor that combines with names or variables to range over expressions using those names or open in those variables. Quinean corner-quotes are sometimes omitted when there is no risk of confusion.

[12]Thanks to Cian Dorr and Mark Moffett.

won't let her have one of these; it forces her to associate '∈'s first argument place with a particular sort.

Second, single-sorted pluralism is simply harder to defend than multi-sorted. Certain arguments (e.g., those in sections 3.2 and 3.5) are not easily formulated against a multi-sorted pluralism. On the other hand, I know of no arguments against multi-sorted pluralism that would not also work against the single-sorted variety. So a defense of single-sorted pluralism is, in passing, a defense of multi-sorted pluralism, whereas a defense only of the multi-sorted kind would leave single-sort pluralists out in the cold.

3.1.4 Fundamental Quantifiers

We should clarify two more issues. First, what is it for an expression to count as an existential *quantifier*? And second, under what conditions should we say that a theory has *multiple* existential quantifiers?

Criteria for Quantification

Let's begin with the first question: what does it mean to call an expression a 'quantifier'? There are two criteria we might use: the inferential and the semantic.[13]

According to the inferential criterion, an expression is an existential quantifier if and only if it obeys the right inference rules. Which ones? Existential instantiation and existential generalization are the usual suspects. If $\exists$ is an existential quantifier, $F(x)$ a formula open in x, and t a name, then these rules roughly say:

EXISTENTIAL GENERALIZATION

$F(t) \vdash \exists x F(x)$.

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[13]Cf. Lewis (2004: 11).

Existential Instantiation

If $Q, R, \ldots$, and $F(t) \vdash P$, and if t does not occur in $P, Q, R, \ldots$, or $F(x)$, then, $Q, R, \ldots$, and $\exists x F(x) \vdash P$.[14]

According to the semantic criterion, an expression is an existential quantifier if and only if its semantic function is to say that there is something which satisfies the formula it prefixes. If $\exists$ is an existential quantifier, its semantics must imply that $\exists x F(x)$ is true only if there is something that satisfies the open formula $F(x)$.

Call expressions that satisfy the inferential criterion *i-quantifiers*, and call expressions that satisfy the semantic criterion *s-quantifiers*. When an ontological pluralist says that any theory which accurately describes reality uses multiple existential quantifiers, does she mean 's-quantifiers' or 'i-quantifiers'?

She ought to mean both. After all, we ontological *monists* think that the expression which depicts reality's ontological structure is both an i- and an s-quantifier. If a pluralist lets her multiple ontology-depicting expressions fail either criterion, we might suspect her of cheating. If they behave both semantically and inferentially the way quantifiers should, though, then we cannot complain about her view on these sorts of grounds.

So we can assume that pluralists are not distinguishing between i- and s-quantifiers. For the most part, I will not distinguish these either. For many purposes, the two won't come apart. When they do (e.g., in section 3.2), I will say just what criterion of quantifierhood is in play.

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[14]In section 3.5, I will suggest that t has to meet certain conditions in order for existential generalization to hold; this is one reason these characterizations are rough. Another is that these inference rules, as stated, leave no room for binary existential quantifiers, expressions of the form '$\exists(\ldots: \_ \_ \_)$' which mean 'some ... is _ _ _'. (Thanks here to Cian Dorr.) Furthermore, this characterization makes quantification an essentially variable-binding matter: if a symbol doesn't bind variables, it cannot participate in the right inference rules. But the quantifiers in variable-free quantificational logics (Quine 1960*a*, 1971) ought to satisfy the inferential criterion, too. We can make the rules sufficiently general, I think, but this is not the place to do it.

Counting Quantifiers

Finally, we should ask what it takes for a theory to have *multiple* existential quantifiers. You don't get to be an ontological pluralist, for instance, just because you sometimes use a singular existential quantifier that means 'there is at least one thing which...' and at other times use a plural one which means 'there are some things which all together...'.[15] Singular and plural existential quantifiers talk about the same things, but in different ways. The singular existential quantifier talks about them one at a time; the plural one talks about them by groups. But you don't get to be an ontological pluralist simply by talking about the same things in different ways.

The pluralist wants multiple existential quantifiers because she wants to represent multiple pegboard structures. In standard first-order systems, a single domain is associated with exactly one existential quantifier — a singular one which ranges over it. In other words, a single existential quantifier is used to talk about a single pegboard structure. Systems with both singular and plural quantifiers, though, have *two* existential quantifiers which range over a single domain, and therefore two quantifiers which represent a single pegboard structure. So we do not want to count such systems as ontologically plural.

A stickier variant of our question asks whether higher-order languages should count as ontologically plural. On the one hand, a well-entrenched philosophical tradition, extending back to Frege (1891, 1892), treats the domains of higher-order quantifiers as fundamentally different from those of first-order quantifiers. For Frege, the higher-order quantifiers range over 'unsaturated', predicate-like 'concepts', while the lower-order ones range over 'saturated' objects. Since the predicate-like things somehow depend on the

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[15]See Boolos (1984, 1985).

objects, but the objects do not depend on the predicate-like things, we might think that these different quantifiers range over things that 'are' in very different senses.

On the other hand, some philosophers (e.g., Agustín Rayo and Stephen Yablo (2001), and Timothy Williamson (2003: 458-459)) have recently challenged this tradition. By their lights, if predicates do not denote predicate-like, 'unsaturated' things — and they think they do not — then quantifiers that bind predicate variables do not range over predicate-like, 'unsaturated' things either. According to these philosophers, higher order quantifiers are not in the business of *ranging over* things at all. They do not pick out items with *any* kind of being. Rather, they let us talk generally about how things are, just as predicates let us talk specifically about how things are.

Again, the pluralist wants multiple existential quantifiers because she wants to depict multiple ontological structures. So we should count higher-order languages as ontologically plural only if their higher-order quantifiers are to be understood as ranging over higher-order domains. If the higher-order quantifiers aren't even in the ranging business, they also aren't in the business of representing ontological structures, either. So what kind of business are higher-order quantifiers in?

Rather than answer this tough question, I intend to dodge it. The easiest way to do this is to restrict our attention to theories with multiple, first-order, singular existential quantifiers. Since the quantifiers are singular, we ensure that they do not simply talk about the same things in different ways as singular and plural quantifiers do. And since they are first-order, we avoid any controversy about the nature of higher-order quantification. This first-order ontological pluralism will give us controversy enough to be getting on with.

3.1.5 The Thesis of Ontological Pluralism

Thus we have, for the purposes of this chapter, the thesis of *ontological pluralism*: a true, metaphysically perspicuous theory will use multiple, first-order, singular existential quantifiers. Nature has multiple ontological joints, and metaphysically perspicuous theories use these multiple first-order, singular existential quantifiers to represent these joints.

3.2 The Disjunctive Quantifier Argument

Most philosophers with whom I talk about this view quickly say something along the following lines: 'Look, you can use "$\exists_1$" and "$\exists_2$" to just *define* a new quantifier, "$\exists^*$", as follows:

(4) $\ulcorner \exists^* x F(x) \urcorner =_{\text{df.}} \ulcorner \exists_1 x F(x) \vee \exists_2 x F(x) \urcorner$

Once you do, you see that "$\exists_1$" and "$\exists_2$" are restrictions of it. And, as we all know, if we want to find out what there is, we look to our *unrestricted* quantifiers and ignore the restricted ones. So "$\exists_1$" and "$\exists_2$" do not give you different kinds of being at all. They just quantify over things with the *only* kind of being — the kind things in the domain of "$\exists^*$" have.'

Metaphysicians commonly insist that our unrestricted, rather than our restricted, quantifiers tell us what there *really* is. Consider a standard case. I say

(5) There is nothing in the fridge,

but do not think that I thereby deny those physical theories that tell me I can see the inside of the fridge only thanks to the photons it contains. When I uttered (5), I used a quantifier which ignores the photons. I used a quantifier which, thanks to its restrictions, did not tell me the whole ontological story. I used an *ontologically misleading* quantifier.

The ontological pluralist thinks that quantifiers avoid misleading by being fundamental; since she thinks that '$\exists_1$' and '$\exists_2$' are fundamental and '$\exists^*$' isn't, she thinks that '$\exists^*$' is ontologically misleading in a way that '$\exists_1$' and '$\exists_2$' aren't.[16] But the line of argument outlined above suggests she is wrong about something. That argument, put more precisely, runs:

The Disjunctive Quantifier Argument:

(i) '$\exists_1$' and '$\exists_2$' are restrictions of '$\exists^*$'.

(ii) If $\exists$ is an existential quantifier and $\exists'$ a restriction of $\exists$, then $\exists'$ is more ontologically misleading than $\exists$.

(iii) Therefore, '$\exists_1$' and '$\exists_2$' are ontologically miselading.

And the pluralist ought to agree with her opponent that, if '$\exists_1$' and '$\exists_2$' are ontologically misleading, they are not fit to tell us what kinds of being there are.

If the Disjunctive Quantifier Argument is right, the pluralist has made some sort of mistake. But the argument is quiet about exactly what mistake she allegedly made. Someone might endorse the Disjunctive Quantifier Argument because he thinks that quantifiers avoid misleading by being unrestricted, fundamentality notwithstanding. Or he might agree with the pluralist that quantifiers avoid misleading by being fundamental, but deny that a quantifier could be fundamental if it has an unrestriction.

Either way, the pluralist has the resources to answer the argument and thereby avoid the charge of error. How she should respond will depend on whether the argument's use of 'quantifier' is supposed to mean 'i-quantifier' or 's-quantifier'. We will consider each option in turn.

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[16]Cf. McDaniel (2008: §§3–4). Note that McDaniel responds to the argument below by insisting that restricted quantifiers can be more natural than their unrestricted counterparts and thus denying (ii). While I am sympathetic to this line of thought, I think matters are a bit more complex when s-quantifiers are at issue; see section 3.2.2 below.

Before we do, note that just as we distinguish an inferential and a semantic notion of quantification, we need to distinguish an inferential and a semantic notion of restriction, too. First, if $\exists$ and $\exists'$ are i-quantifiers, then we say that $\exists'$ is an *i-restriction* of $\exists$ iff every formula F is such that $\exists'xF(x)$ entails $\exists xF(x)$ but not every formula F is such that $\exists xF(x)$ entails $\exists'xF(x)$. And second, if $\exists$ and $\exists'$ are s-quantifiers, then we say that $\exists'$ is an *s-restriction* of $\exists$ iff $\exists$ ranges over everything $\exists'$ ranges over, but not *vice versa*. As we consider each potential meaning for 'quantifier', we will understand 'restriction' correspondingly.

3.2.1   Easy Unrestriction

The Problem

If we think of quantifiers inferentially, the argument becomes:

>**The Disjunctive Quantifier Argument (inferential style):**

- (i-I) '$\exists_1$' and '$\exists_2$' are i-restrictions of '$\exists^*$'.
- (ii-I) If $\exists$ is an existential i-quantifier and $\exists'$ an i-restriction of $\exists$, then $\exists'$ is more ontologically misleading than $\exists$.
- (iii-I) Therefore, '$\exists_1$' and '$\exists_2$' are ontologically miselading.

But premise (ii-I) has a problem: less i-restricted i-quantifiers are too easy to come by. For any language with an existential quantifier $\exists$, we can define a new symbol that acts inferentially like a 'bigger' existential quantifier.

Here's how. First, pick a new symbol, α. It will be a 'quasi-name': if we take a sentence with a name in it and replace that name with α, we count the resulting expression as a sentence, too. Then, where R is any n-placed predicate of the language, apply the following definitions:[17]

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[17]I adapt the following trick from Williamson (2003: 441–443); see Dorr (2005: 256–257) and Sider (2008: §5) for similar tricks.

(6) $\ulcorner R(\alpha, \ldots, \alpha) \urcorner =_{\text{df.}} \ulcorner P \vee \sim P \urcorner$, where P is some sentence not containing α;

(7) $\ulcorner R(t_1, \ldots, t_n) \urcorner =_{\text{df.}} \ulcorner P \mathbin{\&} \sim P \urcorner$, where P is some sentence not containing α and some but not all of the t_i's are α, and

(8) $\ulcorner \hat{\exists} x F(x) \urcorner =_{\text{df.}} \ulcorner \exists x F(x) \vee F(\alpha) \urcorner$.

The first two definitions make α act like a name assigned to a peculiar object — an object that satisfies all predicates, but (for polyadic ones) only in conjunction with itself. The third definition introduces a new expression '$\hat{\exists}$' which acts like a quantifier that is substitutional with respect to α but objectual otherwise.

'$\hat{\exists}$' satisfies the inferential criterion of existential quantification and $\exists$ counts as an i-restriction of it. So, assuming that (ii-I) is right, '$\hat{\exists}$' is less ontologically misleading than $\exists$ and therefore gives us a better picture of what there is. But this can't be right: '$\hat{\exists}$' is just a linguistic trick. We cannot possibly get ontological insight from it.

To drive the point home, suppose the language includes the predicate 'is a unicorn'. Then

(9) $\hat{\exists} x (x \text{ is a unicorn})$

is true.[18] But surely this shouldn't lead us to think that, really, there are unicorns after all. There *aren't* unicorns, and any quantifier that seems to say differently is not telling us a straight ontological story. Since (ii-I) says otherwise, we ought to reject it and the inferential Disjunctive Quantifier Argument that relies on it.

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[18]Since 'is a unicorn' is a one-placed predicate, $\ulcorner \alpha \text{ is a unicorn} \urcorner$ is true. Thus $\ulcorner \exists x \ (x \text{ is a unicorn}) \vee (\alpha \text{ is a unicorn}) \urcorner$ is true by (6); but by (8), this is equivalent to (9), so the latter must be true, too.

An Objection

In order for '$\hat{\exists}$' to count as an i-quantifier, α needs to count as a name. Otherwise, even if $Q, R, \ldots, F(t) \vdash P$, there is no guarantee that $Q, R, \ldots, \hat{\exists}xF(x) \vdash P$. Notice, for instance, that for every name t other than α, $F(t) \vdash \exists xF(x)$. But $\hat{\exists}xF(x) \nvdash \exists xF(x)$ — (9), for instance, does not entail

 (10) $\exists$x(x is a unicorn).

If α counts as a name too, though, then this counterexample is blocked: existential instantiation will only license the inference from $Q, R, \ldots, F(t)$ to P if t could be *any* name, α included.

Someone might object to the argument in section 3.2.1 as follows: 'The argument requires that α be a name. But α is *not* a name. In order to be a name, an expression must refer to something. But α does not refer to anything. Hence it is no name, and the purported problem for the inferential criterion is not really a problem.'[19]

Just as we can distinguish different criteria for quantifiers, we can distinguish different criteria for names. On what we might think of as an inferential (or, at least, syntactic) criterion, an expression counts as a name just in case it plays the right syntactic role. But on the semantic criterion, an expression counts as a name if and only if there is something that it names. And just as we distinguish between i- and s-quantifiers, we can also distinguish between i- and s-names: i-names are expressions that function syntactically like names, and s-names are expressions that function semantically like names.

Each criterion for names gives rise to a slightly different inferential criterion for quantification. On what we might call the *pure inferential criterion*, an expression is a quantifier if and only if it obeys the right inference rules, where any appeal to 'names' in those rules is to be understood as an appeal

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[19]Thanks to Matti Eklund for pressing me on this objection.

to i-names. But on what we might call a *mixed criterion* for quantification, an expression has to obey the inference rules where the 'names' in the rules are understood as s-names.

The present objection essentially appeals to a mixed criterion of quantification. As such, it does nothing against the argument of section 3.2.1 if 'i-quantifiers' means '*pure* i-quantifiers'. If 'i-quantifiers' means that, (ii-I) still gives us untenable results.

However, it is worth wondering what a pluralist should say about a version of the Disjunctive Quantifier Argument that understands 'quantifiers' as meaning *mixed* i-quantifiers. Since this mixed criterion has both inferential and semantic elements, it will be useful first to see how the pluralist should respond to the Disjunctive Quantifier Argument understood as talking about purely semantic quantifiers. Once we see what the pluralist should say to that argument, we will be in a position to see what the pluralist should say about mixed i-quantifiers, too.

3.2.2 Semantic Quantifiers

If we think of quantifiers semantically, the argument becomes:

The Disjunctive Quantifier Argument (semantic style):

(i-S) '$\exists_1$' and '$\exists_2$' are s-restrictions of '$\exists^*$'.

(ii-S) If $\exists$ is an existential s-quantifier and $\exists'$ an s-restriction of $\exists$, then $\exists'$ is more ontologically misleading than $\exists$.

(iii-S) Therefore, '$\exists_1$' and '$\exists_2$' are ontologically misleading.

In this case, the pluralist can grant the truth of (ii-S). But she ought to deny (i-S), for she ought to deny that '$\exists^*$' is an s-quantifier. And if '$\exists^*$' is not an s-quantifier, it cannot s-unrestrict '$\exists_1$' or '$\exists_2$'. So the argument gives

the pluralist no reason to think that '$\exists_1$' or '$\exists_2$' don't tell straight ontological stories.

But can our pluralist justify her claim that '$\exists^*$' isn't an s-quantifier? Indeed she can, but it will take a bit of work to see how.

The Semantic Criterion Revisited

We said that something is an s-quantifier if and only if it says that there are some things which satisfy the formula it prefixes. We now face an important question: what did we mean by 'there are' when we stated this criterion?

We better not have meant '$\hat{\exists}$' by 'there are', lest '$\hat{\exists}$' count as an s-quantifier that unrestricts the $\exists$ it was defined in terms of. If we did, (ii-S) would say that '$\hat{\exists}$' was less ontologically mislading than $\exists$, and we would once again have to say that there really are unicorns after all.

Fortunately, we clearly did not mean '$\hat{\exists}$' by 'there are' when we put forth the semantic crierion. But what *did* we mean?

The following thought may tempt us: 'Well, we were speaking English when we formulated the criterion. And "there are" is an expression of English. So we must have meant whatever "there are" means in English when we said what it took for an expression to be an s-quantifier.'[20] But we should be careful. We may indeed have been speaking English when we stated the criterion, but it is not obvious that this by itself settles what our 'there are' meant.

Ordinary and Philosophers' English

Let me explain. Most philosophers insist that there is no difference between existence and being — that there is not anything that does not exist. That is,

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[20]Cf. van Inwagen (1998: 19–22) and (2000: 237–238).

most philosophers endorse

(11) It is not the case that there are some things that don't exist.

But an overwhelming majority of English speakers will happily assent to

(12) There are some things (Santa Claus, the Fountain of Youth, etc.) that don't exist.

And (11) and (12) seem contradictory. So we naturally conclude that someone — either the philosopher or the unreflective man on the street — must be wrong. But who?

If the philosopher is wrong, we will reject (11) and adopt a position we might call 'neo-Meinongianism'. But this is to ignore the philosophical motivations for saying (11) in the first place. What are these bizarre things that don't exist? What does it mean to say they don't exist? Are they just out there in subsistence-limbo, non-existing away, or what? In short: if they *are*, what is the cash value of saying further that they don't *exist*?

So should we reject (12) instead? I think most philosophers would like us to. But this has problems of its own: there may well be ways to interpret (12) that make it true, and if so, then no apparent reason *not* to interpret it in one of these ways.

To see the problem, suppose that, in ordinary everyday English, (11) is true and (12) is false. Now imagine that we, as intrepid field linguists, come across a hitherto unknown, linguistically independent tribe speaking a language that sounds an awful lot like English. Wanting to communicate with them, we try to figure out how to translate their language.

To our surprise, the tribespeople's lingustic practices comport almost completely with our own. Whenever we would say 'There is a white rabbit over there', they say 'There is a white rabbit over there'; whenever they hear their friend say 'A bear is charging you', they flee in terror; etc.

But the tribespeople's use differs from ours in one small way: they assent to sentences such as (12), and deny ones like (11). (And they make the corresponding adjustments in their other quantifiers: they deny 'Everything exists,' too, for example.) So, while we translate most of the tribespeople's terms homophonically, we shouldn't do so with their quantifier expressions.

So how should we proceed? There are a number of things we could do. We could translate the tribespeople's 'there are' as 'if neo-Meinongianism had been true and everything else been just as it is, then there would have been. . . '.[21] Or we might instead think of the tribespeople's 'there are' as a strange mix of our objectual quantifier and a substitutional one taking empty names: 'either there are things which are . . . , or Santa Claus is . . . , or the fountain of youth is . . . ,' etc.[22] It looks likely that we can interpret the tribespeople in a way that makes (12) true in their mouths. And if we can, charity seems to tell us that we should.

But if we should interpret the tribespeople in this way, then shouldn't an ideal interpreter interpret *our* tokens of (12) similarly? And if the semantic content of our language is more-or-less whatever an ideal interpreter would think it was after watching us for a bit, then, given a widespread acceptance of (12) among English speakers, shouldn't (12) have a true content in *our* mouths too?[23]

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[21]Cf. the strategies in Dorr (2005: §§3–5).

[22]Hofweber (2000) develops a version of this interpretation in detail.

[23]I can think of *one* reason an ideal interpreter would make (12) false in the mouths of ordinary English speakers. Some philosophers (e.g. Lewis 1984) suggest that certain candidate meanings are *reference magnets*: more 'eligible' to be meant than their competitors. Perhaps the most eligible candidate meaning for the ordinary 'there are' makes (12) false and (11) true. (See Sider 2001*a*: 205–208; 2001*b*: xix–xxiv.) But on the reference-magnet picture, the magnetic semantic values are generally thought to be the more fundamental ones, so we have reason to interpret *everybody*'s 'there are' as the existential quantifier in a fundamental language. We thus get essentially the same result that I argue for below.

So there is pressure against rejecting either of (11) and (12). But perhaps we can proceed differently, by denying that (11) and (12) really contradict each other. More precisely, we can deny that the particular tokens of these sentences which each seem so independently plausible contradict each other. When the philosopher asserts (11) and denies (12), he speaks truly but does not contradict the man on the street. And when the man on the street asserts (12) and denies (11), he speaks truly but does not contradict the philosopher.

There are a few ways this might go. 'There are' might be somehow ambiguous or polysemous: perhaps the philosopher and the man on the street are using subtly different homophonic expressions when they respectively deny and assert (12). Or perhaps 'there are' is context-sensitive: when the philosopher utters (11), he does so in a context where 'there are' means one thing; when the man on the street utters (12), he does so in a context where it means something else.[24] Or perhaps there is no variation in the semantic value of 'there are' at all, but rather in a contextually specified, unuttered restrictor.[25] But however the details go, the upshot is the same: the semantic contribution of the various tokens of 'there are' (perhaps along with the contributions from associated unuttered, contextually-supplied parameters) are different in the cases where we think (11) ought to be true than they are in the cases where we think (12) ought to be true.

Although important in the philosophy of language, for our purposes we can ignore the subtleties between the different variation-generating mechanisms. For simplicity, we will pretend there are two expressions of English, both written 'there are'. One of them — the ordinary 'there are' — is what English speakers use in their unreflective moments when they truly say things

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[24]Cf. Horgan and Timmons (2002: Part II).

[25]See, e.g., Stanley and Szabó (2000) and Stanley (2002*b*: 366–377).

such as (12). The other — the philosophical 'there are' — is what philosophers use when they truly say, in their philosophical discussions, things such as (11). Everything below presupposes this little just-so story, but with some effort we can rework what follows for use with a more nuanced story about the variance in (11) and (12)'s truth-conditons.

The Philosophical 'There Are' and Fundamentality

So how does this philosophical 'there are' get its meaning? Living our workaday lives, we are content to say things such as (12). But when we start doing philosophy, we notice that what we mean by 'there are' in our less reflective moments does not quite mesh with what we want it to mean in other, 'serious' discussions — discussions of the sort that started us thinking philosophically in the first place. We correct for this by using 'there are' in a correspondingly serious way — a way which most of us think makes sentences such as (12) *false*. We create a sort of philosophical ideolect in which 'there are' is supposed to capture the metaphysically important center of the English quantifier while cutting out the excess fluff added by charitably interpreting the vulgar.[26]

Of course, while in the philosophy room, we can use 'there are' however we choose. But certain features of our usage suggest that we are best interpreted as wanting 'there are' to latch on to the fundamental ontological structure of reality — that we want it to be interpreted as a fundamental quantifier.

Consider, for instance, the kinds of evidence philosophers take as potentially undermining various existence claims. Philosophers have argued against various ontological views on the grounds that they are objectionably arbitrary (e.g. van Inwagen 1990: 66–69; Merricks 2001: 41–42; Van Cleve 2007:

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[26]Cf. Dorr (2005: §7) and van Inwagen (1990: 101).

333), anthropocentric (e.g., van Inwagen 1990: 124–127; Sider 2001*b*: 156–157; Hawthorne 2007: 270-271), or otherwise ungainly. Likewise, other high-level theoretical considerations, such as general principles about causation (Merricks 2001: ch. 3) or supervenience (e.g., Heller 1990: 30–32; Burke 1992), have been used to argue for various ontological results.

We would not *usually* take such considerations as evidence that there are or aren't certain sorts of things. Nobody who says, in ordinary conversation, 'There is another chair here; go ahead and sit down,' will take high-falutin' claims about causal overdetermination as relevant to what he said. The very fact that philosophers feel the need to address these sorts of considerations (whether they think such considerations carry the day or not) show that they at least think them *relevant* to what they intend to express when they say, in their reflective philosophical moments, 'There is a chair here.'

If philosophers intend the philosophical 'there are' to latch on to the fundamental ontological structure of reality, it makes sense for them to take charges of arbitrariness, anthropocentrism, etc. as relevant to the truth of 'there are' sentences. After all, it is very plausible to think that reality's fundamental structure will not be arbitrary, anthropocentric, etc. On the other hand, if the philosophical use of 'there are' *doesn't* latch on to a fundamental ontological joint, it is hard to see why anyone ever brought these considerations up in the first place. So there is pressure to think not only that an ideal interpreter *won't* interpret tokens of 'there are' uttered in philosophical contexts the same way as tokens of 'there are' uttered in ordinary contexts, but also that such an interpreter *will* try to interpret the former as a fundamental quantifier.

Fundamental Quantifiers and the Semantic Criterion

When we stated the semantic criterion for quantification, we were not speaking the English of the vulgar. We were (and still are) speaking philosophers' English. So to be an s-quantifier is to range over things that a fundamental, joint-carving quantifier ranges over and say of those things that they satisfy the postfixed formula.

We ontological monists ought to find this picture of philosophers' English unproblematic. Many ordinary English expressions take on subtly different meanings in the hands of philosophers: we tend to want 'necessarily', 'cause', 'person', and other expressions to mean not quite *exactly* what ordinary folk mean by them, but to mean instead whatever important feature lies in the neighborhood of what the folk are talking about.[27] If there is a unique important feature in the quantificational neighborhood, that is what the philosophers' 'there are' should mean. Ontological monists think that there is a unique important feature in the neighborhood of the English 'there are': the single fundamental quantifier.

Our ontological pluralist thinks something else. According to her, there are *two* important features in the quantificational neighborhood: the two fundamental quantifiers, '$\exists_1$' and '$\exists_2$'. She will agree that when we started speaking philosophers' English, we tried to use 'there are' to mean whatever the fundamental quantifier meant. But there were too many candidates, and something went wrong.

The philosophers' 'there are' is similar in many ways to a technical, theoretical term. We can think of it as having been implicitly introduced the way theoretical terms are often *explicitly* introduced: by reference to some theoretical role. We introduce 'electron' for the players of the electron role,

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[27]Cf. Williamson (2003: 459).

'quark' for the players of the quark role, 'mass' for the player of the mass role, etc.[28] By intending the philosophical 'there are' to get at the metaphysically important core of the folk's counterpart term, we essentially introduce it as the player of the fundamental-quantifier role.[29]

Sometimes many things each play a given theoretical role, or at least come very close to playing it and no closer than any of the others. Relativity taught us, for instance, that nothing plays the role Newtonian mechanics assigned to 'mass'. As it turns out, two relativistic properties — *relativistic mass* and *proper mass* — each come very close to playing that role, and closer than any other. In this case, we say that Newton's 'mass' was indeterminate between these two properties. Much of what Newton said using 'mass' was true when it denoted one of these properties or another, and quite a bit of what he said using it was true whichever property it denoted.[30]

According to the ontological pluralist, there are two expressions that come equally close to playing the fundamental quantifier role and closer than any other: '$\exists_1$' and '$\exists_2$'. In fact, they each fail to play that role perfectly only because the role calls for uniqueness, and they aren't unique. So our ontological pluralist will say that the philosophical 'there are' is indeterminate between '$\exists_1$' and '$\exists_2$'.

She can precisify the philosophical 'there are' with 'there are$_1$' and 'there are$_2$' and talk accordingly. Since 's-quantifier' was defined in terms of 'there are', she will think that it is likewise indeterminate in meaning, and precisify it by saying that an expression is an s-quantifier$_1$ iff it says that there are$_1$ some things which satisfy its postfixed formula, and that it is an s-quantifier$_2$ iff it says that there are$_2$ some things which satisfy its postfixed formula. She

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[28]See Lewis (1970).

[29]Cf. Sider (2008: §§5, 11).

[30]See Field (1973) and Lewis (1984: 58–59).

will also say that an s-quantifier$_1$, $\exists$, is an s-restriction$_1$ of another, $\exists'$, iff everything$_1$ ranged over by $\exists'$ is ranged over by $\exists$ but not *vice versa*. Likewise, an s-quantifier$_2$, $\exists$, will be an s-restriction$_2$ of another, $\exists'$, iff everything$_2$ ranged over by $\exists'$ is ranged over by $\exists$ but not *vice versa*.

Back to the Argument

We are now ready to see how the pluralist should respond to the semantic version of the Disjunctive Quantifier Argument. Let's start with (ii-S). The pluralist will say that it has two precisifications:

(ii-S$_1$) If $\exists$ is an existential s-quantifier$_1$ and $\exists'$ an s-restriction$_1$ of $\exists$, then $\exists'$ is more ontologically misleading than $\exists$.

(ii-S$_2$) If $\exists$ is an existential s-quantifier$_2$ and $\exists'$ an s-restriction$_2$ of $\exists$, then $\exists'$ is more ontologically misleading than $\exists$.

Consider (ii-S$_1$). The pluralist thinks that '$\exists_1$' is not ontologically misleading at all, and therefore no more ontologically misleading than any other quantifier. So she will want to reject (ii-S$_1$) only if she thinks some other quantifier$_1$ is an s-unrestriction$_1$ of '$\exists_1$'. But she thinks that '$\exists_1$' ranges over everything there is$_1$, so no quantifier can be an s-unrestriction$_1$ of it. So she has no reason to reject (ii-S$_1$). And for precisely the same sorts of reasons, she will have no reason to reject (ii-S$_2$). Since she thinks these are the only precisifications of (ii-S), she has no reason to say that it is not true *simpliciter*.

Now consider (i-S). Its precisifications are:

(i-S$_1$) '$\exists_1$' and '$\exists_2$' are s-restrictions$_1$ of '$\exists^*$'.

(i-S$_2$) '$\exists_1$' and '$\exists_2$' are s-restrictions$_2$ of '$\exists^*$'.

Recall that, in order for one expression to be an s-restriction of another, both expressions must be s-quantifiers. So, for one expression to be an s-restriction$_1$

of another, they must both be s-quantifiers$_1$. An expression is an existential s-quantifier$_1$ only if its semantic function is to say that there is$_1$ something that satisfies its postfixed formula. But '∃*' does *not* say that there is$_1$ something that satisfies its postfixed formula; hence, it is not an s-quantifier$_1$ and thus not an s-unrestriction$_1$ of anything else. For similar reasons, it is not an s-quantifier$_2$ and thus not an s-unrestriction$_2$ of anything else. So the pluralist will think that (i-S) is false on every precisification and hence false *simpliciter*. She will reject (i-S) outright, and so the Disjunctive Quantifier Argument gives her no reason to reject her pluralism.

We can now also see how the pluralist ought to respond to the objection of section 3.2.1. On a mixed inferential criterion of quantification, an expression will count as a quantifier if and only if it obeys the right inferential roles, where those inferential roles are specified by reference to s-names — expressions that name something. But of course this criterion for s-names was stated in philosophers' English, where quantifiers are intended to be fundamental. Since the pluralist will insist that 'something' in this language is indeterminate between 'something$_1$' and 'something$_2$', she will insist that there are two kinds of s-names: s-names$_1$, which refer to something$_1$, and s-names$_2$, which refer to something$_2$. Then there will again be two kinds of mixed i-quantifiers: mixed i-quantifiers$_1$, which obey the inference rules where 'names' mean 's-names$_1$', and mixed i-quantifiers$_2$, which obey the rules where 'names' mean 's-names$_2$'. And for reasons that should now be familiar, the pluralist will insist that '∃*' is neither a mixed i-quantifier$_1$ not a mixed i-quantifier$_2$. Even on this mixed reading, the Disjunctive Quantifier Argument is no threat to the pluralist.

3.3 The Conjunction Argument

In responding to the Disjunctive Quantifier Argument, the pluralist said that 'there are' is indeterminate between the two fundamental quantifiers. But this now opens her up to a new argument:

The Conjunction Argument:

If 'there are' is indeterminate between '$\exists_1$' and '$\exists_2$', you will have to say, along with Ryle (1949: §1.3), that for some F and G, both of

(13) There are Fs,

(14) There are Gs,

are true, even though

(15) There are Fs and Gs

is not. But quick reflection on how we use 'there are' shows this to be false. Everyone agrees that the inference from (13) and (14) to (15) is valid. So pluralism must be mistaken.[31]

This argument needs to say whether it is discussing the ordinary 'there are' or the philosophical one. If the argument is talking about the ordinary 'there are', pluralists ought to part ways with Ryle and grant that (15) is just as good a thing to say as (13) and (14). (Ryle, unfortunately, cannot come along; as an 'ordinary language philosopher', he cannot recognize the distinction between ordinary and philosophical quantifiers. For him to grant the truth of (15) in ordinary discourse is for him to give up his position.) The fact that the vulgar happily infer (15) from (13) and (14) tells us that, if we can charitably interpret their 'there are' in a way that validates this inference, we should.

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[31]Cf. van Inwagen (1998: 17–18). Thanks to Ted Sider for pressing me on this argument.

Since we can — we can, at a minimum, let it mean '$\exists$*'[32] — the inference turns out valid.

So suppose the argument is about the philosophical 'there are'. It is not quite right to say that the philosophical 'there are' will not licence an inference from (13) and (14) to (15). Pluralists hold that the philosophical 'there are' is indeterminate between '$\exists_1$' and '$\exists_2$'. But to call an inference involving indeterminate expressions *valid* is to say that, for every precisification of those expressions on which all the premises are true, the conclusion must be true too. On this understanding of validity, every inference of the relevant form is valid.

This may not be enough to satisfy some proponents of this argument. They may think that, even if the philosophical 'there are' is indeterminate, certain uses are most naturally taken to mean one quantifier rather than another. Suppose, for instance, that '$\exists_1$' ranges over concreta and '$\exists_2$' ranges over abstracta. Then perhaps when someone utters in a serious philosophical context

(16) There are numbers,

we should take her utterance to mean that there are$_2$ numbers, and if she utters

(17) There are chairs,

we should take her utterance to mean that there are$_1$ chairs. If we did this, then when someone makes serious, philosophical utterances of (16) and (17) one after the other, we would take them both to be true. But if she then says

(18) There are both numbers and chairs,

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[32]Or something even less fundamental, in order to account for sentences such as (12); cf. section 3.2.2.

we must take her to have said something false, for there is no precisification of the philosophical 'there are' that makes (18) true.

Most philosophers, even in their most serious moments, will move seamlessly from sentences like (16) and (17) to ones like (18). If utterances of (16) and (17) ought to be interpreted charitably, are pluralists, who will have to resist at least some such transitions, therefore mistaken?

No. It only follows that philosophers do not *use* 'there are' as though they think it is indeterminate. But we shouldn't expect them to: most philosophers aren't ontological pluralists, so they think it *isn't*. They commonly infer (18) from (16) and (17) because they have certain (often tacit) theoretical beliefs that underwrite the inference. Since the pluralist does not share these beliefs, she should not be surprised — or embarassed — if she does not accept the inference.

Indeterminacy and related semantic phenomenon can come from either of two sources. A term may be indeterminate because we use it with a tacit understanding of its indeterminacy, or it may be indeterminate thanks to the metaphysical facts of the matter. As noted above, in Newton's mouth, 'mass' was indeterminate between relative and proper mass. But this was not because Newton *used* 'mass' as though he thought it was indeterminate or otherwise semantically underspecified; it was because the metaphysics of the situation left it with no single interpretation.[33]

Ontological pluralists think that we monists are in a situation like Newton's. If we are to be charitably interpreted when we (philosophically) utter sentences such as (16) and (17), the indeterminacy of the philosophical 'there are' must be resolved in different ways. But there is no way, pluralists think, of resolving the indeterminacy so as to make (18) true. The metaphysical facts of the matter, rather than ambiguous use on our part, make our philosophical

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[33]Compare Hawthorne (2007: 267) on the context-sensitivity of 'simultaneous'.

use of 'there are' indeterminate. Our smooth transition from (16) and (17) to (18) is therefore no evidence for its determinateness, but rather evidence only for widespread ignorance of the metaphysical truths that make it indeterminate.

3.4 Van Inwagen's Counting Argument

Peter van Inwagen (1998) argues against ontological pluralism as follows:

The Counting Argument:

No one would be inclined to suppose that number words like "six" or "forty-three" mean different things when they are used to count different sorts of objects. The very essence of the applicability of arithmetic is that numbers may count anything: if you have written thirteen epics and I own thirteen cats, then the number of your epics *is* the number of my cats. But [being] is closely tied to number. To say that [there are no unicorns] is to say something very much like saying that the number of unicorns is 0; to say that [there are horses] is to say that the number of horses is 1 or more. The univocacy of number and the intimate connection between number and [being] should convince us that there is at least very good reason to think that [being] is univocal.[34] (17)

I take it that one way for a term to be 'equivocal' in van Inwagen's sense is for it to be indeterminate. So if the pluralist is right, 'there are' in philosophers' English is indeed equivocal. And, if the 'there are' in ordinary English is interpreted with an eye towards charity to the vulgar, then it may very well be indeterminate: it is very likely that the way ordinary speakers use 'there are' does not single out just one interpretation as *the* charitable one. If this suffices for indeterminacy, then the ordinary 'there are' will be equivocal also.

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[34]Having already defended the view that being is the same as existence, van Inwagen moves freely between the thesis that *being* is univocal and that *existence* is univocal. The equivalence of being and existence isn't under question here, but for uniformity, I have rephrased what he says using "existence" in quantificational terms instead.

The pluralist *does* think that there is a quantifier expression which is not indeterminate — '∃*' from section 3.2.[35] But this fact alone helps the pluralist but little. For she will still grant that the 'there are' in philosophers' English is equivocal, so it still seems she must either deny that sentences such as

(19) There are no unicorns if and only if the number of unicorns is zero

are unequivocally true in philosophical English or grant that there is an ambiguity in numerical terms such as 'zero' and 'one'.

Neither option is completely unpalatable, although it's hard to savor the taste of either. Fortunately for the pluralist, she need not choose. Van Inwagen makes a subtle slide in his argument. Let's grant that even in philosophers' English there is a tight tie between counting and quantification.[36] And we will also grant that these connections guarantee that, if there are different senses of

(20) There are no unicorns,

then there also must be different senses of

(21) The number of unicorns is zero.

It does not follow, as van Inwagen seems to assume, that there must be different senses of 'zero'. There may instead be different senses of 'the number of'.

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[35]Cf. McDaniel (2008: §3).

[36]In section 3.2.2, we compared the philosophical 'there are' to an explicitly introduced theoretical term. To extend the comparison further, we might here pretend the Ramsey sentence we used to fix its meaning specified certain ties with numerical quantifiers. For instance, the sentence may have a clause such as 'Σ is a fundamental existential i-quantifier and Δ is a fundamental numerical i-quantifier where, for any predicate Π, $\ulcorner \sim \Sigma x(x$ is a $\Pi) $ iff $\Delta(\Pi, 0)\urcorner$ is true. ($\ulcorner \Delta(\Pi, 0) \urcorner$ is supposed to say, intuitively, that the number of Π-satisfiers is zero.) Then, ceterus paribus, pairs of candidate semantic values that respect this tie between numerical and existential quantification are more eligible to be the semantic values of these two quantifiers than pairs that do not.

To say that the number of Fs is *n* is to say that a certain *numbering* relation holds between something — the Fs themselves, or the property of F-ness, or what-have-you — and *n*. But, if we think that the Fs may exist in different ways, there is nothing particularly embarrassing about thinking that there are different kinds of numbering relations as well. Perhaps when there are$_1$ some Fs, then they number$_1$ some non-zero number *n*, and if there also aren't$_2$ any Fs, then they number$_2$ zero. There is no ambiguity in the terms for numerical objects, but only in the terms relating these objects to whatever they are counting. This sounds like a perfectly natural extension of ontological pluralism, and provides the pluralist a way of preserving the tight tie between counting and quantification without any equivocality in numerical terms.

3.5   The 'There Can Be Only One' Argument

According to ontological pluralists, the fundamental theory uses a language with multiple first-order, singular existential quantifiers. But Timothy Williamson (1988, 2006) and Vann McGee (2000, 2006) have an argument that in such a language the two quantifiers would be equivalent. The argument runs:

The 'There Can Be Only One' Argument:

If the pluralist's '$\exists_1$' and '$\exists_2$' are existential *quantifiers*, they must obey the inference rules appropriate to such quantifiers. If they do, they are provably equivalent. By existential$_2$ generalization, $F(t) \vdash \exists_2 x F(x)$. And by existential$_1$ instantiation, if $F(t) \vdash \exists_2 x F(x)$ and t does not occur in $F(x)$, then $\exists_1 x F(x) \vdash \exists_2 x F(x)$. So, since we can always find some term t that does not occur in $F(x)$, $\exists_1 x F(x) \vdash \exists_2 x F(x)$. Precisely the same argument, with indices swapped, shows that $\exists_2 x F(x) \vdash \exists_1 x F(x)$.[37]

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[37]The argument is essentially part of a proof of a theorem by J. H. Harris (1982), who suggests these inferentially exclusionary properties are what make logical constants *logical*. Neither he, McGee, nor Williamson deploy the argument directly against ontological pluralism. Williamson seem to assume at one point that the following argument would rule out pluralism (1988: 115), although he says things later in the same paper with regard to a different view which are in the same spirit as my remarks below.

If the pluralist's quantifiers are indeed provably equivalent, she is in trouble: if whatever one quantifier ranges over is also ranged over by the other, she will find it hard to justify the claim that we really have *two* ways of being here.

But the argument that the quantifiers are equivalent relies on their obeying certain inference rules. In particular, the argument needs each quantifier to obey classical existential instantiation and generalization rules. And pluralists should have been suspicious of these rules long before they saw the 'There Can Be Only One' Argument.

Imagine you tell a pluralist that a certain book is about Tony, but do not tell her what kind of thing Tony is. Should she conclude that there is$_1$ something this book is about? No, for that presupposes that Tony exists$_1$,[38] which is not something she knows. If Tony does not exist$_1$, then from the perspective of the quantifier '$\exists_1$', 'Tony' is an empty name and cannot be generalized from. Should she instead conclude that there is$_2$ something the book is about? No, for that presupposes that Tony exists$_2$, something else she does not know. If Tony doesn't exist$_2$, then from the perspective of the quantifier '$\exists_2$', 'Tony' is an empty name and again cannot be generalized from.

Our pluralist friend should conclude nothing before she decides which quantifier she can generalize from, and she cannot do that until she finds out which quantifiers treat 'Tony' as non-empty. She is not unlike an (ontologically monistic) free logician: if told that a certain book is about Tony, he could not conclude that the book was about something unless he knew that 'Tony' was not an empty name.

The free logician avoids this problem by revising his (ontologically monistic) inference rules as follows:

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[38]That is, it would be to suppose that there is$_1$ something identical to Tony; I'm supposing that to exist is just to be identical to something, and if there are multiple ways of being, there are multiple kinds of existence — one for each way of being.

Free Existential Generalization

$F(t)$ & $\exists x(x = t) \vdash \exists x F(x)$.

Free Existential Instantiation

If Q, R, $\ldots$, $F(t)$, and $\exists x(x = t) \vdash P$, and if t does not occur in P, Q, R, $\ldots$, or $F(x)$, then, Q, R, $\ldots$, and $\exists x F(x) \vdash P$.

Our pluralist ought to follow suit: just as the free logician's monist quantifiers have to make sure a name isn't empty before they generalize from it, each of her pluralist quantifiers must make sure that a name isn't empty (with respect to themselves) before they generalize from it. That is, for each of her quantifiers $\exists_i$, she ought to endorse the following rules:

Pluralist Existential$_i$ Generalization

$F(t)$ & $\exists_i x(x = t) \vdash \exists_i x F(x)$.

Pluralist Existential$_i$ Instantiation

If Q, R, $\ldots$, $F(t)$, and $\exists_i x(x = t) \vdash P$, and if t does not occur in P, Q, R, $\ldots$, or $F(x)$, then Q, R, $\ldots$, and $\exists_i x F(x) \vdash P$.

With these rules, the 'There Can Be Only One' Argument cannot go through. Pluralist existential$_1$ instantiation will let us infer $\exists_2 x F(x)$ from $\exists_1 x F(x)$ so long as $\ulcorner F(t)$ & $\exists_1 x(x = t) \urcorner$ implies $\exists_2 x F(x)$. But it doesn't; pluralist existential$_2$ generalization tells us we need $\ulcorner F(t)$ & $\exists_2 x(x = t) \urcorner$ to infer $\exists_2 x F(x)$. If the pluralist's quantifiers obey these rules rather than classical ones, they will not be provably equivalent.

I can think of three objections one might make to my suggestion. Let's examine each of them in turn.

3.5.1 Empty Names

Objection 1:

Logic is not the logic of sentences, but the logic of *propositions* — the logic of what those sentences *mean*. But sentences with empty names do not express propositions, so there can be no logic of sentences with empty names. 'Free-logic' is therefore not really logic, and so its 'inference rules' are not really inference rules, either. Your defense of pluralism fails: you tried to assign inference rules to quantifiers that aren't really inference rules at all.[39]

The most straightforward construction of an ontologically plural logic from a free logic goes like this: Begin with an axiomatization for free logic. Add more quantifiers to the language. Then say that the axioms apply for any uniform substitution of one of the original quantifiers with one of the new ones. (See section A.2.) But the resulting logic is *free*: it allows names to be completely uninterpreted. That is, not only might a name not be assigned a referent with thus-and-so a mode of being, but it might not be assigned a referent *at all*. It might be empty not just from the perspective of this or that quantifier, but from the perspective of *every* quantifier.

A pluralist might like this. She may be independently attracted to free logic, and think we can talk meaningfully about inferences involving 'Tony' even if there is$_1$ nothing that 'Tony' denotes and there is$_2$ nothing that 'Tony' denotes. If so, she must tackle the complaint head-on, arguing either that even sentences with empty names can express propositions or that logic isn't just the logic of propositions after all.

But her ontological pluralism does not force her to do this. If she wants, she can grant that logic is the logic of propositions and that sentences with absolutely empty names do not express propositions. She can add an axiom

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[39]See Williamson (2006: 382). Notice that Williamson deploys the 'There Can Be Only One' Argument for another purpose, and it is not clear whether his opponent can use the reply I offer below.

that rules out absolutely empty names:

(22) $\ulcorner \exists_1 x(x = t) \vee \exists_2 x(x = t) \urcorner$, for any name t.

On the resulting logic, every term has a denotation. More precisely, for every term t, either there is$_1$ something t refers to or there is$_2$ something t refers to. (See section A.5.) Then she may insist that, since no name is absolutely empty, every sentence of her language expresses some proposition or other.

Some may remain unsatisfied. True, the modified logic keeps names from being empty from the perspective of *every* quantifier. But a name may still be empty from the perspective of this or that quantifier. So doesn't the problem re-arise from the perspective of any particular quantifier? If '$\exists_1$' treats 'Tony' as empty, then from its perspective, doesn't 'Tony is prime' express no proposition? And if so, doesn't this ruin talk about inferences this sentence participates in?

No. According to ontological pluralism, in order to describe reality in its entirety, you need multiple fundamental quantifiers. You cannot say everything there is to say using only some of the fundamental quantifiers. You must use them all. To view the world from this or that quantifier's perspective is to view the world from a partial perspective — you cannot see all there is to see about the world.

Granted, from the perspective of this or that quantifier, some names may be empty and some sentences may not express propositions. But the quantifiers in question don't have all the needed information. Logic is not the logic from the perspective of this or that quantifier — it is *absolute* logic, logic from the perspective of all the quantifiers taken together. So if logic also needs to be the logic of propositions, it is only important that the sentences in question express propositions from the perspective of all the quantifiers taken together. Given axiom (22), they do.

3.5.2 Names and Free Variables

Objection 2:

Your presentation of the 'There Can Be Only One' Argument used names. Then you dodged that argument by appealing to inference rules that dealt differently with names. But the argument could have been given using a logic with inference rules using free variables instead. In such a logic, $\exists_1 x F(x) \vdash F(x)$ by existential$_1$ instantiation, and $F(x) \vdash \exists_2 F(x)$ by existential$_2$ generalization. Again, we can repeat the argument with the indices swapped, and conclude that the two quantifiers are equivalent. And no names were used in this argument.[40]

The pluralist inference rules suggested above do not block this name-free version of the argument. But pluralists ought to be just as skeptical of classical free-variable-using rules as they were of the classical name-using rules.

In fact, even a free logician should suspect the classical name-free rules. One attraction of free logic is its treatment of empty names. Another is that free logics do not make it a logical truth that something exists. But classical inference rules — even the ones that use free variables — let us derive $\exists x \exists y (x = y)$ from no premises, and thus make it a logical truth that something exists. So a free logician will want to reject these rules. And if he does, he will replace them instead with:

FREE NAMELESS EXISTENTIAL GENERALIZATION

$F(x)$ & $\exists y(y = x) \vdash \exists x F(x)$.

FREE NAMELESS EXISTENTIAL INSTANTIATION

If Q, R, ..., $F(x)$, and $\exists y(y = x) \vdash P$, and if x does not occur free in P, Q, R, ..., then Q, R, ..., and $\exists x F(x) \vdash P$.

Pluralists should dislike the classical name-free rules for a similar reason: they do not think that $\forall_1 x \exists_2 y (x = y)$ should be a logical truth. And they

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[40]Cf. Williamson (2006: 382).

can avoid this — as well as the name-free 'There Can Be Only One' Argument — by adapting the free logican's rules as follows:

PLURALIST NAMELESS EXISTENTIAL GENERALIZATION

$F(x)$ & $\exists_i y(y = x) \vdash \exists_i x F(x)$.

PLURALIST NAMELESS EXISTENTIAL INSTANTIATION

If Q, R, ..., $F(x)$, and $\exists_i y(y = x) \vdash P$, and if x does not occur free in P, Q, R, ..., then Q, R, ..., and $\exists_i x F(x) \vdash P$.

Once again, with these modified rules the argument cannot go through; the final step requires that we have $\exists_2 y(y = x)$, and we have no way to derive this from $\exists_1 x F(x)$.[41]

3.5.3 Change of Logic, Change of Subject

Objection 3:

You have not shown that multiple, logically distinct quantifiers are coherent. You have shown instead that multiple backwards 'E's in a language can each obey inference rules that look a little bit like quantificational ones. But a symbol isn't a quantifier unless it obeys good old-fashioned classical existential generalization and instantiation — none of this mucking about with free-logic-type rules and the like.

If anyone wants to refrain from calling a symbol a 'quantifier' unless it obeys their favored inference rules, there is little I can do to stop them. But if the objection is to have any force, it must say that somehow the standard rules capture 'what it is' to be a quantifier in a way the pluralist revisions do not.

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[41]Notice also that this means we could have a name-free pluralist logic that still wouldn't license the 'There Could Be Only One' Argument. In this case the complaint from section 3.5.1 looks even worse, since such a logic would have no need to countenance empty names. Thanks here to Cian Dorr.

I do not know how to argue that a set of inference rules captures or fails to capture the essence of quantification. But I can make a few observations that take a lot of bite out of the charge that, whatever it takes for some inference rules to be essential for quantifierhood, the pluralists' rules don't have it.

First, note that if axiom (22) is adopted, the logic we proposed, and hence the inference rules that go with it, collapses into classical logic for languages with just one existential quantifier. As it happens, most linguists and philosophers cut their teeth on just such languages. So even though the pluralist denies that the classical inference rules are 'right', she can still explain why we were tempted to think they were. In one-quantifier languages that satisfy the one-quantifier version of (22) — including most languages that linguists and philosophers work with (free logicians excepted, of course) — there is no visible difference between the classical rules and the pluralist's. We failed to notice the need for that extra premise because it was a logical truth (an instance of (22)) and so never needed any special attention.

Second, restricted quantifiers do not obey 'good old-fashioned classical existential generalization and instantiation'. For instance, I cannot infer 'There is something in the fridge' from 'Elly the electron is in the fridge' if my use of 'There is something . . . ' is restricted to foodstuffs, although classical existential instantiation would license the inference. Restricted quantifiers, in fact, obey the same inference rules we suggested above for the pluralists. Surely, though, restricted quantifiers are *quantifiers* — any criterion of quantifierhood that leaves them out is not getting at 'what it is' to be a quantifier.

So I see no good reason to think the classical rules somehow capture 'what it is' to be a quantifier better than pluralist ones. In fact, things look just the opposite: the pluralist's rules, by ruling in restricted as well as unrestricted quantifiers, appear more general than classical ones, getting closer to the heart

of what it is about quantifiers that make them quantificational.

3.6   The Economy Argument

So far, none of the arguments considered give ontological pluralists any serious trouble. A final, though, ought to bother some pluralists — although it will ultimately prove ineffective against pluralism in general.

We evaluate theories along a number of of dimensions. One of these dimensions is ideological: how many primitive expressions do we need in order to state the theory, how complex are those expressions, etc. As Ockham's razor says it is with ontology, when it comes to ideology, less is better: fewer and simpler primitive expressions are preferable to more or more complex ones. When all else is equal, we ought to prefer theories with cleaner, leaner ideologies.

A theory's primitive expressions are the ones it refuses to define. In metaphysics, it is natural to think of these 'definitions' as metaphysical reductions or analyses, reducing some higher-level structure to some more fundamental structure. In this case, the primitive expressions of metaphysical theories are the *fundamental* expressions, the expressions supposed to carve nature at its joints.[42] The other expressions are then somehow analyzed or reduced in terms of these fundamental, primitive ones.

Ontologically plural theories have multiple primitive quantifiers. Pluralists can disjoin these multiple quantifiers to make a single 'big' quantifier (as we did with '$\exists^*$' in section 3.2), and they can also use each of their quantifiers to define a predicate that applies to all and only things in its domain. For instance, if '$\exists_1$' and '$\exists_2$' are supposed to range over concreta and abstracta respectively, the pluralist can define 'is concrete' and 'is abstract' as follows:

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[42]Cf. Dorr (2004: §2) and section 3.2.2 above.

(23) $\ulcorner t$ is concrete$\urcorner$ =$_{df.}$ $\ulcorner \exists_1 x(x = t)\urcorner$

(24) $\ulcorner t$ is abstract$\urcorner$ =$_{df.}$ $\ulcorner \exists_2 x(x = t)\urcorner$

Since these are defined terms, '$\exists^*$', 'is concrete', and 'is abstract' are not primitive expressions of the pluralist's theory.

There is another theory which takes '$\exists^*$', 'is concrete', and 'is abstract' as primitive and defines '$\exists_1$' and '$\exists_2$' in terms of them as follows:

(25) $\ulcorner \exists_1 x F(x)\urcorner$ =$_{df.}$ $\ulcorner \exists^* x(x$ is concrete $\& F(x))\urcorner$

(26) $\ulcorner \exists_2 x F(x)\urcorner$ =$_{df.}$ $\ulcorner \exists^* x(x$ is abstract $\& F(x))\urcorner$

Since it defines '$\exists_1$' and '$\exists_2$' but refuses to define '$\exists^*$', this theory has only one primitive — that is, one *fundamental* — quantifier. Thus, it is an ontologically monistic theory: it recognizes only one mode of being.

Suppose the only disagreement between these two theories has to do with whether it is the two quantifiers '$\exists_1$' and '$\exists_2$' or rather the expressions '$\exists^*$', 'is concrete' and 'is abstract' that are primitive. In this case, call the monist's theory the *monist counterpart* of the pluralist's theory. The recipe we used to cook it up was perfectly general, and every pluralist theory has a monist counterpart.[43]

Ontologically plural theories, with their multiple primitive quantifiers, look more ideologically extravagant than their monist counterparts. If appearances aren't deceiving, monists can argue as follows:

The Economy Argument:

(i) Every ontologically plural theory has a monist counterpart.

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[43]Well, almost every pluralist theory has a monist counterpart. The recipe fails, for instance, when the pluralist theory has an infinite stock of quantifiers but does not allow infinitely long disjunctions and conjunctions. But I take it that if the only defensible form of pluralism needs infinitely many 'modes of being', pluralism is in pretty poor shape.

(ii) Any plural theory is more ideologically extravagant than its monist counterpart.

(iii) All else is equal between plural theories and their monist counterparts.

(iv) Therefore, every ontologically plural theory ought to be rejected.

If we think ideological economy is a theoretical virtue, we ought to accept the inference from (i)–(iii) to (iv). Take any pluralist theory. We might have lots of reasons to reject it — maybe it is empirically inadequate, or maybe it is ontologically extravagant in ways that have nothing to do with its pluralism. But even if there is no *other* reason for rejecting it, we still ought to reject it in favor of its more economical (by ii) but otherwise equal (by iii) monist counterpart.

But ought we accept premises (ii) and (iii)? Let's begin with (ii). It is tempting to think that the monist counterpart of a pluralist theory is more economical simply because it has fewer primitive expressions. But, in fact, it does not. We are tempted to think it does because we think to ourselves, 'We traded in two quantifiers for one, so we lowered the primitive expression count by one.' But we are wrong, because in order to give the monist theory all the expressive power of the pluralist one, we had to introduce two new predicates to act as restrictors for our one monist quantifier. In order to define '$\exists_1$' and '$\exists_2$', the monist counterpart needs not just the primitive '$\exists^*$', but also primitives 'is concrete' and 'is abstract'. If we count ideological economy by number of primitive expressions, the pluralist theory simply wins.

(Could the monist at least break even by defining, say, 'is concrete' as 'is not abstract'? Yes — so long as he knows that the concrete and the abstract are mutually exclusive. Perhaps some things are both concrete and abstract; the so-called 'immanent universals' defended by David Armstrong (1978), with their causal powers and spatiotemporal locations, may be likely candidates.

At any rate, it is no part of *ontological pluralism* that things not have have multiple kinds of being. Pluralism does not by itself rule out the truth of '$\exists_1 x \exists_2 y(x = y)$'; it needs some additional theoretical posits to do so. If the pluralist fails to make those posits, his monist counterpart cannot define one of his translating restrictors as the negation of the other.[44])

A better defense of premise (ii) says that the monist counterpart is more economical because it trades in (some) quantifiers for predicates, and predicates are ideologically cheaper than quantifiers. Adding new predicates to your theory seems less objectionable than adding new quantifiers. To add either sort of expression to a theory is to add structure to that theory. But the structure added by quantifiers in some sense runs deeper: quantifiers give us a realm of things, and predicates let us divide that realm. But the quantifiers seem to 'come first': only *after* we have our domain of things, provided by the quantifiers, can we start dividing them up with our predicates.

These considerations make the most sense when we understand ideological economy as a measure of structural complexity. The monist theory has, in a sense, one level of structure: the structure determined by the divisions between the extensions of the predicates. But the pluralist theory has two levels of structure: the divisions between the predicates' extensions, but *also* the divisions between the different ontologies.

So there is a sense in which pluralist theories are more ideologically costly than their monist counterparts. And since structural complexity is the sort of thing we should postulate only out of need, the sort of cost pluralist theories incur is the sort of cost that we ought to try to avoid when we can. So premise (ii) of the Economy Argument looks compelling.

What of premise (iii)? Well, there is a sense in which the monist's theory,

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[44]On the other hand, if the pluralist *does* make these posits, then the monist may be in better shape, for the monist can rule out by definition what the pluralist must rule out by *fiat*. Thanks here to Cian Dorr.

being a 'translation' of the pluralist's, can account for all the data the pluralist's can. Of course, this will depend on what we mean by 'accounting for the data'. Metaphysical theories are supposed to be accountable to some body of data, yet just what the data are and how they constrain these theories isn't so clear. But here is a toy model: the data consist of some sentences that are supposed to be true, and a theory accounts for them by showing how, if the world is the way the theory says it is, those sentences get their truth.

On this toy model, at least, the pluralist theory and its monist counterpart account for exactly the same data. For we can easily transform whatever 'accounting' function takes us from theorems of the pluralist theory to data-sentences into one which takes us from the monist translations of the pluralist's theorems to the same data-sentences. On this toy model, that is all it takes for the monist counterpart to account for all the data the pluralist theory does.

So all pluralist theories may well be tied with their monist counterparts on at least one theoretical virtue. But we ought to take care; there are more virtues than just adequacy and economy. For instance, *elegance* is a virtue: when choosing between theories, we ought to prefer elegant to ungainly ones.

In many cases, we should expect monist theories to be more elegant, as well as more economical, than their pluralist counterparts. A pluralist theory which differs from its monist counterpart only by positing a separate way of being for, say, tweed suits gains nothing in elegance. But this is not always the case, and some pluralist theories do seem more elegant than their monist counterparts.

Consider an example. Davids Lewis (1986*a*) and Armstrong (1986) disagree about the possibility of structural universals. Lewis insists that since

composition obeys the axioms of classical mereology, and since the way structural universals are allegedly composed out of their parts violates these axioms, there can be no structural universals. Armstrong responds that composition doesn't *always* obey these axioms: the axioms get it right so long as material things are composing material things, but when universals and other abstracta get into the mix things work differently.

There is something unlovely about Armstrong's response. It suggests that the composition relation, thought by both Lewis and Armstrong to be a deep and metaphysically important relation, acts very differently when it acts upon abstracta than it does when it acts upon concreta. So an attempted axiomatization of the compositional rules, in the fundamental language, will seem hopelessly convoluted, including all sorts of clauses reflecting whether parts are concrete or abstract. Furthermore, the response seems objectionably arbitrary. A monistic ontology may include many metaphysically important divisions — the division between abstract and concrete, the division between space-time points and their occupants, the division between phenomenal and non-phenomenal properties, etc. — so why should composition be so sensitive to *this* one?

If the distinction between concreta and abstracta is made to run deeper than the distinction between, say, space-time points and their occupants — that is, if it is upgraded to a distinction between different *ways of being* — the inelegance of Armstrong's response goes away. First, there is nothing arbitrary about composition's deferential treatment of concreta and abstracta: composition is sensitive to the *only* division between ways of being that there is. Second, the fundamental-language axiomatizations of the compositional rules look remarkably clean: there are simply two different axiom systems, one formulated using the fundamental quantifier for concreta, and the other

using the fundamental quantifier for abstracta.[45]

Now consider: the monist version of Armstrong's theory is less lovely, less elegant, more cumbersome than this pluralist counterpart. So not all else is equal between these counterpart theories. Furthermore, the elegance gained by positing multiple fundamental quantifiers may here very well outweigh the structural simplicity enjoyed by monism. So for this pair of theories, at any rate, premise (iii) is false and the argument fails.

On the simple model of adequacy I described above, pluralist theories and monist counterparts will be equally adequate. And it does seem that, in some sense or another, pluralist theories are going more ideologically economical than their monist counterparts. But evaluating competing theories' various virtues is a complex and multifaceted thing, and there is no way to tell, in advance, whether the apparent ideological simplicity of monism will always outweigh other theoretical virtues pluralist theories may enjoy. This means that there is no generic, sweeping Economy Argument against pluralism. At best, there is an argument form that we can evaluate only on a case-by-case basis: take any pluralist theory that comes along and see if its pluralism gives it any benefits that its monist counterpart lacks. But while this may give us good reason to reject this or that pluralist theory, it does not go anywhere near undermining pluralism in general — and, as a result, does not go anywhere near justifying the derisive attitude contemporary analytic philosophers commonly take towards it.

3.7   Conclusion

Ontological pluralism has few friends and many foes — foes who think it untenable, perhaps unthinkable, and almost certainly devastatingly refuted.

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[45]Cf. how McDaniel (2008: §7.1) deploys pluralism in a similar debate.

But although I do not count myself one of its friends, I don't think it untenable or unthinkable. Perhaps this is because I think I understand certain concepts — concepts involving metaphysical perspicuity and joints in nature — which have been slow to make their way out of the positivist shadow.

But given that I understand the view, do I think it refuted? Not in a way that justifies the curt dismissal it still tends to receive at the hands of analytic philosophers. I have examined here every argument against pluralism of which I am aware; not one of them has anything like the strength it would need to justify the dominant anti-pluralist attitude of the last half-century. The jury remains out, of course — we may bring to bear more anti-pluralist arguments before all is said and done — but I for one remain to be convinced that we are justified in treating ontological pluralism as anything less than a serious metaphysical option.

Chapter 4

Pluralism and Logical Truth

In chapter 3 I defended the doctrine of *ontological pluralism* against a number of arguments. Each tried to show that the view was determinately false or, at least, was determinately to be rejected. But I said nothing against a different worry: that there was no fact of the matter as to whether pluralism or its longtime adversary, ontological monism, were true. In this chapter I say something against that worry.

But first let me say more about what that worry is. Ontological pluralism, as I defended it, is a view about the ultimate structure of reality and therefore (I claim) a view about what a true, metaphysically perspicuous theory must be like. It holds that such a theory will represent reality as having multiple ontological structures. If we adopt *neo-Quineanism*, which says that metaphysically perspicuous theories will represent ontology through existential quantification, we will understand this as the claim that a true metaphysically perspicuous theory will use multiple existential quantifiers.[1]

Notice, though, that there is no guarantee that there will only be *one* metaphysically perspicuous theory. Maybe reality's ultimate structure can be represented in a variety of different ways. And maybe some of these true metaphysically perspicuous theories use multiple existential quantifiers, whereas others use only one. If this were so, it would be natural to say that there is no fact of the matter about whether pluralism or monism were true:

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[1]We will assume that these quantifiers are singular; see section 3.1.4.

we could represent reality as having multiple ontological structures or only one, and neither representation would do a better job of picking out the joints in nature than the other.

As it turns out, we have reason to think that this *won't* be the case. Or, more precisely, we have reason to think that, if there is a fact of the matter about which sentences express logical truths — a fact of the matter about what *logic* is like — then there will be a fact of the matter about whether pluralism or monism is true.

Here is how I will proceed. In section 4.1, I outline the worry in a bit more detail. In section 4.2, I explain how thinking that there is a fact of the matter about which truths are logical can save us from the worry. Finally, in section 4.3, I explore one way one might try to resurrect the original worry in light of my proposed response and point out certain problems it faces.

4.1   Fundamental Theories and Notational Variants

4.1.1   Fundamental Languages and Metaphysical Disputes

A *fundamental language* is a language where every simple expression is supposed to 'carve reality at the joints' — to correspond to some ultimate structural feature of reality. And a *fundamental theory* is a theory where every primitive (i.e., undefined) expression is an expression of a fundamental language. True fundamental theories are therefore metaphysically perspicuous: they show what the structure of reality is like. Since metaphysicians aim to tell us what the structure of reality is like, so they aim to find true fundamental theories.

Let's consider some examples. Some philosophers (e.g. Theodore Sider (2001*b*: 11–25) and D. H. Mellor (1981, 1998)) deny that reality is fundamentally *tensed*. Talk about what was or what will be going on is, according to

them, ultimately just talk about what (tenselessly) *is* going on at some time in the past or the future of the utterance. But other philosophers (e.g. A. N. Prior (1968) and Peter Ludlow (1999)) think instead that if you only talk about what goes on tenselessly at various times you miss out on important, tensed facts. Talk about what was or will be going on outstrips talk about what happens to be going on tenselessly at various times, they hold, because talk about what was or will be going on includes important additional information about which times *were* present, which times *will be* present, and which time *is* present *now*.

According to the second sort of philosopher, reality is irreducibly tensed. And if they are right, then the fundamental theory has some primitively tensed locutions, such as sentential tense operators 'WILL' and 'WAS' or a tensed predicate 'is present' that applies to times. But the first sort of philosopher, who denies that reality is irreducibly tensed, will define such operators or predicates (insofar as he recognizes them as meaningful at all) in terms of untensed expressions. The primitivist about tense thinks that the fundamental language has some tensed expressions in it; the reductivist about tense does not.

Similarly, some philosophers aim to reduce modality. Talk about what could or could not be the case is, according to them, ultimately just talk about what is or is not the case in some spatiotemporally disconnected spacetime (e.g. David Lewis (1986*b*)) or reducible to some sort of linguistic convention (e.g. Sider (MS*b*)). But other philosophers (e.g. Prior (1977) and Alvin Plantinga (1987)) think instead that a metaphysical reduction of modality is a mistake. Whether or not such-and-so could be the case is, according to them, written in to the fabric of reality: modal talk latches on to some fundamental modal joint.

According to the second sort of philosopher, reality is irreducibly modal.

And if they are right, then the fundamental theory has some primitively modal locutions, such as sentential modal operators 'POSSIBLY' and 'NECESSARILY', for instance, or a modal predicate 'is actual' that applies to worlds (cf. Bricker 2001, 2006). But the first sort of philosopher, who denies that reality is irreducibly modal, will define such operators or predicates (insofar as he recognizes them as meaningful at all) in terms of non-modal expressions. The primitivist about modality thinks that the fundamental language has some modal expressions in it; the reductivist about modality does not.

4.1.2   Notational Variants

So at least some disputes in metaphysics — e.g., the disputes between primitivists and reductivists about tense or modality — can be thought of as disputes about what the fundamental language is like. But notice that there can be a fact of the matter about who is right in these disputes without there being a fact of the matter about exactly which expressions show up in the fundamental language.

Consider, for instance, a primitivist about modality who takes the fundamental language to use primitive modal operators. Since, as is well-known, the standard modal operators 'POSSIBLY' and 'NECESSARILY' are, with the help of a negation, interdefineable, this philosopher need not insist that the fundamental language uses *both* of these expressions as primitive. He might think instead that there are two languages which are equally good candidates for the fundamental language and better than any other candidate. One has an undefined 'POSSIBLY' operator, and the other has an undefined 'NECESSARILY' operator. Each language, this philosopher thinks, is every bit as metaphysically perspicuous as the other. They just each represent reality's single modal joint in a slightly different way. One gets at this joint via possibility, and the other via necessity. But such a philosopher is still a primitivist

about *modality*: there may be different equally-qualified candidates for the fundamental language, but *all* of these candidates include undefined modal expressions.

We might describe this philosopher as thinking that there are two fundamental theories that are notational variants of each other. One uses a primitive possibility operator and defines a necessity operator in terms of it; the other uses a primitive necessity operator and defines a possibility operator in terms of it. But neither is any less metaphysically perspicuous than the other, and both are more metaphysically perspicuous than any third theory.[2]

In general, we say that theories T_1 and T_2 are *notational variants* if and only if (i) T_1 defines some of T_2's primitive expressions in such a way that every theorem of T_2 is also a theorem of T_1; (ii) T_2 does the same thing for T_1; and (iii) the languages of T_1 and T_2 are equally metaphysically perspicuous and no less metaphysically perspicuous than any other.

4.1.3   The Worry for Pluralism

When one theory is a notational variant of another in this sense, it is natural to say that there is no fact of the matter as to which theory is 'right' (where 'rightness' includes metaphysical perspicuity as well as truth). For instance, it is very natural to say that the fan of primitive modal operators discussed above thinks there is a primitive modal joint but does not think there is a fact of the matter about whether this modal joint is *possibility* or *necessity*.

The worry for pluralism is that every pluralist theory is a notational variant, in this sense, of some monist theory, and therefore that there will be no fact of the matter about whether pluralism or monism is right.

There is a general and a specific form of this worry. The general form

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[2]Cf. section 2.2.

is skeptical that reality has much of a determinate structure at all. It worries that almost any language, so long as it has enough expressive power, does as good a job of describing reality's ultimate structure as any other. According to this worry, for the most part *any* two true theories will be notational variants of each other, pluralist and monist ones included.

The general worry is indeed a worry for pluralist — and also a worry for monists, for realists about tense or modality, for reductionists about tense or modality, and for many others. It needs to be addressed.[3] But I am not going to address it here. I'm going to concern myself instead with a more specific sort of worry which holds that, even if many other metaphysical disputes turn out to not be over notational variants, there is something special about the particular debate between monists and pluralists that makes it notational. According to this worry, lots of equally true theories fail to cut nature very close to its joints at all — but among the elite few theories that *do* carve nature at its joints, some are ontologically plural and others are ontologically singular.

To see the worry, consider an ontological pluralist who claims that the fundamental theory uses two singular existential quantifiers: '$\exists_1$', which ranges over concreta, and '$\exists_2$', which ranges over abstracta. Such a philosopher can define a 'generic' existential quantifier, '$\exists^*$', by

(1) $\ulcorner \exists^* x \phi \urcorner =_{\text{df.}} \ulcorner \exists_1 x \phi \vee \exists_2 x \phi \urcorner$,

and she can define predicates 'is concrete' and 'is abstract' by

(2) $\ulcorner t \text{ is concrete} \urcorner =_{\text{df.}} \ulcorner \exists_1 x (x = t) \urcorner$,

(3) $\ulcorner t \text{ is abstract} \urcorner =_{\text{df.}} \ulcorner \exists_2 x (x = t) \urcorner$.

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[3]Indeed, it *has* been addressed, if not always under this guise, by a number of philosophers; see especially Lewis (1983*a*, 1984), Sider (2008, 2001*b*: xvi–xxiv), Fine (2001, 2005: 261–270), Hawthorne and Cortens (1995: 154–157), and Dorr (2005).

Now consider an ontological monist who claims that the fundamental theory uses only one singular existential quantifier, '$\exists^*$', but has two predicates, 'is abstract' and 'is concrete'. Such a philosopher can define two restricted quantifiers '$\exists_1$' and '$\exists_2$' as follows:

(4) $\ulcorner \exists_1 x\phi \urcorner =_{\text{df.}} \ulcorner \exists^* x(x \text{ is concrete } \& \phi) \urcorner$

(5) $\ulcorner \exists_2 x\phi \urcorner =_{\text{df.}} \ulcorner \exists^* x(x \text{ is abstract } \& \phi) \urcorner$

Suppose that, other than the disagreement about whether it's '$\exists_1$' and '$\exists_2$' that are fundamental or instead '$\exists^*$', 'is concrete', and 'is abstract', the two philosophers agree about everything else.[4] The worry is that these two philosophers may very well *both* be right — the monist's theory and the pluralist's counterpart may be notational variants of each other.

It's particularly important that the present worry about pluralism and monism is not tied to worries about whether there is a unique way to 'carve up reality'. Philosophers such as Hilary Putnam (e.g. 1987*a*, 1987*b*) and Eli Hirsch (e.g. 2002*b*, 2007) have insisted that there are different things we could mean by quantifier expressions, that none of these candidate meanings is in any way metaphysically privileged, and that as a result there could be theories that are notational variants of each other even though they have quantifiers that act as though they range over different (and different numbers of) objects.[5] Perhaps one theory divides up reality in such a way that whenever there are three mereologically simple objects, 'there are only three objects' comes out true, and another theory carves things up so that whenever there are three mereologically simple obejcts, 'there are seven objects' comes out true. According to the deflationary view of ontology championed by Putnam and Hirsch, neither theory would be metaphysically privileged compared to the

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[4]Cf. section 3.6.

[5]See also Kim (1993: ix–x) and Sosa (1993: 619–625).

other; they would be notational variants. And, in some hard-to-define but easy-to-understand sense, if Hirsch and Putnam are right, there isn't really a fact of the matter about how many objects there are.

I addressed this sort of deflationism in chapter 2.[6] But the specific worry about ontological pluralism addressed here is orthogonal to this more general ontological deflationism. The worry described above assumes that the monist and the pluralist agree about *everything* except the number of quantifiers in the fundamental language. In particular, they agree about *what there is*, in the generic ('$\exists^*$') sense. They simply disagree about whether talking about what there is in this generic way carves reality at the joints. And the worry is that their disagreement is just like a disagreement between two primitivists about modality, one of whom insists that it is necessity rather than possibility that carves reality at the joints, and the other who instead insists that it is possibility rather than necessity that carves reality at the joints.[7]

We must keep these two worries separate. Even someone who thinks that there is a perfectly determinate fact of the matter as to what there is and how many of them there are — someone who thinks there is a unique, privileged way of parceling out reality into object-sized bites — may still balk at the thought that there's a real metaphysical difference between a pluralist theory and its monist counterpart. And it is the worries of philosophers of this sort that I aim to assuage here.

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[6]And see Hawthorne (2006*b*) and Eklund (2007), as well as some of the works mentioned in note 3, for further critical discussion.

[7]For the record: although it is very plausible to think that there won't be a fact of the matter about who is right in a disagreement of this sort, nothing I have said forces this view upon us. It is consistent, if perhaps a bit strange, to think that there are two fundamental modal joints — *possibility* and *necessity* — which, as it turns out, are necessarily correlated in a certain way.

4.2 How Logical Realism Taught Me to Stop Worrying. . .

Consider the thesis of *Logical Realism* (discussed at length in section 2.3):

(LR) There is a fact of the matter as to which sentences are logical truths.

I will argue that, if logical realism is true, then, given the denial of a general sort of ontological deflationism, a monist theory and its pluralist counterpart are not notational variants.

4.2.1 The Argument: A First Pass

Here is the basic idea. Consider the following sentence:

(6) Everything is either concrete or abstract.

Both the pluralist and the monist agree that this sentence is true. But they both translate it into their fundamental theories in different ways. The monist translates it as (7), while the pluralist translates it as (8):

(7) $\forall^* x(x \text{ is concrete} \vee x \text{ is abstract})$;

(8) $\forall_1 x(\exists_1 y(x = y) \vee \exists_2 y(x = y)) \,\&\, \forall_2 x(\exists_1 y(x = y) \vee \exists_2 y(x = y))$.

Furthermore, (8) is, by the monist's lights, definitionally equivalent to (7). And (7) is, by the pluralist's lights, definitionally equivalent to (8).

But the two theories, with their attendant logics, don't treat these sentences the same way. The monist thinks that (7) gives the most logically perspicuous representation of all three sentences. But (7) isn't a logical truth — there is no rule of classical logic that requires everything to be in the extension of either 'is concrete' or 'is abstract'. And since the monist thinks the other two sentences are definitionally equivalent to this one, he thinks the other two sentences aren't logical truths, either.

The pluralist, on the other hand, thinks that (8) gives the most logically perspicuous representation of all three sentences. But (8) is a logical truth — it is a theorem of pluralist logic. (It follows from $\ulcorner\forall_i x\exists_i y(x = y)\urcorner$, which is itself a pluralist logical truth.) And since the pluralist thinks the other two sentences are definitionally equivalent to this one, she thinks the other two sentences are logical truths, too.

If there's a fact of the matter about whether (6) is a logical truth, then there's a fact of the matter about whether the pluralist or the monist is right.[8] If (6) is a logical truth, the pluralist is right; if it is not, the monist is right.

Some might think this is too fast. Suppose the monist defined 'x is abstract' as 'x is not concrete'. In this case the monist *would* think that (7), and therefore all three sentences, were logical truths. Does this resurrect the worry?

Nope. Suppose that 'x is abstract' is indeed defined as 'x is not concrete'. Now consider the sentence:

(9) Some concrete thing is also abstract.

The monist will think this is best understood as (10), while the pluralist will think it is best understood as (11):

(10) $\exists^* x(x$ is concrete $\&$ x is not concrete$)$;

(11) $\exists_1 x(\exists_2 y(y = x))$.

But (10) is, of course, a classical logical falsehood, whereas (11) is not a pluralist logical falsehood: there is nothing in pluralist logic that requires the

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[8]Assuming that at least one of them is right, of course; perhaps they both get things wrong. But that would be a problem independent of their theories being notational variants of each other.

domains of different quantifiers to be disjoint.[9] So if there is a fact about whether (9) is a logical falsehood, then there will once again be a fact about whether the pluralist or the monist is right, and so the theories won't be notational variants.

4.2.2 The Argument Generalized

But did the above argument work only because we haven't been clever enough to figure out just how the monist should define up his counterparts of the pluralist's expressions? Would a more subtle set of definitions help the monist's logical truths match up with the pluralist's in a way that could make their theories notational variants?

As a matter of fact, no. There is a perfectly general result to the effect that, if the pluralist's logic is of the form I describe in the appendix (specifically, in section A.5, where every term has a referent in the domain of some quantifier or another) and the monist's logic is classical, there is no way to get monist and pluralist logical truths to match up in the way the worry would require.[10]

Let's be more precise. Let L_P be a first-order pluralist language, P be ontologically plural logic,[11] L_C be a first-order monist language, and C be classical logic. Let a *translation scheme* between these languages be a pair of functions $\langle f, g \rangle$, where f is a function from sentences of L_P to sentences of L_C, and g is a function from sentences of L_C to sentences of L_P.

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[9]People often here push the implausibility of anything being both abstract and concrete, and say that pluralist logic should be modified to rule this out. If you are one of these people, for right now just rest content with the fact that the logical system OPC, as it stands, doesn't make (11) a logical falsehood. We will return to this objection in section 4.3, but it will help if we get the initial argument on the table first.

[10]In fact, the argument works just as well if we pair the 'free' system OP from section A.2 with a positive free logic. But the classical case is simpler.

[11]Specifically, system OPC from section A.5.

According to the worry we're dealing with, for every pluralist theory T_P, there will be some monist theory T_M and translation scheme $\langle f, g \rangle$ between T_P and T_M where (i) T_P and T_M are equally fundamental, (ii) ϕ is a theorem of T_P iff $f(\phi)$ is a theorem of T_M, and (iii) ϕ is a theorem of T_M iff $g(\phi)$ is a theorem of T_P. When this happens, say that T_M and T_P are *notational variants under* $\langle f, g \rangle$.

Suppose L_1 and L_2 are languages with associated logics $\mathscr{L}_1$ and $\mathscr{L}_2$, respectively. Then say that a translation scheme $\langle f, g \rangle$ between L_1 and L_2 *preserves logical truth* iff

(i) $\vdash_{\mathscr{L}_1} \phi$ iff $\vdash_{\mathscr{L}_2} f(\phi)$, and

(ii) $\vdash_{\mathscr{L}_2} \phi$ iff $\vdash_{\mathscr{L}_1} g(\phi)$.[12]

The thesis of logical realism is thus:

(LR) If a translation scheme t does not preserve logical truth, then theories T_1 and T_2 are not notational variants under t.

So, if a pluralist theory T_P and a monist theory T_M *are* notational variants, there must be a translation scheme between them that preserves logical truth.

However, given some plausible assumptions, there is no such translation scheme. Let's go through the plausible assumptions and see why they are plausible. First:

Linguistic Finitude: The languages L_P and L_C have only a finite number of quantifiers, names, and predicates.

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[12]'$\vdash_{\mathscr{L}_1} \phi$' should be read as '$\phi$ can be proven in $\mathscr{L}_1$ from no premises.' In chapter 2, we had only one kind of logic (classical with plural quantifiers) in play, and so we didn't need to have this sort of indexing to logical systems. Also, in section 2.3.4, we interpreted the logical realism constraint semantically, and so dealt with truth in all models ('$\models$') instead of derivability ('$\vdash$'). Since the logics in this chapter are all complete (see the appendix), it really doesn't make any difference whether we focus on derivability or entailment; I arbitrarily choose the former.

I don't know any general reason why the fundamental language would *have* to be so; but if there's supposed to be a general worry that pluralist theories and their monist counterparts are notational variants, that worry ought to be independent of whether the languages in question have a finite or infinite stock of these expressions.

Before we give the next two assumptions, let's have a few definitions. First, call a function f from sentences of L_1 to sentences of L_2 *truth-functionally conservative* iff

(i) $f(\ulcorner \sim\phi \urcorner) \dashv\vdash \ulcorner \sim f(\phi) \urcorner$, and

(ii) $f(\ulcorner \phi \,\&\, \psi \urcorner) \dashv\vdash \ulcorner f(\phi) \,\&\, f(\psi) \urcorner$.[13]

(Assuming that the truth-functional constants are interdefineable in the usual ways — as they are in P and C — similar clauses will follow for the other truth-functional constants.) And call a translation scheme $\langle f, g \rangle$ truth-functionally conservative iff both of f and g are truth-functionally conservative.

Next, say that a translation scheme $\langle f, g \rangle$ is *recoverable* iff

(i) $\phi \dashv\vdash g(f(\phi))$, and

(ii) $\psi \dashv\vdash f(g(\psi))$.

The next two assumptions are:

Conservatism: If T_P and T_M are notational variants under t, t is truth-functionally conservative.

Recoverability: If T_P and T_M are notational variants under t, t is recoverable.

Why can we assume conservatism? The original worry was that somehow T_M and T_P will be notational variants simply because their respective

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[13]'$\dashv\vdash$' stands for mutual implication: '$\phi \dashv\vdash \psi$' means that $\phi \vdash \psi$ and $\psi \vdash \psi'$.

quantifiers are interdefineable: we can translate the pluralist's many quantifiers into the monist's single quantifier and *vice versa*. But it was never in the bargain that we got to translate the truth-functional constants into different (or non-) truth-functional constants while doing so. If we think that T_P and T_M are notational variants under a translation scheme that tinkers with the truth-functional constants, we may begin to suspect that we're smuggling in a covert appeal to a more generic no-fact-of-the-matter worry than the one we're supposed to be tackling here.

What about recoverability? The main thought behind this assumption is that when we translate a sentence, we shouldn't change its content. But if translating the sentence into the target language and then translating it back into its original language changes its logical properties, it looks as though something has gone awry along the way.

We may be inclined to balk at this thought when it comes to names: perhaps 'a = a' expresses the same content as 'a = b' when 'a' and 'b' name the same thing, even though one is a logical truth and the other isn't.

But we can insist that both languages use their names to name the same things, and so we can demand that a translation scheme translate every name 'directly' (i.e., homophonically), in which case the translation scheme will be recoverable after all. Remember that the sort of worry we're responding to grants that there is a fact of the matter about what there is. It only worries that there might not be any fact of the matter about whether it is more perspicuous to describe those things as being what there is* or what there is$_1$ and what there is$_2$. But if there is a fact of the matter about what there is, then surely each theory can use the same names for the same things.[14]

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[14]Furthermore, nothing in the argument to be given depends on the translation of names. If someone denies us recoverability, we can resort to *weak recoverability*, which says that if ϕ is true only on models of power 1, then $f(g(\phi)) \vdash\!\!\dashv \phi$ (or $g(f(\phi)) \vdash\!\!\dashv \phi$, for ϕ in L_C). This gets around the complaint since (thanks to completeness) any ϕ that can only be true on models of

Now for our final assumption. If *M* is a classical model, let the *power* of *M* be the cardinality of its domain, and if *M* is an ontologically plural model (i.e., an *OPC* model of the kind defined in section A.5), let the power of *M* be the cardinality of the union of its domains. We suppose:

Equinumerosity: If T_P and T_M are notational variants under *t*, then if a sentence ϕ is true only on models of power *n*, $t(\phi)$ is true only on models of power *n* also.

Remember that the particular no-fact-of-the-matter worry we're concerned with is happy to grant that both the pluralist theory and its monist counterpart recognize exactly the same things. Since neither 'carves the world' into different object-shaped bites than the other, they should both agree — and hence agree under the translation *t* — about how many things there are.

Before we get to the argument itself, let's get one more bit of notation out on the table: if ϕ is a sentence of L_P (or L_C), let $[\phi]$ be the set of *P*- (or *C*-)models on which it is true. Here are two facts to keep in mind:

Fact 1: $[\ulcorner \phi \,\&\, \psi \urcorner] = [\phi] \cap [\psi]$

Fact 2: $[\phi] = [\psi]$ iff ϕ and ψ are logically equivalent.

Proof of Fact 1: $m \in [\ulcorner \phi \,\&\, \psi \urcorner]$ iff $m \models \phi \,\&\, \psi$ iff $m \models \phi$ and $m \models \psi$ iff $m \in [\phi]$ and $m \in [\psi]$. QED.

Proof of Fact 2: $[\phi] \neq [\psi]$ iff for some model *m*, $m \in [\phi]$ and $m \notin [\psi]$ (or *vice versa*) iff $m \models \phi$ and $m \not\models \psi$ (or *vice versa*) iff $m \not\models \ulcorner \phi \equiv \psi \urcorner$ iff $m \not\vdash \ulcorner \phi \equiv \psi \urcorner$ iff ϕ and ψ are not logically equivalent. QED.

Now for the argument. Suppose for reductio that T_P and T_M are notational variants under $t = \langle f, g \rangle$. By logical realism, *t* preserves logical truth,

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power 1 will entail all sentences of the form 'a = b'. And weak recoverability will be enough to get us a one-to-one function between the sets $\mathscr{A}$ and $\mathscr{B}$ below, which is what the argument depends upon. But things are a bit less messy if we go ahead and assume the stronger form of recoverability here.

and by our other assumptions, t is conservative, recoverable, and satisfies equinumerosity.

The argument proceeds first by showing that, if there is such a translation scheme, then there is a one-to-one function from certain sets of P-models of power 1 to certain sets of C-models of power 1. There are thus just as many sets of the former kind as sets of the latter kind. Then we show that there cannot be just as many sets of the former kind as of the latter kind unless L_P has only one quantifier (which, since it is a pluralist language, it doesn't). In this case, there cannot be such a translation scheme and therefore T_P and T_M cannot be notational variants.[15]

In order to get the needed one-to-one correspondence between those sets of power-1 models, we first get a one-to-one correspondence between sets of P-models of any power and sets of C-models of any power and then consider a restriction of it.

To begin: let $\mathscr{P}$ be the set of all sets $[\phi]$ for $\phi \in L_P$, $\mathscr{C}$ the set of all sets $[\phi]$ for $\phi \in L_C$, and F be a function from $\mathscr{P}$ to $\mathscr{C}$ such that $F([\phi]) = [f(\phi)]$.

Claim 1: F is a one-to-one correspondence between $\mathscr{P}$ and $\mathscr{C}$.

Proof of Claim 1: F is clearly a function; we need only to show that it is one-to-one (every member of $\mathscr{P}$ is mapped to a unique member of $\mathscr{C}$) and that it maps $\mathscr{P}$ *onto* $\mathscr{C}$ (every member of $\mathscr{C}$ is the value of F for some member of $\mathscr{P}$).

First, F maps $\mathscr{P}$ onto $\mathscr{C}$. Suppose ϕ is in L_C; we need to show that for some ψ in L_P, $F([\psi]) = [\phi]$. Note that $f(g(\phi)) \vdash_C \phi$ by recoverability, so (by Fact 2) $[f(g(\phi))] = [\phi]$. But $[f(g(\phi))] = F([g(\phi)])$ and $g(\phi)$ is in L_P, so we're

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[15]That is, they cannot be notational variants given our assumptions. Perhaps they are notational variants under some translation scheme that doesn't meet all of our assumptions; this would be the case if, for instance, some sort of more general skepticism about facts-of-the-matter in metaphysics were true.

done.

Second, F is one-to-one. Suppose otherwise. Then there are sentences ϕ and ψ in L_P such that $[\phi] \neq [\psi]$ but $F([\phi]) = F([\psi])$. By the definition of F, this means $[f(\phi)] = [f(\psi)]$, so $f(\phi)$ and $f(\psi)$ are logically equivalent (by Fact 2). Likewise, since $[\phi] \neq [\psi]$, ϕ and ψ are not logically equivalent (by Fact 2). But then $\nvdash_P \ulcorner \phi \equiv \psi \urcorner$, so $\nvdash_C \ulcorner f(\phi \equiv \psi) \urcorner$, since t preserves logical truth. But since t is conservative, this means $\nvdash_C \ulcorner f(\phi) \equiv f(\psi) \urcorner$. So $f(\phi)$ and $f(\psi)$ aren't logically equivalent after all. Contradiction. So F must be one-to-one. QED.

So we have a one-to-one correspondence F between sets of models on which sentences of L_P are true and corresponding sets of models on which sentences of L_C are true. And, thanks to equinumerosity, we know that all of the models in a set $[\phi]$ are of power n if and only if all of the sets in $F([\phi])$ are of power n also.

If S is a set of models, call it *minimal* iff

(i) S is not empty,

(ii) for some ϕ in the relevant language, $S = [\phi]$, and

(iii) for every ψ in that language, if $[\psi] \subset S$ then $[\psi] = \varnothing$.

Here is a useful fact about minimal sets of models of power 1:

Fact 3: If $[\phi]$ is a minimal set of models of power 1, then for any ψ, either $[\phi \ \& \ \psi] = [\phi]$ or $[\phi \ \& \ \psi] = \varnothing$.

Proof of Fact 3: let $[\phi]$ be a minimal set of models of power 1. By Fact 1, $[\phi \ \& \ \psi] = [\phi] \cap [\psi]$, so $[\phi \ \& \ \psi] \subseteq [\phi]$. But, since $[\phi]$ is minimal, if $[\phi \ \& \ \psi] \neq [\phi]$, then $[\phi] = \varnothing$ (by condition (iii) in the definition of minimality). QED.

Notice that, since both languages are finite, there will be a sentence that characterizes each model of power 1 up to permutation of domains. Let ϕ

be such a sentence; since neither language has the resources to distinguish models with permuted domains, no sentence of the language whatsoever will be true on some models of $[\phi]$ but not others. So for such a sentence, there are no models $m_1, m_2 \in [\phi]$ where, for some ψ in the language, $m_1 \in [\psi]$ and $m_2 \notin [\psi]$.[16] So, for every sentence ϕ, if $[\phi]$ is of power 1, then for some ψ, $[\psi]$ is minimal and $[\psi] \subseteq [\phi]$.[17]

Let $\mathscr{A}$ be the set of all minimal sets of P-models of power 1, and $\mathscr{B}$ be the set of all minimal sets of C-models of power 1. Let F' be the restriction of F to $\mathscr{A}$.

Claim 2: F' is a one-to-one correspondence between $\mathscr{A}$ and $\mathscr{B}$

Since we already know F is a one-to-one correspondence, we know F' will be in one-to-one correspondence with whatever its range is. So we need to show only that the range of F' is $\mathscr{B}$.

Proof of Claim 2: Suppose $\mathscr{B}$ is not the range of F'. Then for some ϕ with $[\phi] \in \mathscr{A}$, $F([\phi]) \notin \mathscr{B}$. We know that $F[(\phi)]$ is of power 1 by equinumerosity; since it is not in $\mathscr{B}$, it must not be minimal. So for some ψ in L_C, $[\psi]$ is a minimal set of power 1 and $[\psi] \subset [f(\phi)]$.

Now consider $[\ulcorner f(\phi) \,\&\, \sim\psi \urcorner]$. This set is not empty. (If it were, then $[f(\phi)] = [\psi]$, and $[f(\phi)]$ would have been minimal after all.) So for some χ in L_C, $[\chi] \subseteq [\ulcorner f(\phi) \,\&\, \sim\psi \urcorner]$

Note the following equivalencies:

(i) $[g(\ulcorner f(\phi) \,\&\, \psi \urcorner)] =$

(ii) $[\ulcorner g(f(\phi)) \,\&\, g(\psi) \urcorner] =$ by conservatism

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[16]Otherwise we could detect a permuted domain by asking whether $\ulcorner \phi \,\&\, \psi \urcorner$ were true.

[17]If $[\phi]$ is of power 1, then all of its models are of power 1. Let m be such a model. Then there is a sentence ψ that characterizes m up to domain permutation. Since $m \in [\psi]$, if $m' \in [\psi]$ also, then for any sentence of the language — ϕ included — $m' \in [\phi]$. So $[\psi] \subseteq [\phi]$. Note that ϕ might just *be* ψ.

(iii) $[\ulcorner \phi \mathbin{\&} g(\psi) \urcorner] =$ \hfill by recoverability

(iv) $[\phi] \cap [g(\psi)]$ \hfill by Fact 1

$\ulcorner f(\phi) \mathbin{\&} \psi \urcorner$ is not a logical falsehood, so $g(\ulcorner f(\phi) \mathbin{\&} \psi \urcorner)$ is not a logical false-hood, so $[g(\ulcorner f(\phi) \mathbin{\&} \psi \urcorner)] \neq \{\}$, so $[\phi] \cap [g(\psi)] \neq \varnothing$. Thus, by fact 3, $[\phi] = [\phi] \cap [g(\psi)] = [g(\ulcorner f(\phi) \mathbin{\&} \psi \urcorner)]$.

The same argument shows that $[\phi] = [g(\ulcorner f(\phi) \mathbin{\&} \chi \urcorner)]$. Thus, sentences $g(\ulcorner f(\phi) \mathbin{\&} \psi \urcorner)$ and $g(\ulcorner f(\phi) \mathbin{\&} \chi \urcorner)$ are logically equivalent. So $\ulcorner f(\phi) \mathbin{\&} \psi \urcorner$ and $\ulcorner f(\phi) \mathbin{\&} \chi \urcorner$ are, too, in which case $[\ulcorner f(\phi) \mathbin{\&} \psi \urcorner] = [\ulcorner f(\phi) \mathbin{\&} \chi \urcorner]$.

This means $[f(\phi)] \cap [\psi] = [f(\phi)] \cap [\chi]$. But these are not empty (as we noted above), and both of $[\phi]$ and $[\psi]$ are minimal. So by Fact 3, $[\psi] = [\chi]$. But $[\chi] \subseteq [\ulcorner f(\phi) \mathbin{\&} {\sim}\psi \urcorner] \subseteq [{\sim}\psi]$, so the non-empty $[\psi] \subseteq [{\sim}\psi]$. Contradiction. So $\mathscr{B}$ is the range of F' after all. QED.

So we know that there is a one-to-one correspondence, namely F', between $\mathscr{A}$ and $\mathscr{B}$. We can also figure out exactly how many members each of $\mathscr{A}$ and $\mathscr{B}$ has. $\mathscr{A}$ will have one member for each way of making a P-model with just one object scattered across its (multiple) domains, and $\mathscr{B}$ will have one member for each way of making a C-model with just one object in its domain.

Let's begin with C-models. Since each model has only one object in it, there's only one way to assign names: each name must be assigned to the one object, no matter how many objects there are. And since the model only has one object in it, the predicates' adicies don't matter. For each predicate, there will only be two options: either the one thing satisfies it (by itself for one-placed predicates, or with itself i times for i-placed predicates) or it doesn't. So if L_C has n distinct predicates in it, there will be 2^n ways to make logically distinct C-models with just one object in their domains. In other words, $\mathscr{B}$ has 2^n members.

Now consider *P*-models. Once again, there's only one thing we can do with the names. And once again, if L_C has m predicates, there will be 2^m ways to distribute that one object across its predicates. But suppose L_C has i quantifiers in it. For each quantifier, we can either put the thing in it or not. So there's 2^i possible distributions of the object across the quantifiers, too. But *one* of these distributions — the one where the object doesn't end up in the domain of *any* quantifier — is disallowed. That object has got to show up somewhere. So there are only $2^i - 1$ allowable distributions of the object across the quantifiers. As a result, there are $2^m(2^i - 1)$ ways to make logically distinct *P*-models with just one object in their domains. In other words, $\mathscr{A}$ has $2^m(2^i - 1)$ members.

Since F' is a one-to-one correspondence between $\mathscr{A}$ and $\mathscr{B}$, there are just as many members in $\mathscr{A}$ as there are in $\mathscr{B}$. So $2^n = 2^m(2^i - 1)$. But this equation only has an integer solution for n, m, and i when $n = m$ and $i = 1$.[18] But this means that L_P has only one quantifier — which means L_P isn't really a *pluralist* language after all! But by hypothesis, P was a pluralist language. This completes the reductio; there is no translation function t that meets all our criteria. Hence, T_P and T_M are not notational variants of each other.

4.3   Can We Start Worrying Again?

The argument of the last section depended heavily on the logics associated with theories T_P and T_M. Some may suspect that the deck has been carefully stacked: there is nothing about pluralist and monist logic *in general*, they

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[18]If $n \geq m$, then $n = m + r$ for some integer r, so dividing both sides by 2^m gives us $2^r = 2^i - 1$. The only solution here is where $r = 0$ (and so $n = m$) and $i = 1$. If $n \leq m$, then $m = n + r$, so dividing both sides by 2^n gives us $1 = 2^r(2^i - 1)$, which again means $r = 0$ (so $m = n$) and $i = 1$.

think, that keeps pluralist and monist theories from being notational variants. Rather, it is the particular *forms* of pluralism and monism that can't be matched up as notational variants. But if we just fiddle with the logic a bit we can patch that up, and the threat of notational variance returns.

Consider again a monist theory which defines 'is abstract' as 'is not concrete'. I argued above that this theory makes

(9) Some concrete thing is also abstract.

a logical falsehood, whereas the ontologically plural treatment of it as

(11) $\exists_1 x(\exists_2 y(y = x))$

does not.

But some may wonder why this is so. Granted, the logic P we used here doesn't make (11) a logical falsehood. But it's easy enough to modify P so as to make (11) turn out logically false. We just take the original stock of P-axioms and add a *unique sorting axiom*:

(12) $\ulcorner \forall_i \alpha \sim \exists_j \beta (\alpha = \beta) \urcorner$, where $i \neq j$.

(12) effectually bars anything from showing up in the domain of more than one of the pluralist's quantifiers. And the denial of (11) follows quickly from the addition of (12).

Let $P+$ be the system we get by adding (12) to P. Here's a very tempting line of thought: '$P+$ is a much more natural logic for pluralists to endorse, including as it does a ban on overlapping modes of being. But the argument from logical realism to the distinctness of pluralist and monist theories assumed that pluralists would be endorsing only P. As we see, the special case of the argument, which we looked at in section 4.2.1, fails when the monist defines "is abstract" as "is not concrete" and the pluralist endorses $P+$ rather

than *P*. So — as long as we look at the logic pluralists *should* be endorsing — we see that the threat of notational variance hasn't been dealt with after all.'

I think there is something wrong with this tempting line of thought. In fact, I think there are *two* things wrong with it. First, I doubt that there is anything inherent in the idea that there are multiple modes of being which requires that these modes not overlap. Granted, we tend to think of ontological categories such as 'concrete' and 'abstract' as being mutually exclusive. But it is not clear they have to be, and it is not clear that failing to be so would make them unfit to be associated with different modes of being. Consider, for instance, immanent universals of the sort championed by David Armstrong (1978). On the one hand, they exhibit features usually associated with concreta: they're located in space and time, for instance, and they have causal powers. On the other hand, they exhibit other features usually associated with abstracta: they're 'repeatable', for instance — one and the same universal can be in many places and instantiated by many objects. Is it so obvious that these things (if there are any) are not *both* concrete and abstract? And is it so obvious that, if they are, 'concrete' and 'abstract' cannot go with two different modes of being?

Furthermore, even if the abstract and the concrete must be exclusive, there is no reason to think all potential applications of ontological pluralism will follow suit. The abstract/concrete division is just a handy illustration for getting into the pluralist's mindset; there are other things we might want to use modes of being for.

On some readings of Descartes, for instance, his distinction between objective and formal reality is a distinction between two different kinds of being. To have objective reality is to have a certain mental mode of being; to have formal reality is to have a different, non-mental mode of being.[19]

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[19]Cf. Normore (1986: 235–238), Alanen (1994: 232–234), and Hoffman (1996: 368–371).

But on this interpretation, one and the same thing can have both of these modes of being. When Descartes writes in the first set of replies

> ...the idea of the sun is the sun itself existing in the intellect — not of course formally existing, as it does in the heavens, but objectively existing, i.e. in the way in which objects normally are in the intellect, (1984: 75)

this interpretation takes him as saying that there is one thing — the sun — which has each of these modes of being: it has the 'objective', mental one insofar as it exists in a mind, and it has the 'formal', mind-independent one insofar as it exists 'in the heavens'. No Cartesian pluralist of this kind will be willing to say that modes of being cannot overlap or want to endorse a unique sorting axiom.

That is one problem with the natural line of thought given above. Here is the other. Even if pluralists did all agree that $P+$ rather than P is the logic for them, there will only be translation schemes between pluralist theories and some monist counterpart for a limited class of pluralist theories.

Consider again the argument from section 4.2.2. It is straightforward to argue once again that, for a pluralist language L_P and a classical language L_C, there will be a one-to-one correspondence between minimal sets of $P+$-models of power 1 and minimal sets of C-models of power 1. (It is straightforward because nothing in the original arguments for Claims 1 and 2 depended on anything that would be affected by a unique sorting axiom.) And once again, if there are n predicates in L_P, there will be 2^n ways to construct minimal sets of C-models of power 1.

But now consider how many ways we can construct $P+$-models of power 1. As before, if L_P has m predicates, we will be able to distribute one object across them in 2^m ways. But if L_P has i quantifiers, we have *exactly i* ways to put that one object into quantifier domains: we can put it in the first one, or put it in the second one, or ..., or put it in the ith one, and that's it.

This means that there will be $i(2^m)$ ways to make $P+$-models of power 1, in which case there will be $i(2^m)$ ways to make minimal sets of $P+$-models of power 1. Once again, the one-to-one correspondence tells us that there are just as many minimal sets of $P+$-models as there are minimal sets of C-models. So $2^n = i(2^m)$. But, if $i \neq 1$, this means that $i = 2^j$ for some integer j.

In other words, given all of our assumptions, the only time we will get a translation scheme that preserves logical truth is when the pluralist says that there are two ways of being, or four ways of being, or eight ways of being, or 2^j ways of being for some integer j. But it is certainly not part of ontological pluralism that there are 2^j ways of being. Perhaps there are three ways of being: you can be actual, you can be merely possible, or you can be impossible.[20] In this case, the fundamental theory will use three existential quantifiers, and even with a unique sorting axiom on board it will not allow a logical-truth-preserving translation into a monist theory.

So what does this tell us? Well, notice first of all that it certainly does not tell us that a pluralist theory with 2^n quantifiers *must* be a notational variant of some monist theory, even though other pluralist theories with, say, three, seven, or nine quantifiers aren't. The thesis of logical realism says that if a translation scheme *doesn't* preserve logical truth, then the theories it translates between aren't notational variants. It does not say that if a translation scheme does preserve logical truth, the theories *are* notational variants. That is a further question; there may be reasons other than logic that keep theories from being notational variants.

So what should we say about pluralist theories that endorse unique sorting and have 2^j quantifiers in them? We probably should not insist that such theories are *never* notational variants of monist theories. But we should probably also not go to the other extreme by insisting that such theories are *always*

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[20]Cf. McDaniel (forthcoming: §5).

notational variants of some monist counterpart either.

Consider, for instance, an Aristotle-inspired pluralist who begins her career thinking that there are ten modes of being, corresponding to the classical ten non-overlapping Categories: substance, quantitiy, quality, relation, place, time, position, state, action, and affection. The theory she endorses has ten primitive existential quantifiers, and so (since $10 \neq 2^j$ for integer j) cannot be a notational variant of a monist theory. But, thanks to learning a bit of physics, she decides that time and position really aren't separate categories but rather a species of, say, relation. She cuts the Categories she believes in down to eight, so her revised pluralist theory uses eight primitive existential quantifiers. Since $8 = 2^3$, if we say that every theory with 2^j primitive existential quantifiers is a notational variant of a monist theory, then we must say that our Aristotelian friend's disagreement with her monist counterpart is now mainly notational.

This seems wrong. Even if some pluralist theories are notational variants of monism, the fact that they are should not be determined *merely* by the number of quantifiers they use. The change our Aristotelian friend made simply is not the sort of change that should turn her from a thoroughgoing pluralist to someone who disagrees with the monist only notationally.

Furthermore, if we insist that every pluralist theory with 2^j quantifiers is a notational variant of some monist theory, we end up with a strange result. Every monist theory (with at least one predicate other than '=') will be translatable into some pluralist theory that endorses unique sorting and has 2^j existential quantifiers. If we say all such pairs of theories are notational variants, we will have to say that every monist theory is a notational variant of some pluralist theory. In other words, there is no way it could be a fact of the matter that monism is true. On the other hand, there *could* be a fact of the matter that pluralism is true — there would be, for instance, if the true

metaphysically perspicuous theory had three existential quantifiers in it.

This is really weird. If monism could be determinately false, then it should be possible for it to be determinately true, too. So this suggests we shouldn't think that a pluralist theory is automatically a notational variant of a monist theory just because it postulates 2^n modes of being. We ought to regard monism and pluralism as generally different, and treat the existence of logical-truth-preserving translation schemes between certain pairs of them as a surprising oddity rather than a deep, revealing fact. But in this case, the worry has been resolved; pluralist theories won't generally be notational variants of monist ones, even given a unique sorting axiom, and there will be a fact of the matter as to whether monists or pluralists are right.

Chapter 5

Ontological Nihilism

5.1 Ontological Nihilism

Ontology, Quine tells us, asks what there is; and while this ontological question can be answered in a word — 'everything' — there is still room for disagreement about cases. (1948: 1) When we encounter this case-by-case disagreement, we occasionally come across views that can best be described as versions of ontological nihilism. *Compositional nihilists*, for instance, hold that there are no composite objects: nothing has parts. So-called nominalists (of the good, old-fashioned 'nothing is abstract' type) could just as well be called *abstractional nihilists*: they claim that there are no abstract objects. *Perforational nihilists* are those who, like the Lewis' (1970) Argle, say that there are no holes. And so on.

These run-of-the-mill ontological nihilists do something that every good metaphysician wants to do at one time or another — deny that there is anything of such-and-such a kind. But another kind of ontological nihilist goes further, denying that there is *anything at all*. He answers Quine's ontological question not with 'everything', but with 'nothing'. He is not just an ontological nihilist, but an *Ontological Nihilist*, complete with capital letters.

The Ontological Nihilist says that there isn't anything at all. So we might naturally expect him to endorse the following claims:

(1) Our ordinary beliefs — such as that some electrons are attracted to some

protons or that there are buildings in Portugal — are radically mistaken.

(2) Reality is a blank void — an unstructured and undifferentiated blob, but without the blob.

Each of these is incredibly hard to believe. It seems undeniable that our experiences are richly structured and differentiated, and that the structure of our experiences will somehow be accounted for by structure in the world. And it seems reasonable that our ordinary beliefs, formed as they are on the basis of our richly-structured experiences, will thus track this worldly structure. If the Nihilist[1] endorses (1), he rejects the reasonable. And if he endorses (2), he denies the undeniable.

The Nihilist need not be quite as crazy as all that, though — he can hold that there isn't anything at all without endorsing either of (1) or (2). He can agree that our experience exhibits structure, and that the organization of reality accounts for this structure. And he can think that this structure connects up in important ways with our ordinary beliefs, since these beliefs are formed in large part by our interactions with this structure. What he insists is that this structure will not involve any *things*, any *entities* — any *ontology*.

At the simplest level, human language[2] has two basic resources for describing structure. First, it has noun phrases: paradigmatically, proper names such as 'Bertrand' and 'Gottlob', and quantifier phrases such as 'every philosopher' or 'some logicist'. Second, it has predicates, such as 'thought about language' or 'didn't notice the inconsistency in Basic Law V'. And it

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[1]Ontological Nihilist, that is. For stylistic reasons, I'll sometimes drop the 'Ontological', letting the capital 'N' do the disambiguating work.

[2]At least, the languages with which I have any familiarity; perhaps some languages do not at bottom operate this way. If so, it would be interesting to see what kind of metaphysics native speakers of these languages produce.

uses these resources as follows: noun phrases latch on to some things, and predicate phrases then describe these things and differentiate them from one another.

Our language thereby presupposes that we can adequately represent reality's structure with a pegboard and some rubber bands. The pegs represent the things, and the rubber bands represent the ways these things are and are interrelated. For instance, to say 'Bertrand thought about language' is to hang the *thought about language* rubber band on the peg labeled 'Bertrand'. And to say 'Some logicist admired every philosopher who didn't notice the inconsistency in Basic Law V' is to say that, somewhere on the pegboard, there is a peg which (a) has a *logicist* rubber band hanging on it, and (b) if you take any peg which has the *didn't notice the inconsistency in Basic Law V* band on, there's will be an *admires* rubber band stretching between those two pegs.[3]

The Ontological Nihlist agrees that reality exhibits structure. He denies, though, that we can adequately represent this structure with pegboards. However reality does its thing, it *doesn't* do it by having a bunch of interrelated and differentiated things. Accounting for the world's richness, he says, requires no ontology.

The pegboard model — the ontological model — of structure is fairly natural and well-understood. We know what reality would be like if it were structured that way. On the other hand, we don't come pre-equipped with any other way of thinking; simply saying that reality isn't like a pegboard leaves us with no clue of how it might be instead. So the Ontological Nihlist owes us a story: a story about the kind of structure reality *does* have, and how this structure manages to account for the richness and variety of our experiences.

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[3]This pegboard-and-rubber-band image is helpful, but imperfect. In particular, it leaves little room for asymmetric predicates (such as 'loves') or predicates with a fixed adicy: rubber bands do not have a direction, and can be hung on as many or as few pegs as its elasticity will allow. Nonetheless, the image has its uses, and for our purposes here we can manage this model without these technicalities getting in the way.

This chapter explores the Nihilist's prospects for telling this story. In it, I argue that there are certain costs that a Nihilist must pay in order to tell this story. One upshot of this conclusion is that we have some reason to reject Nihilism and believe that there are at least a few things after all.

This might not be thought a very surprising conclusion; but for a few mad-dog metaphysicians (e.g., Hawthorne and Cortens 1995), few would have ever thought Nihilism a likely candidate for truth in the first place. If my main purpose in examining the view were to persuade others not to believe it, the chapter probably wouldn't be worth the effort. But there are reasons to expose problems with unattractive views that go beyond merely stressing their unattractiveness. When we see the troubles faced by extreme views (such as Ontological Nihilism), we gain a deeper understanding of why it is good to deny them, and thus come to a deeper understanding of the implications of what we already believe. By seeing the natures of Ontological Nihilism's theoretical woes, we understand better the role ontology has been playing in our reasoning about the world all along.

I proceed like this: First (section 5.2), I explain the challenge Ontological Nihilism must meet to be viable. Then, after a brief interlude about 'ontological commitment' (5.3), I discuss two less-promising attempts to meet this challenge, and point out just why they are less promising (section 5.4): either they smuggle in an illicit appeal to things, or they require a bloated ideology, too many brute, necessary connections, and a deep-seated holism about the structure of reality. Finally, I consider a proposal thought by many to be much more promising (section 5.5), and argue that the two natural developments of this proposal succumb to the same problems as the less promising attempts (sections 5.6 and 5.7). The fact that avoiding ontology gives rise to the tripartate problem of brute necessary connections, ideologcal bloat, and holism

even in the most plausible cases suggests that it is our natural ontological pre-suppositions that let us think of the world in a local, combinatorial, systematic way.

5.2   The Need for Paraphrase

5.2.1   The Challenge

The Nihilist, we imagine, denies each of (1) and (2). So, in lieu of (2), he needs to tell us what structure reality *does* have, if not pegboard-and-rubber-band-like. And in lieu of (1), he must tell us how this structure hooks up to our ordinary beliefs and practices.

Let's compare this challenge to a similar challenge for a more conservative sort of nihilist: the perforational nihilist, who claims that there are no holes.

At first blush, the perforational nihilist's claim may seem incredible, implying that we are radically deceived about the nature of the world. Suppose, for instance, that you just crossed a bridge like the one in figure 5.1.

Figure 5.1: A Defective Bridge
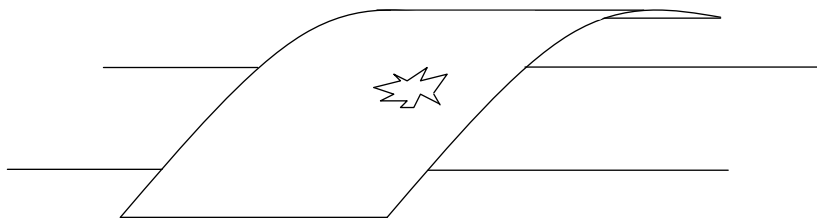
If someone asks you why you crossed on the left, you will probably say

  (3) There is a hole in the right-hand side of the bridge,

and point out that you were not keen on dropping through to the river below.

The perforational nihilist insists that there are no holes; since (3) seems to entail that there *are* holes, perforational nihilists should reject (3). So it seems they must say that you were radically mistaken about the nature of the bridge — and that crossing on the right-hand side would have been fine.

Of course, perforational nihilists want to say neither thing. They are happy to grant that there are indeed bridges shaped like the one in the diagram, and that walking on the right-hand-sides of such bridges is a bad idea. And they will say that there is *something* right about your utterance of (3): even though there are no holes, there is some important fact, relevant to bridge-crossing activities, that you were getting at with (3). This fact adequately explains your reluctance to cross on the right. The perforational nihilist's complaint is only with the idea that this important fact involves a special kind of entity called a 'hole'. They do not think that crossing on the right-hand side of the bridge is bad because among reality's pegs there is one with a 'hole' rubber-band on it and the 'in' rubber-band stretched between it and the peg that goes with that side of the bridge. Whatever fact you were getting at with (3), it didn't involve a special class of hole-ey entities in this way.

Perforational nihilists can convince us, by saying all of this, that they do not think we are radically mistaken about the nature of certain precarious bridges and the like. But they will have told us nothing about how the world *is* in virtue of which (3) is a good thing to say in the circumstances. If crossing on the right-hand side of the bridge isn't a bad idea thanks to its being related to some separate entity, some hole, in its right-hand side, then why *is* it a bad

idea?

The perforational nihilist could refuse to answer this question. If he did, he would endorse a certain *negative* metaphysical thesis: the appropriateness of saying (3) in the circumstances isn't thanks to an entity rightly called a 'hole'. But he then would provide us with no *positive* metaphysical thesis about how the world is structured, perforation-wise; he would say nothing about how to fill the gap that we would otherwise fill with holes.

There are two reasons perforational nihilists should go further. First: doubters may worry that if there were no entities deserving to be called 'holes', the world just wouldn't *have* enough structure to guarantee that (3) is a good thing to say in the envisaged circumstances. Perforational nihilists can assuage these doubts by giving a positive account of the world's perforation-relevant structure that provides this guarantee.[4]

Second, and to my mind, more important: if we stop with a negative thesis, we only do half the job of metaphysical inquiry. Metaphysics asks what the fundamental structure of the world is and how this structure accounts for the richness and variety of experience. To simply tell us what the world *isn't* like is not yet to tell us what the world *is* like. A complete metaphysical picture will tell us what the world is like, and if it is indeed not a blatant error to appeal to (3) when explaining how we cross bridges like the one in the diagram, a complete metaphysical picture will tell us why.

5.2.2   How to Respond To the Challenge

The perforational nihilist thinks we get at some important fact about the world when we assert (3) in the presence of bridges like the one in figure 5.1. But the perforational nihilist *also* says that, despite (3)'s usefulness in this regard,

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[4]Cf. Sider (MS*a*: §2).

there is nonetheless something defective about it. It misrepresents the real metaphysical facts of the matter as involving a *hole*, and they don't. And we, in response to their denial, want to know what the real, hole-free metaphysical facts of the matter *are* that make (3) useful but nonetheless defective.[5]

The perforational nihilist answers our question in the simplest way by telling us what useful but hole-free fact (3) is getting at. For instance, the perforational nihilist might think that, although there are no holes, certain physical objects have a special shape property, that of being *perforated*. Furthermore, he claims,

(4) The right-hand side of the bridge is perforated,

is true. And he will say that (4) is the true and metaphysically perspicuous fact we have been getting at with (3) all along.

If (3) is the only useful hole-involving sentence we ever say, this will be enough. But it is not; we communicate many other important facts by talking about holes. So we need more than just this particular, one-off explanation — we need an account of how hole-talk communicates important facts generally.

A perforational nihilist can give us this account is by providing a *paraphrase scheme*: a systematic recipe for taking claims about holes and specifying the important hole-free facts we communicate with those claims. For instance, they may decide to trade in apparent talk of holes and the objects they are in for talk about which objects are perforated. Then, whenever we would say

There is a hole in _____,

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[5]I am being deliberately cagey about just what this 'metaphysical defectiveness' amounts to. It may be that (3) is simply *false*, but can be used to convey true information in the neighborhood; see Merricks (2001) for this sort of view about table-and-chair talk. Or perhaps (3) says something true in ordinary contexts but says something else, which is false, in 'serious' philosophical contexts; see van Inwagen (1990) for this sort of view about table-and-chair talk. The differences between these views can be set aside for our purposes.

the perforational nihilist will tell us the important fact we are communicating is

       _____ is perforated.[6]

The perforational nihilist thus tells us what he thinks this hole-free world *is* like — he thinks it is filled with things with certain perforated shapes — and how apparent talk of holes is really getting at these perforation facts.

    The term 'paraphrase scheme', may call to mind a certain philosophy of language according to which (4) cannot in any sense count as an analysis of, or be synonymous with, ordinary uses of (3) (see, e.g., Quine 1960*b*: 250). And we may thereby implicitly suggest that the proposed scheme must meet certain conditions: that the proposed paraphrases must be finitely specifiable, for instance, or that anyone who understands the claim to be paraphrased away must be able to understand the claim it is paraphrased into.

    But let's not foist any particular philosophy of language on the nihilist or bind him to its peculiar commitments. We demand merely that the perforational nihilist tell us, for any claim involving holes that he takes to be getting at some important fact, exactly what important, hole-free fact the claim he thinks it is getting at. We do not insist that this hole-free fact be finite, easily recognizable by anyone capable of talking about holes, etc.[7]

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[6]More generally, whenever we would say

    There are n holes in _____,

the perforational nihilist can say

    _____ is n-perforated.

See Lewis and Lewis (1970) for a fuller treatment of this sort of paraphrase scheme, and for some of the troubles it encounters.

[7]Likewise, we need not insist that 'paraphrases' avoid semantic ascent; anyone who thinks there are no ultimately egocentric facts — no facts that must be stated using terms like 'I' or 'you', for instance — may fairly take Kaplan's (1989) semantics for indexicals as providing a 'paraphrase', in our sense, of tokens of sentences of the form ⌜I am F⌝ even though, as Kaplan argues, there is no way to provide the account as a translation from sentences to sentences all in the 'material mode'.

Given our liberality about paraphrase schemes, what should we say about a proposal's *systematicity*? Must similar hole-sentences receive similar paraphrases? The proposal above is relatively systematic, but how poorly should we view a nihilist who offers a more gerrymandered scheme, paraphrasing some sentences of the form

There is a hole in _____,

in one way, and paraphrasing others in another?

We should not automatically dismiss a gerrymandered paraphrase scheme. 'There is a hole in the bridge' says something very different about the bridge than 'There is a hole in the argument' does about the argument, and it would be unreasonable to demand that the perforational nihilist paraphrase these in the same way. But, insofar as the nihilist thinks that various claims about holes *are* getting at similar facts, they ought to paraphrase them in similar ways. And insofar as *we* think that various claims about holes are getting at similar facts, we ought to take any paraphrase strategy that paraphrases them in different ways as accusing us of some sort of mistake. Nobody should worry if perforational nihilists paraphrase 'There is a hole in the bridge' and 'There is a hole in the argument' differently, since nobody thought these facts were similar in the first place. But we do think that there is a certain sort of similarity between a bridge's having a hole and a door's having a hole; if a perforational nihilist paraphrases 'There is a hole in the bridge' and 'There is a hole in the door' in radically different ways, he thereby denies that these claims are getting at similar facts after all. And, the more convinced we are of these facts' similarity, the more work the nihilist must do to convict us of error in this.[8]

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[8]There are subtle issues to be sensitive to, though. Perhaps the perforational nihilist uses one recipe to paraphrase 'There is a hole in the bridge' as *P* and uses a very different recipe to paraphrase 'There is a hole in the door' as *Q*. Nonetheless, if *P* and *Q* are themselves clearly

5.2.3 Paraphrase and Ontological Nihilism

Just as the perforational nihilist does not want to deny that (3) gets at some important fact, the Ontological Nihilist does not want to deny that claims such as

(5) There are buildings in Portugal,

Some people have several shirts,

There are more marshmallows in my hot chocolate than in yours,

and so on are also getting at important facts.[9] But since the Ontological Nihilist denies that there is anything at all — and hence denies that there are buildings, people, shirts, or marshmallows — he must think the sentences in (5) are somehow misleading. He needs to tell us what this building-, people-, shirt-, and marshmallow-free world is like, and why its being this way makes the sentences in (5) worth saying. So he, like the perforational nihilist, needs a paraphrase scheme: a method for taking ontological, pegboard-and-rubber-band presupposing claims and trading them in for 'ontologically innocent' facts — facts which do not entail that there is anything.

This will be a complex and difficult business for the Nihilist. We can simplify it a bit by pretending the *target language* — the language he is going to be 'paraphrasing away' — is the relatively simple language of first-order logic without names (but with identity). This language is generally thought sufficient for talking about ontological structure: its existential quantifier, '∃', means *there is*, and it can form all sorts of sentences that talk about what there

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very similar facts, then the differences in the formulas used to get to them from the original hole-sentences do not mean the nihilist is denying any intuitive similarity.

[9]Of course, insofar as he is a Nihilist, he wants to deny that there are any facts at all. But the 'fact'-talk he gives us should be thought of as merely a useful turn of phrase for trying to explain his view to us doubters. He will talk about facts only while trying to get us into the spirit of his view; once we are fully converted to Nihilism, he promises to show us how to understand what he was saying without any 'fact'-talk at all. Similarly for his talk about 'the world', 'structure', 'sentences', and so on.

is, what there isn't, and how things are interrelated.

We can also help the Nihilist by making him paraphrase only a portion of our ontology-involving talk. In particular, we make him paraphrase only claims from well-established scientific theory (or, at least, simple first-order consequences of well-established scientific theory). By making him do this, we makes his task both easier and harder.

Easier, because it takes from the Nihilist's shoulders the burden of deciding which sentences deserve paraphrase. A Nihilist ought not paraphrase *everything* we say: some of what we say just isn't getting at any important fact. (Nihilists need not give us a paraphrase for 'Phlostigon is emitted during combustion', for instance.) But Nihilism is plausible only if it can recover at least the claims of our (incredibly fruitful) best science — surely if any claims ever get at important facts, these do.

Harder, because by focusing on these sentences gives us the right to demand the Nihilist paraphrase systematically. Even if

(6) An electron orbits a proton, and

(7) Two electrons orbit a proton,

are metaphysically misleading, they clearly get at very similar facts. But if similar sentences are getting at similar facts, then we should expect them to be paraphrased in similar ways.

The Ontological Nihilist must give us a systematic recipe for taking any sentence of a first-order language (with predicates assumed to be predicates of our best science) and cooking up the ontologically innocent claim it was supposed to be getting at all along.

5.3 Ontological Guilt: An Aside

If the proposed paraphrase scheme is to be acceptable, it must be 'ontologically innocent'. But just what does that mean? And what is it about an expression that makes it ontologically innocent?

5.3.1 Ontological Commitment

Some (interpreted) sentences have a feature philosophers are pleased to call 'ontological commitment'. A sentence is 'ontologically innocent' if and only if it carries no ontological commitments. Unfortunately, though, this term tends to get used more often than it gets defined, and I fear as a result it tends to be heard more often than understood. I do not intend to spill any more ink over the proper 'criterion of ontological commitment',[10] but I do want to be clear about just what 'ontological committment' is supposed to be.

The core idea is that we somehow manage to convey, semantically, by our linguistic activity, that the world has a certain ontological structure. In particular, we convey that there are some things of a certain kind K — that there are some pegs with the 'K' rubber-band hanging from them. When someone performs the right sort of linguistic activity, we say that the individual is *ontologically committed to Ks*.

The 'right sort' of linguistic activity sincere assertion of the right sentences, properly understood.[11] But the sentence has to be the right one — I cannot commit myself to unicorns just with any old sentence. I have to say 'There are unicorns' or something like that. That is, I have to use a sentence that *says* that there are unicorns. So I am ontologically committed to unicorns

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[10]Although see Cartwright (1954) and Richard (1998) for discussion.

[11]If Joe mistakenly thinks that 'unicorn' means *zebra*, he doesn't ontologically commit himself to unicorns when he says 'There are unicorns'. Thanks here to Ted Sider.

if and only if I understand and sincerely assert a sentence that says that there are unicorns; and in general I am ontologically committed to *K*s if and only if I understand and sincerely assert a sentence that says that there are *K*s.[12]

From this, we can extract a derivative notion of sentential commitment: a sentence *carries ontological commitment to Ks* if and only if anyone who understands and sincerely asserts it would thereby be ontologically committed to *K*s. So we can identify languages that are *ontologically guilty*: they allow us to form sentences that carry ontological commitments to *K*, for some kind *K*. And a language will be *ontologically innocent* if and only if it isn't ontologically guilty.

The Nihilist needs to find an ontologically innocent language with which to paraphrase the ontologically guilty target. But we can get a better picture of what this innocent language will be like by getting a better understanding of why guilty languages are guilty.

5.3.2 Variable Binding and Quantification Proper

What makes a language ontologically guilty? We all learned at Quine's knee that, in first-order languages, the existential quantifier '∃' is to blame. But in first-order languages, this expression does two jobs: it manages variable-binding, and it says something about how many values of its bound variable satisfy the postfixed formula. For which of these tasks do we find it ontologically guilty?

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[12]This, more or less, is how Mark Richard (1998) seems to understand the notion; and Peter van Inwagen (1998: Thesis 5) is perhaps best interpreted this way, too. Agustín Rayo (2007, MS) suggests a different formulation, according to which I'm ontologically committed to *K*s iff I understand and sincerely assert a sentence with truth-conditions which demand that there are *K*s. Little hangs on this distinction in what follows. Note also that the 'only if' part of the clause may be debatable; perhaps someone could be intuitively 'ontologically committed to *K*s' even without ever asserting (either out loud or in her mind) a sentence which says, or have truth-conditions which demand, that there are *K*s. Again, this won't matter in what follows — we are here primarily concerned with the 'if' half of the biconditional.

Let's clarify the natures of these two tasks. In first-order languages, we can take a sentence open in a variable 'x' and prefix it with '∃x' or '∀x' to get a new sentence. If the original sentence was open in other variables, the new sentence is open in those variables, too. Otherwise, the sentence is *closed* and can be evaluated for truth.

The turning of open sentences into closed (or at least less open) ones is what we call *variable binding*. Variable binding is what lets us make complex predications about a single peg. We can use

∃x(Fx & Gx)

to say that it's one and the same thing which is both F and G. We do this by binding two instances of the same variable. Semantically — from the point of view of the pegboard — variable binding is what lets us hang *two* rubber bands from the same peg.

In addition to variable-binding, quantifiers also *quantify proper*: they say *how many* pegs are arranged the way the postfixed formula says. '∃', for instance, says that least one peg is that way; '∀' says that every peg is that way. If we have some more sophisticated quantifiers than first-order languages allow, we can also say, for instance, that infinitely many pegs are a certain way, or that most pegs that are one way are also some other way.

Which feature of first-order languages' existential quantifiers make them so well-suited for talking about pegboard, ontological structure? Is it because they bind variables, or because they properly quantify?

We sharpen the question by dividing the dual burdens of the first-order quantifiers between two different expressions of another language. This is what *lambda-abstraction languages* do.[13] These languages have the predicates

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[13]There are, in fact, quite a few languages that go by the name of 'lambda-abstraction'. We are here concerned with the first-order fragment of typed lambda-abstraction languages

and truth-functional constants of first-order languages. But instead of the first-order quantifiers, they have two separate symbols: a variable-binder and a proper quantifier.

Here's the idea. Introductory logic texts often tell us that we can read '∃x(...x...)' as a sort of quasi-English expression, meaning

There is something that is an x such that ...x...

Likewise, '∀x(...x...)' can be translated as

Everything is an x such that ...x...[14]

But we could do the same work with separate expressions: one which means 'something', one which means 'everything', and a third which means 'is an x such that ...x...'.

This is what lambda-abstraction languages do. They have a predicate-forming operator, 'λ' that combines with a variable and an open expression to make a predicate: where ϕ is an open expression, $\ulcorner \lambda x \phi \urcorner$ means $\ulcorner$is an x such that $\phi \urcorner$. They also have expressions '$\exists_p$' and '$\forall_p$' that mean 'there is something that' and 'everything', respectively.

These languages are just as ontologically guilty as first-order ones. But we can meaningfully ask whether these languages are guilty thanks to their quantifiers proper or thanks to their variable-binders.

I think the answer is straightforward: the languages are guilty thanks to the quantifier proper, not the variable binder. That the variable-binder is not to blame: suppose that we had a language with 'λ' and only one sentence-making operator, 'B', which means 'It is possible for there to be someone who

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with categoramical quantifiers (Gamut 1991: 102–115; see Hindley and Seldin 1986: 266-286 for the untyped counterpart). Since the languages have categorical quantifiers, only 'λ' can bind variables; since they are typed and first-order, 'λ'-abstraction can only form first-order predicates.

[14]Quine (1960*b*: 162); cf. van Inwagen (1998: 18–22).

believes that something…'. No ontologically committal sentence could be formed in that language. We could only use it to talk about what possible believers could or couldn't believe. But we can talk about *that* all day without ever saying anything about what there *is*. The variable binder doesn't suffice for ontological guilt.

On the other hand, '$\exists_p$' is ontologically committing, simply because it means *there is something*. We commit ourselves ontologically when we say that there is something which is some way or another, and '$\exists_p$' is the expression we use to say this.

We can see why quantifiers proper make a language ontologically committal by thinking about why variable-binders don't. Consider a complex predicate such as

(8) $\lambda x \lambda y (F(x) \ \& \ G(y) \ \& \ R(x, y))$

A pair of pegs will satisfy this predicate exactly when one of them has the '*F*' rubber band hanging from it, the other has the '*G*' rubber band hanging from it, and the '*R*' rubber band is stretched between them. If we wanted to identify a single rubber-band structure picked out by (8), we might think of it as three rubber-bands glued together as in figure 5.2. But in this case, 'λ' creates a complex rubber band. It does not fasten that rubber band to any pegs. If you want to say that an *F* thing *R*s a *G* thing — if you want to stretch this complex rubber band between a pair of pegs — you've got to find a way to plunk down some pegs to stretch this between.

Figure 5.2: A Rubber Band for (8)
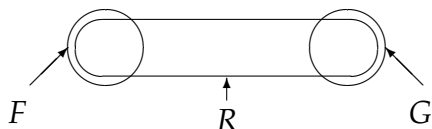
The 'λ'-operator essentially gives us the power to create complex rubber bands. This is not enough to impart ontological structure: making rubber bands doesn't give us somewhere to hang them. We have to use a quantifier proper to drop a peg down into the board, giving the rubber band something to hook on to.

We now better understand the relationship between quantification and ontological structure. The existential quantifier proper is ontologically committing because it, and no non-quantificational expression, has the job of plunking pegs down on the board. It is the existential quantifier, not the variable-binder or any other semantic gizmo, that both requires and semantically communicates that the ontological structure of reality *includes pegs* — pegs of a certain type, pegs with rubber bands corresponding to the expressions prefixed by the quantifier. And this is why quantifiers proper — especially *existential* quantifiers proper — make a language guilty.

5.4 Two Less Plausible Strategies

Let's return to our search for an ontologically innocent way to paraphrase our ontologically guilty target language. We will begin by considering a couple of clearly unattractive proposals. When we see the problems that beset these strategies, we will better know which pitfalls a more nuanced strategy must avoid.

5.4.1 Quiet Nihilism

Consider first a Nihilist who says:

> I don't see what all the fuss is about. It's quite easy to account for the problem sentences. We simply introduce an ontologically innocent expression, 'there schmare' (and its obvious cognates), which we can use

to capture all the truths we might ever need to capture. For example, when an ordinary speaker utters

(9) There are two electrons in every helium atom,

she speaks falsely but manages to communicate the true

(10) There schmare two electrons in schmevery helium atom,

where the only difference between (9) and (10) lies in the meanings of 'there are' and 'there schmare' (and cognates, like 'every' and 'schmevery'), respectively. And 'there schmare' doesn't invoke pegboard structure in any way whatsoever.

When we press him on the meaning of 'there schmare', this Nihilist refuses to say anything informative. He merely insists over and over again that it can be uniformly replaced for 'there are' to turn falsehoods into truths and that it is ontologically innocent.

Call this fellow a *Quiet Nihilist*. He seems to be cheating — surely it can't be *that* easy to get by without ontology. But just what, exactly, is wrong with his strategy?

A Warm-up Exercise

Imagine meeting a man — Eustance — who, to your surprise, tells you nothing is blue. 'What?' you cry in amazement. Pointing at something you had always thought of as 'blue', you ask: 'What color is that, then?' And Eustance responds, 'Eulb'.

Trying to figure out what's going on, you ask further: 'Is eulb a color?' He says, 'Yes'. He tells you that eulb is a cool color, the color of the sky, and that it lies on the spectrum between red and green. When you ask what color complements eulb, he replies, 'yellow'. He even insists, 'Contrary to what most people think, purple is not a combination of red and blue. It's a

combination of red and eulb.' He denies any sentence that you are willing to assert using the word 'blue', but will happily assert the sentence that results from it by a systematic replacement of 'blue' for 'eulb'.

It won't be long before you start thinking that when Eustance says 'eulb', he means *blue* — he is talking about the color you have known and loved all along, the color of the sky and of bluebirds, the color you have always called 'blue'. And so, even though he won't use the word 'blue' to describe those things, you will suspect that, insofar as the two of you have any real disagreement at all, it is only disagreement about which word to use for the color blue. You certainly aren't disagreeing about anything's *color*.

Suppose we think of you and Eustance as speaking subtly different languages — the 'blue'-language and the 'eulb'-language, respectively. Then your understandable attitude towards the shallowness of the 'eulb'-speaker's claims seems underwritten by the following line of thought:

> Eustance and I seem to mean the same thing by all of our terms *other* than 'blue' and 'eulb', and he uses 'elub' in exactly the same way that I use 'blue'. But, since our words get to mean what they mean thanks to the way we use them, 'blue' in my mouth and 'eulb' in his should have the same meaning. Since 'blue' in my mouth means *blue*, 'eulb' in his mouth must mean that, too.

There is a general lesson here. Suppose L_1 and L_2 are languages that are exactly alike except that, where L_1 has an expression α, L_2 has a different expression, β. If ϕ is a sentence in L_1 that uses α, we write it as ϕ_α, and ϕ_β will be the expression of L_2 that is just like ϕ_α except that β is replaced everywhere for α. The line of thought just sketched relies on the following principle:

(∗) If every term (other than α and β) is interpreted the same way in L_1 as it is in L_2, and if the speakers of L_1 utter ϕ_α in all and only the circumstances in which speakers of L_2 utter ϕ_β, then α and β have the same interpretation also.

In the above case, of course, the 'blue'-language was L_1, the 'eulb'-language L_2, 'blue' was α and 'eulb' was β. Since you and your interlocutor meant the same thing by your *other* expressions, ($*$) licenses the conclusion that 'blue' and 'eulb' mean the same thing in your respective mouths.

The Status of ($*$)

Let's clear up a few points about ($*$) before going on. First, it talks about circumstances in which speakers of L_1 utter ϕ_α and in which speakers of L_2 utter ϕ_β. This talk ought to be understood dispositionally: to say that you and I utter ϕ in just the same circumstances is to say that our dispositions are such that, for any circumstance C, I am disposed to utter ϕ in C iff you are disposed to utter ϕ in C.

If we don't understand ($*$) in this way, it will prove too much. Imagine two communities that differ linguistically only in that one uses 'green' and one uses 'grue'. The green speakers are just like us, except they have never read Goodman (1979/1983) and never entertained the disjunctive predicates 'grue' and 'bleen'. The 'grue'-speakers are just like the 'green'-ones, except (a), they have never entertained the predicate 'green', and (b) although this community calls things 'grue' exactly when the 'green'-speaking community calls them 'green', they have different linguistic intentions. The 'grue'-speakers fully intend, when they encounter green-looking things for the first time after the set future date, to not call them 'grue' anymore. And they fully intend to call blue-looking things encountered for the first time after this date 'grue'.[15]

Unfortunately, both the 'green'- and the 'grue'-speaking communities are annihilated by an asteroid strike before the future date is reached. So,

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[15]Since they are otherwise just like their 'green'-speaking counterparts, they intend that after this future date they will be able to say things like 'this sapphire is both blue and grue'. But they do not yet have any idea what they will call green things observed after this date.

when it comes to actual tokens of 'green' and 'grue' uttered, the two communities agree entirely. (This isn't guaranteed: the 'grue'-speakers might say things like 'emeralds observed now are grue, but emeralds observed after the special future date won't be'. Nonetheless, these referential dispositions don't guarantee that they will say anything like this; let's suppose they never do.) If (∗) is understood just about what speakers *in fact* say, it will tell us that 'grue' and 'green' in these communities' respective mouths have the same interpretation. This looks implausible. Fortunately, though, (∗) will not license this result if it is understood as talking about the way speakers are disposed to use the expression in any possible circumstance; in any circumstances involving green things after the future date, the 'green'-speakers are disposed to call them 'green' and the 'grue'-speakers are not.[16]

Here is a second observation: (∗) will only seem plausible if 'interpretation' in the consequent is understood in a coarse-grained way, so that intensionally equivalent interpretations have the same interpretation. We can easily imagine two communities which differ only in that one uses the term 'triangular' whenever the other would use 'trilateral'. We should expect these communities to together satisfy the antecedent of (∗), but it is at least contestable that, in some sense, we don't want to say that 'triangular' means the same thing as 'trilateral'. However, we *do* want to say that these two expressions are at least intensionally equivalent — that they at least apply to the same things in the same possible circumstances. We ought to understand (∗)

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[16]One caveat: we should *not* be concerned with the speakers' dispositions to utter sentences containing both of the disputed words in question. For instance, we shouldn't demand that (∗)'s antecedent not be satisfied in the above 'blue'/'eulb' case simply because the 'eulb'-speaker is disposed to assert 'eulb things are not blue' and you, at least after serious reflection, are not disposed to assert 'eulb things are not blue'. The question is whether, *setting aside the way the speakers think these terms interact*, we should interpret them the same way; (∗) is supposed to give us a guide for determining whether speakers' assertions of this sort are plausible, and as such it should not be overly sensitive to the mere fact that they make these assertions.

so that it says nothing more than this.[17]

(∗) **and Quiet Nihilism**

(∗), of course, makes trouble for Quiet Nihilism. Consider the first-order Quiet language the Nihilist will use to paraphrase the first-order target language. It has all the same predicates and truth-functional connectives as our first-order language, but whereas we use the existential quantifier '∃', which means 'there is something that…', he uses his 'schmexistential' quantifier, 'schm∃', which he says means 'there schmis something that…'. But he grants that his predicates and truth-functional connectives mean what ours do, and he uses 'schm∃' in all and only the circumstances in which we would use '∃'. So (∗) tells us that 'schm∃' in his mouth means what '∃' does in ours.

Could the Quiet Nihilist defuse the appeal to (∗) by his mere insistence that 'schm∃' *doesn't* mean the same thing as '∃' does? I doubt it. Suppose Eustance insisted vehemently that 'eulb' did *not* mean the same as 'blue' in our mouths. He then places the following stipulations on the meaning of 'eulb':

(S1) 'Eulb' applies to exactly those things ordinary people would call 'blue' under ordinary conditions.

(S2) 'Eulb' is not interpreted the same way as (is not intensionally equivalent to) 'blue'.

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[17]A third observation: 'circumstances' and 'interpretation' will both have to be understood in a fairly specific way if we are to make room for context-sensitive expressions. In particular, two speakers 'being in the same circumstances' should be understood as entailing their being in the same context (in as narrow a sense as possible, so that if John truly says 'I am tired', Bill can only count as being in the same circumstance if it is one in which Bill is tired). And two expressions 'having the same interpretation' should be understood as their having the same *character*, as opposed to the same content (in Kaplan's 1989 terms). But our focus here is on a narrower class of languages — a class that is context-insensitive — so we can ignore these details in what follows. Thanks here to Ted Sider.

It is not at all clear that these stipulations are jointly satisfiable. If there is a property *B* that applies to exactly those things that ordinary people would call 'blue' under ordinary considerations, an ideal interpreter, under pressure, will interpret 'blue' as meaning *B*. When Eustance comes by and makes stipulation (S1), the ideal interpreter will have no choice but to interpret 'eulb' as *B*. But then she will have no way to satisfy (S2) without *re*-interpreting 'blue' as something other than *B*. No ideal interpreter would give Eustance that sort of control over the interpretation of everyone else's 'blue' — any reasonable principle of charity will have her make Eustance, rather than the rest of us, speak falsely. So, insofar as she makes sure (S1) is satisfied, she will have good reason to leave (S2) unsatisfied.

What goes for Eustance goes for the Quiet Nihilist: he can insist all he wants that 'schm∃' does not mean '∃', but this gives us no reason to think both that it does not and that sentences such as (10) are true in exactly those situations where we think we ought to assert (9). If we grant that his 'schm∃'-using sentences are true in the circumstances he says they are, we will have good reason to think that 'schm∃' means 'there is' after all.

(∗) and Charity Arguments

One final comment is in order. My argument against Quiet Nihilism bears some superficial similarities to some other interpretative arguments that philosophers (e.g., Eli Hirsch (2002*b*, 2005, 2007)) have run in other cases of metaphysical dispute. These 'charity' arguments run more-or-less as follows: party *A* insists that every one of party *B*'s sentences ϕ is false, but can be translated into a true sentence $t(\phi)$ of party *A*'s preferred idiom. But party *A* will assert $t(\phi)$ in exactly the situations where party *B* asserts ϕ, so (the argument goes) if $t(\phi)$ really is true in the circumstances where *A* would utter it, a charitable interpreter will interpret ϕ as synonymous with $t(\phi)$ and therefore as true

in those circumstances as well. Since our sentences mean whatever ideal interpreters say they mean, A should think that ϕ in B's mouth has the same meaning, and hence the same truth-value, of $t(\phi)$ after all.

The crucial difference between these charity arguments and my above argument relying on $(*)$ is simply that they take place at the level of sentences whereas mine takes place at the level of words. There are thus ways to resist the charity arguments that do not likewise affect the $(*)$ argument. To take one well-discussed example, there might, as Lewis (1983a: 45–55, 1984) argued, be a so-called *naturalness* constraint on interpretation: try, *inter alia*, to give each word as natural and un-gerrymandered a meaning as possible. This constraint will of course be balanced against other interpretative constraints like charity. But it is crucially a constraint about the interpretation of *words* rather than the interpretation of *sentences*.[18] It may very well be that every interpretation of parties A and B that makes all of B's sentences ϕ synonymous with A's $t(\phi)$ does so by assigning overly gerrymandered meanings to the individual words of A's or B's language. And so the naturalness constraint may, as a result, require some of B's ϕs to have different meanings than A's $t(\phi)$s after all.[19]

But the $(*)$ argument relies on an interpretative principle about the meanings of *words*: when parties A and B uses the words α and β in the same way, against a background of other, shared words all understood as

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[18]This, at least, is how the constraint is interpreted by many; see e.g. Sider (2001a,b: xxi–xxiv), Stalnaker (2004), and Weatherson (2003). Wolfgang Schwarz (MS) argues persuasively that Lewis' considered view had little concern for the interpretation of individual terms and cared primarily about the assigning of contents to individuals' mental states. In this case, the constraint is not about *words*; but neither is it about sentences, and so it too may override pressure from charity to interpret ϕ and $t(\phi)$ as synonymous — for such an assignment may, for example, require assigning overly gerrymandered mental states to either A or B.

[19]This might very well suggest that the 'grue'-speakers from section 5.4.1 really meant 'green' by 'grue'. But this is perhaps to make the constraint too strong: an ideal interpreter's injunction to give words an ungerrymandered interpretation ought not outweigh a community's *explicit intention* to use an expression in a gerrymandered way.

having the same interpretation in A's and B's mouths, then α and β must be interpreted the same way, too. No naturalness constraint or other word-level constraint is likely to conflict with ($*$): the shared words have the same interpretations and hence all the same semantic properties in both languages, and if we give α and β the same interpretation, they will have the same semantic properties in both languages, too. If β gets a highly natural interpretation, for instance, then nothing about naturalness can keep α from getting the same interpretation. And if β has a gerrymandered interpretation, the fact that this interpretation snuck in against the semantic background of B means that there can be no naturalness-inspired bar to giving α the same interpretation against the same semantic background.[20]

The considerations underwriting the ($*$) argument are much more fine-grained than those supposed to underwrite standard charity arguments, and the two kinds of argument ought not be confused. Even those who suspect interpretative charity arguments in general ought to find ($*$) plausible and thus reject Quiet Nihilism.

5.4.2 Propositional Nihilism

A second Nihilist says instead:

> I am going to paraphrase the problem sentences into the language of propositional logic. It has 'atomic' sentences P, Q, R, ..., and truth-functional connectives '$\sim$', '&', etc. A sentence such as
>
> (11) There is one electron in a hydrogen atom,
>
> will be paraphrased into an atomic sentence — P, for instance — and

---

[20]The situation is really slightly better than this; by insisting that the rest of the respective languages' semantic backgrounds are the same, we essentially ensure that a lot of *other* interpretative issues between both parties have been settled in favor of similar meanings for their languages. Given that this much has been fixed, and given that the only remaining expression is used the same way by all parties, it becomes very hard to think of *any* interpretative constraint, whether at the level of sentences, words, or mental states (see note 18 above), that could pressure us to interpret α differently than β.

(12) There are two electrons in a helium atom,

will be paraphrased into another atomic sentence, say *Q*. But these atomic sentences don't invoke any pegboard structure. They just say that thus-and-so is the case, where thus-and-so is some ontology-free state of reality.

When we press the Propositional Nihilist to tell us more about what these sentences mean, he also refuses to say anything helpful.

I doubt that Propositional Nihilism is untenable in the way that Quiet Nihilism is. But it has several defects that we should not pass over.

Exploded Ideology

First, the view is *ideologically extravagant*. A theory's ideology consists of the expressions the theory takes as meaningful and undefined — the expressions, as it is often put, that the theory takes as *primitive*. But no matter how many (or how few) primitive expressions the target language has, the Nihilist's propositional paraphrasing language needs many, many more. With just a few predicates and standard first-order resources we can construct indefinitely many logically distinct sentences, e.g.:

There is one electron in region *R*.

There are two electrons in region *R*.

There are three electrons in region *R*.

⋮

Since these sentences are not truth-functional compounds, they must each be paraphrased as some atomic proposition. And each of these is logically distinct, so if the Nihilist translates two of these as the same sentence, he will collapse distinctions we can make. So, insofar as he wants his paraphrases to preserve our ability to make these sorts of distinctions, he will need to paraphrase each of these by a *different* atomic proposition:

$$P$$

$$Q$$

$$R$$

$$\vdots$$

Since each of these atomic propositions constitutes a primitive bit of ideology, the Nihilist's ideology will be tremendously large.

Lack of Systematicity

Second, the view is *inferentially unsystematic*: it endorses tremendously many inferences the validity of which it cannot explain. Consider, for instance, the sentences:

(13) There are exactly two electrons orbiting a proton,

(14) There are some electrons orbiting a proton.

The Propositional Nihilist paraphrases these as atomic sentences, say, *A* and *B*. And presumably, as (13) entails (14), *A* will entail *B*, too.

The inference from (13) to (14) is underwritten by a nice, systematic theory — the first-order predicate calculus. But nothing underwrites the Nihilist's counterpart inference from *A* to *B*. In particular, there is nothing the Nihilist can say to explain why the inference from *A* to *B* is valid although the inference from *A* to, say, *C*, where *C* is the paraphrase of

(15) Some neutron is in region *R*,

is not. The fact that *A* entails *B* but not *C* is, according to the Nihilist, a brute fact: it admits of no more basic explanation. And, although everybody has some brute facts somewhere or another, the Propositional Nihilist has more than his share: presumably there will be indefinitely many valid (and

indefinitely many invalid) inferences between atomic propositions, and the validity (or invalidity) of *each one* will be a further brute fact.

Holism

Finally, the view is *holistic*: it cannot make sense of the thought that reality's global structure is somehow 'built up' out of its various local structures.

   We ontologically-minded folk think something like the following: there are a limited number of ways things could be, and a limited number of ways things could be interrelated. And the way reality is *in toto* is determined by the way each thing is and is interrelated to its fellows.

   For instance, when I say

(16) An electron attracts a proton and repels another electron,

I say that there are three pegs, arranged with rubber bands as in figure 5.3. And it is easy to see how this complex pegboard-and-rubber band structure

Figure 5.3: The Rubber Band Structure of (16)
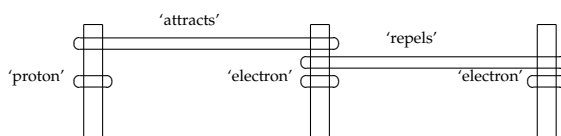
is built up out of two simpler structures, one that involves the leftmost and center pegs, and one that involves the center and rightmost pegs. In a certain way, the fact expressed by (16) is built up out of 'smaller' facts — in particular, the facts expressed by

(17) A proton attracts an electron (figure 5.4),

and

Figure 5.4: The Rubber Band Structure of (17)
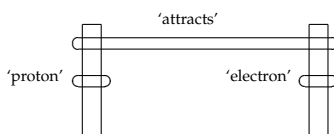
(18) An electron repels another electron (figure 5.5),

Figure 5.5: The Rubber Band Structure of (18)
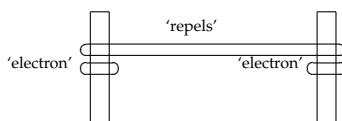
along with the fact that one of the electrons doing the repelling in (18) is also doing the attracting in (17).

Clearly the Nihilist cannot use this flagrantly ontological explanation of how the structure described by (his paraphrase of) (16) is 'built up' out of more basic structures. But what other explanation could he give? Whenever we start to talk about what looks like a distinctly ontological fact, he produces a new 'atomic' fact. Presumably, the fact is *atomic* because it encodes no further structure — it is, rather, simple, a structureless I-know-not-what. But no such paraphrase of a claim like (16) admits of an explanation of its structure in terms of more local structures — because any such paraphrase won't encode any structure to be explained.

Should the Propositional Nihilist Be Worried?

The Propositional Nihilist might shrug his shoulders and say, 'So what? I've bitten bullets in my time — what's a few more?' For my part, I think that the combination of inferential unsystematicity, ideological bloat, and rampant holism are troubling enough to prompt us to look elsewhere. I also think that most metaphysicians would — and should — agree, but I am not going to argue about it here. If the Propositional Nihilist is comfortable paying these prices for his Nihilism, so be it; but let it be known that he must indeed pay them.

A Propositional Nihilist might instead complain, though, that one of these charges or another does not in fact stick. As far as I can tell, both the explosion of ideology and the holism are straightforward consequences of the Propositional proposal[21] — I can see no hope for acquittal on those charges. But there are a few ways a Propositional Nihilist might try to escape the charge of inferential unsystematicity. Let's look at these in turn.

Syntactic Unsystematicity is No Big Deal

The Propositional Nihilist's first appeal insists that inferential unsystematicity is no big deal:

> So my Propositional language has no good syntactic recipe for deter-
> mining which inferences are valid. So what? Lots of perfectly good
> languages have this feature. Incompleteness results, for instance, tell us
> that higher-order languages cannot provide sound, finite inferential sys-
> tems that license every valid inference. And even in natural language,
> many valid inferences are syntactically indistinguishable from invalid
> ones. So insofar as my language is unsystematic, it is no worse off than
> higher-order or natural languages.

---

[21]At least as formulated; I am aware of some other proposals that manage to push the bump in the carpet around, making the view more inferentially systematic at the cost of making it even more ideologically extravagant or holistic, for instance.

This appeal is a red herring. Section 5.4.2's observation wasn't that the inferences between the atomic sentences were not *syntactically discernible*; inferential systematicity doesn't demand that sentences' inferential relations be worn on their syntactic faces. The observation was that the inferences have to be *semantically brute*: there is no explanation *whatsoever*, syntactic or otherwise, for their validity.

Let's look at the appeal to natural languages. Hawthorne and Cortens (1995: 151) point out that while the inference

(19) He happily robbed the bank.

Therefore, he robbed the bank.

is clearly valid, the inference

(20) He allegedly robbed the bank.

Therefore, he robbed the bank.

is clearly not. And these two inferences are *syntactically* indistinguishable; the validity of (19) and invalidity of (20) are not worn on their syntactic faces.[22]

But (as Hawthorne and Cortens point out on the same page) this does not mean the inferences are brute: there is a simple *semantic* explanation for the difference in (19)'s and (20)'s validity. 'Happily' is an adverb which, when attached to a verb that picks out an action V, creates another verb which is still a kind of V-ing. But 'allegedly' is an adverb which, when attached to a verb that picks out an action V, does not create a new verb that picks out a kind of V-ing. The inference is not syntactically discernible, but that doesn't make it brute.

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[22]Hawthorne and Cortens's original invalid example, 'He ran halfway up the hill; therefore, he ran up the hill' is not clearly of the same syntactic form as their valid example, 'He ran quickly up the hill; therefore, he ran up the hill'. In the first case, 'quickly' modifies 'ran'; in the second, 'halfway' modifies 'up the hill'.

A similar point holds for higher-order languages. Even though they have no complete axiomatization, they do make room for semantic explanations of validity. The explanations come from the model theory for those languages, which makes then semantic, not syntactic, explanations.

Propositional Nihilism is not like either of these cases. It lacks not just a syntactic account of the inferences' validity, but it lacks a semantic one, too. Its atomic propositions, recall, do not have semantic values that encode any more detailed structure. They are propositional blobs — they can be true or false, but that's all we can say about them. After he has told us that there is a true atomic proposition P, and that it is what we were getting at all along when we said that there was an electron orbiting a proton, the Propositional Nihilist has nothing left to say. In particular, he has no story about what P *means* that would let him explain why it entails, say, Q but not R.

In fact, whether we have a *syntactic* way of systematizing the inferences is irrelevant. Suppose we supplement Propositional Nihilism with the following syntactic theory. Every sentence is composed of two syntactic components: a *content tag* and an *inference tag*. A content tag is simply a syntactically simple expression, such as a capital letter (perhaps with numbered subscripts, so that we can have more than 26 of them). An *inference tag* is syntactically complex, made up out of various *pseudo=expressions:* pseudo-variables ('x', 'y', 'z', ...), pseudo-predicates ('=', 'P', 'Q', 'R', ...), and pseudo-quantifiers ('∀', '∃'). There is one simple pseudo-expression in the language for every simple expression in the target language, and formulation rules for inference tags mirror those for sentences of the target language: ϕ is a pseudo-tag if and only if it is isomorphic to a sentence of the target language. Sentences of the Propositional language have the form $\ulcorner P^{\phi} \urcorner$, where P is a content tag and ϕ an inference tag. But we deny that *every* string of this sort is well-formed: each inference tag can be joined to only *one* content tag. That is, the syntax of the

language specifies a function f from inference tags to content tags, and $\ulcorner P^{\phi} \urcorner$ is well-formed iff P is a content tag, ϕ an inference tag, and P is the value of ϕ for f.

Call this the *tag-language*. It has a fully specified syntax. It remains to give it a semantics. The semantics we give it is quite simple: every content tag is interpreted so as to encode one of the Propositional Nihilist's atomic facts. And inference tags, and all of their parts, are semantically empty.[23]

Propositional Nihilists can easily create a syntactic inference system that will mirror the inferential structure of the target language: paraphrase any sentence ϕ of the target language as $\ulcorner P^{\phi} \urcorner$, for some content tag P. Then say that $\{P_1^{\phi_1}, P_2^{\phi_2}, \ldots\} \vdash Q^{\psi}$ iff $\{\phi_1, \phi_2, \ldots\} \vdash \psi$.

This certainly gets the inferences right. For instance, the first-order renderings of (13) and (14) ,

(21) $\exists x \exists y \exists z (\mathrm{E}x \,\&\, \mathrm{E}y \,\&\, \mathrm{P}z \,\&\, x\mathrm{O}z \,\&\, y\mathrm{O}z \,\&\, x \neq y \,\&\, \forall w(w\mathrm{O}z \supset w = x \vee w = y))$ and

(22) $\exists x \exists y (\mathrm{E}x \,\&\, \mathrm{P}y \,\&\, x\mathrm{O}y)$,

(with 'Ex' abbreviating 'x is an electron', 'Px' abbreviating 'x is a proton', and 'xOy' abbreviating 'x orbits y), get paraphrased as

(23) $\mathrm{A}^{\exists x \exists y \exists z (\mathrm{E}x \,\&\, \mathrm{E}y \,\&\, \mathrm{P}z \,\&\, x\mathrm{O}z \,\&\, y\mathrm{O}z \,\&\, x \neq y \,\&\, \forall w(w\mathrm{O}z \supset w=x \vee w=y))}$ and

(24) $\mathrm{B}^{\exists x \exists y (\mathrm{E}x \,\&\, \mathrm{P}y \,\&\, x\mathrm{O}y)}$,

respectively. But since (22) is deducible from (21) in first-order logic, our Nihilistic inference rules let us deduce (24) from (23). This language can, in this manner, provide a full syntactic recipe for determining which inferences are valid.

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[23]They are thus like the semantically empty 'it' of weather-sentences; see section 5.5 below.

But so what? This syntactic inference-encoding *has nothing to do with what the sentences mean*: the only part of the sentence that does any semantic work is also the only part of the sentence that is irrelevant to the syntactic validity-checking procedure. The scheme tells us *which* inferences are valid, but does nothing to explain *why* those inferences deserve to be valid.

Syntactic systematizations of inferences are useful and informative when and insofar as variation in syntax corresponds to similar variation in semantics. The demand for 'inferential systematicity' is a demand for a semantic story about what underwrites the inferences — not merely a syntactic recipe for figuring out which inferences are the valid ones. Our ability to tell such a story depends ultimately on the structures encoded by the semantic values of the sentences involved. But the Propositional Nihilist denies that his atomic sentences encode any interesting structure; as a result, he denies his paraphrase languages the resources needed for inferential systematicity.

Why Should the Inferences Be Valid?

Our response to the last appeal tells us that, if the Propositional Nihilist endorses all the inferences we expect him to, his system will be unsystematic. But our Propositional Nihilist can now appeal on the grounds that he doesn't endorse all the inferences we expect him to. He says:

> It's no constraint on a paraphrase scheme that every inference supposed to be valid in the target language will remain valid under paraphrase. In fact, proponents of various paraphrase schemes often like them *because* they invalidate certain troublesome inferences.[24] So my paraphrase of a first-order sentence ϕ need not entail my paraphrase of another, ψ, just because ϕ entails ψ. So why can't I say that, in my language, atomic sentences typically *don't* entail other atomic sentences? Now my language is inferentially systematic again; it just does not license all the inferences you thought it would.

---

[24]See Hawthorne and Cortens (1995: 151–152); cf. van Inwagen (1990: 128).

If we think that ϕ entails ψ, we think that whatever important fact we're getting at with ϕ cannot be true if the important fact we're getting at with ψ is false. If someone comes along with a paraphrase scheme according to which the paraphrase of ϕ does not entail the paraphrase of ψ, he says that we are wrong about this relationship: whatever important fact we're getting at with ϕ *could* be true even if the important fact we were getting at with ψ is false.

It is certainly no desiderata on a metaphysics that every inference ordinary folk are inclined to make turn out valid. But it's one thing to say that ordinary folk tend to be wrong about the validity of certain troublesome inferences, and another thing to say that ordinary folk tend to be wrong about the validity of their inferences more often than not. We tend to make paradigmatically quantificational inferences — inferences of the sort that cannot be captured in a purely Propositional language — all the time. If the Nihilist invalidates all of these, he comes dangerously close to saying that we are radically mistaken about the world and affirming (1) after all. Since he wants to avoid (1), he ought to be careful about how many apparently valid inferences he wants to ultimately rule invalid.

The point can be put another way. Ontological nihilists of any stripe want to 'save the appearances' — that is, they want to explain why talking as though there are certain kinds of things is often useful even though there are no things of that kind. But along with this, they also need to 'save the practices', explaining why certain natural transitions involving talk of these kinds of things are so useful.

Consider again the bridge in figure 5.1. We noted there that someone who doesn't believe in holes needs to explain why, if there are no holes, you can point to

(3) There is a hole in the right-hand side of the bridge,

to explain why you crossed on the left instead of on the right. But this explanation will only count as a good explanation if certain inferences are valid.

In one sense, to explain an action it so explain why someone did it. Explanations of this sort usually cite some beliefs and desires: roughly, I can explain my *A*-ing by pointing out that I desired that *C* be the case and I believed that if I *A*-ed, *C*.[25] And I can explain why I *A*-ed instead of *B*-ed by pointing out that I desired that *C*, believed that if I *A*-ed, *C*, and believed that if I *B*-ed, not-C. Call this sort of explanation a *descriptive explanation* — it describes why somebody acted in a certain way.

The most natural way to give a descriptive explanation of your bridge-crossing behavior is to point out that you desired that you cross to the other side without falling through and that you believed both of:

(25) If I walk on the left-hand side of this bridge, I will cross without falling through.

(26) If I walk on the right-hand side of this bridge, I will fall through.

But while this explains why you crossed the bridge as you did, it does not explain why your so doing was a *good idea*. Consider Hal, who tends to hallucinate that there are holes where there aren't any. That is, he tends to hallucinate that bridges shaped like the one in figure 5.6 are instead shaped like the one in figure 5.1. Hal comes across a perfectly good bridge, and crosses it on the left. We can explain both your behavior and Hal's by pointing to your respective desire to cross without falling through and your (25)- and (26)-like beliefs. But we tend to think that you, unlike Hal, had a *good* reason for crossing your bridge: there *was* a hole in your bridge, and there wasn't one in Hal's.

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[25]See Davidson (1963).

Figure 5.6: A Perfectly Good Bridge
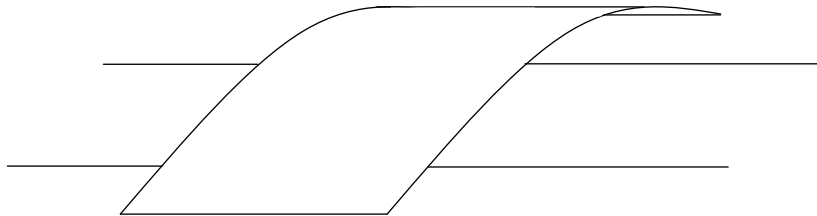
We point to the truth of (3) to explain both why you crossed the bridge as you did and why your bridge-crossing behavior, unlike Hal's, made sense. That is, we point to the truth of (3) not only to give a descriptive explanation, but also to give a *justifying* explanation — an explanation as to why your actions were, under the circumstances, smart. Your recognition of the truth of (3) caused you to believe (25) and (26), which explains why you crossed as you did. And because your belief was based on the *truth* of (3), your bridge-crossing behavior was, unlike Hal's, reasonable.

The perforational nihilist could perhaps point to your belief in (3) to explain why you crossed as you did. But he cannot point to its *truth* to explain why your behavior was reasonable — for he does not think that it is true. This is where the paraphrase strategy comes in: he points instead to the truth of something in the neighborhood of (3) — namely,

(4) The right-hand side of the bridge is perforated,

that makes crossing on the right a bad idea. He believes that (4) is true of your bridge, and not of Hal's; that it is your recognition of the fact expressed by (4) that caused your behavior and something very different that caused Hal's;

and that as a result your bridge-crossing behavior is well-motivated and Hal's is not. That is, he uses the paraphrases of hole-talk to provide the needed justifying explanations.

But this paraphrasis-explanation works only if it really is a bad idea to cross on the right-hand side of right-hand-side perforated bridges. More precisely, it works only if (4) (plus some very reasonable background assumptions) entails (26). If perforated sides of bridges were the sorts of things you could walk over unharmed, the truth of (4) just wouldn't be relevant to your bridge-crossing behavior. In other words, the perforational nihilist's paraphrase scheme meets the challenge only given the validity of certain transitions we are prone to make — so prone to make, in fact, that we often don't notice them until they are pointed out, as has been done here.

The Propositional Nihilist needs to give a justifying explanation for our bridge-crossing behavior just as much as the perforational nihilist — more so, since he thinks not only that there are no holes, but also that there are no bridges. But he will paraphrase (3) and (26) as atomic propositions. And the inference that takes us from the former to the latter is a paradigmatically quantificational inference.[26] So if the Propositional Nihilist wants to be able to offer the needed explanation, he will have to say that at least some inferences between his atomic propositions are valid.

This is no local phenomenon, either. Almost every instance of scientific

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[26]Presumably, the inference in question runs:

(i) There is a hole (of such-and-such a size) in the right-hand side of this bridge.

(ii) Anyone who walks on a side of a bridge with a hole (of such-and-such a size) falls through.

(iii) If I walk on the right-hand side of this bridge, I walk on a side of a bridge with a hole (of such-and-such a size). (from i)

(iv) Therefore, if I walk on the right-hand side of this bridge, I will fall through. (from ii, iii)

This inference is valid in quantificational logic. But the corresponding inference, with (ii) traded in for an atomic proposition, is not.

discovery involves paradigmatically quantificational inferences — inferences of the sort the Propositional Nihilist must paraphrase as inferences between atomic claims. This sort of reasoning is built deeply into our natures — so deeply that it is hard to imagine successfully navigating our environment if it was not typically valid. One way to explain our success is to say that the facts we get at with the premises of our inferences typically entail the facts we get at with the conclusions of our inferences. But it is hard to see what else the Propositional Nihilist could point to, short of a cosmic coincidence, that could explain our success.

The charge of inferential unsystematicity thus stands: if the Propositional Nihilist's paraphrase strategy is to do what paraphrase strategies are supposed to do, it will need indefinitely many brute, inexplicable entailments between atomic propositions.

5.5 A Better Proposal: Feature-Placing Languages

5.5.1 Introducing Feature-Placing Languages

So the Quiet proposal is untenable, and the Propositional Proposal is unattractive. Perhaps a Nihilist can do better.

Consider first the sorts of sentences we use to report the weather:

It is raining,

It is snowing,

It is cold,

and so on. Notice that, despite the 'it' in each sentence, none of these say that any *thing* is raining, snowing, or cold. These sentences simply 'place' certain meteorological features — simply say that raining or snowing is going on, or that coldness is manifest — without saying that any particular object is doing

the raining or snowing or being cold. Unlike most English sentences, these are not talking about the arrangements of rubber-bands on pegs. If they are doing anything even in the neighborhood of that, they are simply throwing a rubber band onto the board between the pegs.[27]

P. F. Strawson (1954, 1963) noticed that we could, in principle, use sentences like this to place 'ontologically innocent' (i.e., peg-free) features usually associated with particular things. For instance, instead of saying

(27) $\exists x(x$ is a cat$)$,

we could say

(28) It is catting.

Just as 'it is raining' says that rain is going on without saying that there is any thing which is raining, (28) should be understood as saying that catting is going on without saying that any particular thing is a cat.

Following Strawson, we will call sentences such as (28) *feature-placing sentences*, and if a language only allows sentences (and truth-functional compounds of sentences) of this sort, we will call it a *feature-placing language*. The idea is that the Nihilist can paraphrase every apparently quantificational sentence we would ordinarily want to count as true into some sentence of a feature-placing language and thereby account for all the undeniable facts without appealing to any pegboard-like structure. (See Hawthorne and Cortens 1995)[28]

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[27]This may not be quite right. The semantics of 'is raining' may make it a predicate of places. The 'it' that syntax demands is definitely semantically empty (see Seppänen 2002: 445–453 for powerful arguments that it must be), but 'is raining' may nonetheless include a location 'slot' at the semantic level, filled in by context in a bare assertion of 'It is raining' but explicitly filled in constructions such as 'It is raining in Austin' or bound as in constructions such as 'Wherever Joe went, it rained' (cf., eg. Stanley 2002*a*: 416–418 on binding). Out of charity towards the Nihilist, though, we will ignore these complications here; cf. note 28 below.

[28]If the predicate-of-places account of the 'it' in 'It is raining' described in note 27 is right,

5.5.2 The Proposal and Predicate Functors

How do we turn this suggestion into a concrete paraphrase scheme? We begin by replacing every one-placed predicate (we will deal with relational predicates later) A with a feature-placing predicate $\ulcorner$is A-ing$\urcorner$. Then we paraphrase every sentence of the target language

(29) $\exists x A(x)$,

as

(30) It is A-ing.

We can now paraphrase very simple sentences. How do we deal with more complex ones? We need to tread carefully around them. Consider, for instance, the distinction between the following:

(31) $\exists x(x$ is positively charged $\&$ x is negatively charged$)$

(32) $\exists x(x$ is positively charged$)$ $\&$ $\exists x(x$ is negatively charged$)$.

(32) says that some things are positively charged and some things are negatively charged; this is the sort of sentence the Nihilist should paraphrase into something he takes to be true. But our best science rules out (31) (or so I take it), and so the Nihilist ought to paraphrase it as something he takes to be false.

It is initially tempting to paraphrase (31) and (32) respectively as:

(33) It is positive-charging and negative-charging,

(34) It is positive-charging and it is negative-charging.

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then a Nihilistically acceptable reading of (28) won't be strictly parallel to 'It is raining': (28) will predicate cattingness of *places*, and thus invoke pegboard structure at that level. I think, however, that we can still make sense of what the Nihilist wants to say with (28); and even if we can't, we can learn much from pretending we can and seeing how far the Nihilist can run with his proposal. So I do not intend to make much hay over these otherwise problematic linguistic considerations here.

But the temptation should be resisted, for these sentences say the same thing. The semantics of feature-placing sentences treat the 'it' as empty and the predicate $\ulcorner A\text{-ing}\urcorner$ as expressing a proposition. The 'it' is needed simply to fill a syntactic requirement, but isn't doing any semantic work. (Some languages do not have this syntactic requirement, and their corresponding feature-placing sentences are simply verbs. The Spanish counterpart of 'it is raining' for instance, is the conjugated verb 'Lluevre'.) But if 'is positive-charging' and 'is negative-charging' express propositions all by themselves, then any 'and' between them simply conjoins those propositions, regardless of where the 'it' shows up.[29] (33) and (34) are equivalent, so we can't use them to respectively paraphrase both (31) and (32).

We do better if we make some logically complex predicates out of the simple predicates *first*, before turning them into 'feature' expressions. We could then construct a predicate 'is positively charged and negatively charged', and turn *that* into a single feature-placing expression 'is (positive-charge and negative-charge)-ing' which is not to be understood as the conjunction of 'is positive-charging' and 'is negative-charging'. Then the Nihilist could paraphrase (31) as

(35) It is (positive-charge and negative-charge)-ing,

which is equivalent to neither (33) nor (34).[30]

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[29]Compare, for instance, 'It is raining and it is cold' with 'It is raining and cold'. This transparency of the 'it' to truth-functional operators is one reason semanticists think 'it' is semantically empty; cf. Seppänen (2002: 448).

[30]Hawthorne and Cortens (1995: 148–149) suggest using adverbs to solve the problem, rendering a sentence such as 'There is a red cat' as 'It is catting redly'. While my suggestion here is similar in spirit, by not distinguishing between feature-placing verbs and adverbs, it is somewhat more streamlined: for instance, it can paraphrase (31) without deciding (as Hawthorne and Cortens's proposal would have to) which of 'is positively charged' and 'is negatively charged' to turn into a verb and which into an adverb.

Let's make this proposal more precise. Suppose we begin with a stock of simple predicates A, B, ... Then we help ourselves to some *predicate functors*, expressions that combine with predicates to make new predicates. For instance, we help ourselves to a *predicate conjunction* functor '&', which combines with any two predicates to create a third. If P and Q are any predicates, then $\ulcorner P \mathbin{\&} Q \urcorner$ is their conjunction. Likewise, we help ourselves to a *predicate negation* functor '$\sim$': if P is a predicate, $\ulcorner \sim P \urcorner$ is its negation.

We can build up any truth-functionally complex predicate we want with these two functors. But how will we turn these complex predicates into the sorts of expressions that the feature-placing language uses?

We might simply help ourselves to a large stock of primitive expressions: for every predicate A of the language to be paraphrased away, regardless of whether it is simple or complex, we introduce a primitive expression $\ulcorner$is A-ing$\urcorner$ of the feature-placing language. But that would be unlovely, incurring some of the costs of Propositional Nihilism. For instance, it would force the feature-placing language to have a huge stock of primitive expressions relative to the quantificational language it paraphrases. And making all of these expressions primitive in this way would obliterate logical relations that we might well want to keep around. Intuitively, since the existence of something both positively and negatively charged ought to entail the existence of something positively charged, for instance, the feature-placing (35) ought to entail

(36) It is positive-charging.

But if the expressions 'is (positive-charge and negative-charge)-ing' and 'is positive-charging' are simply two separate, semantically simple items, then either this entailment won't hold or the Nihilist will have to write it in by hand — along with a huge number of other entailments — as a brute necessary connection.

If he wants to avoid both bloating his ideology and de-systematizing his inferences, the Nihilist can do better: rather than take the many ⌜is A-ing⌝ expressions as primitive, help himself to a third predicate functor, 'is ...-ing', which combines with predicates (whether simple or complex) to produce the feature-placing predicates he needs for his paraphrases.

Actually, at this point we might as well drop the syntactic pretense that the feature-placing language's expressions ⌜is A-ing⌝ are *predicates*. As we have already noticed, from the perspective of the *semantics*, these things are sentence-like — they are truth-evaluable all on their own, and only demand a (semantically empty) 'it' to satisfy a quaint demand of English syntax. To make the semantics and the syntax march in step, we can let the predicate-functor combine with predicates to make *sentences*. Suppose we write this functor 'Δ': then for any predicate A, whether simple or complex, ⌜$\Delta(A)$⌝ will be the Nihilist's symbolic representation of the sentence ⌜It is A-ing⌝.

If our feature-placing language has the simple predicates of the target language and the three predicate functors '&', '$\sim$', and Δ', we can paraphrase the target language into it simply and smoothly.

The paraphrase strategy relies on two facts. First, every sentence in a first-order language with only one-placed predicates is equivalent to a truth-functional compound of sentences of the form

(37) ⌜$\exists x(\ldots x \ldots)$⌝,

where '$\ldots x \ldots$' is some truth-functional compound of atomic predications of the form ⌜Ax⌝.[31] Say that sentences of this type are in *existential normal form*.

Second, every truth-functional compound of atomic predications of the form ⌜Ax⌝ can be turned into a predication of a single complex predicate

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[31]This follows from the fact that a sentence of the form (37) is equivalent to one using only one variable; Boolos et al. (cf. 2002: 274–275).

made up from simple predicates and the truth-functional functors in a fairly obvious way. (⌜Ax & Bx⌝ becomes ⌜$(A\&B)x$⌝, ⌜$\sim Ax$⌝ becomes ⌜$(\sim A)x$⌝, and so on.) Call this the *functor reduction* of the original truth-functional compound.

In this case, to paraphrase a sentence ϕ of first-order logic in the feature-placing language, first put ϕ in existential normal form, and then for each subsentence of the form (37), replace it with

(38) ⌜$\Delta(P)$⌝,

where P is the functor reduction of '... x ...'. Now we have feature-placing replacements for each sentence of the target language without any of the costs of Quiet or Propositional Nihilism. So the feature-placing option, it seems, gives us Nihilism on the cheap.

5.5.3 What About Relations?

But not so fast. We're not *entirely* done, because we have not yet said anything about how to deal with relational predicates. Our best science will endorse claims such as

$\exists x \exists y(x$ repels $y)$,
$\exists x \exists y(x$ orbits y & x attracts $y)$,
etc.

which use relational predicates. But if science won't limit itself to a vocabulary of one-placed predicates, the Nihilist's language shouldn't either.

The paraphrase scheme already in place is nice; the Nihilist ought to try to extend it to deal with relational predicates. How would such an extension go? He will have to say that, just as we can 'place' the feature associated with a one-placed predicate A by prefixing it with a 'Δ', we can also somehow

'place' the relational feature associated with a many-placed predicate R by prefixing it with a 'Δ', too. Just as $\ulcorner \Delta(A) \urcorner$ says that it is A-ing, $\ulcorner \Delta(R) \urcorner$ will, in some sense or another, say that it is R-ing.

But in just what sense? What happens to a many-placed predicate when it gets prefixed with 'Δ'? The Nihilist really has only two useful options here: either say that prefixing a many-placed predicate with 'Δ' creates a new predicate, or say instead that it creates a sentence. On the first option, if R is an n-placed predicate, $\ulcorner \Delta(R) \urcorner$ is an $n-1$-placed predicate. On this proposal, 'Δ(repels)', for instance, is a one-placed predicate — the Nihilist's predicate paraphrase of our complex predicate 'repels something'. On the other option, attaching 'Δ' to a predicate always creates a sentence, no matter how many places the predicate had to begin with. On this proposal, 'Δ(repels)' is the Nihilist's sentential paraphrase of our sentence 'Something repels something'.

Let's examine each of these in turn.

5.6 Predicate Functorese

5.6.1 The Combinatorial Functors

According to the first proposal, when I attach 'Δ' to, say, the predicate 'orbits', I get a new predicate, 'Δ(orbits)'. Since 'orbits' has two places, this new complex predicate has just one. And, although it is difficult to find any predicate of natural language (or even of a hybrid natural language akin to Strawson's 'it is catting' language) that concisely communicates what this predicate *means*, the idea is straightforward: 'Δ(orbits)' is the Nihilist's feature-placing paraphrase of our one-placed predicate 'orbits something'. Then, to make a sentence out of this predicate, I can attach another 'Δ' to it: 'something orbits something' is paraphrased as '$\Delta\Delta$(orbits).'

This proposal suggests a natural paraphrase strategy. Every first-order

sentence is equivalent to one in *prenex normal form*: one which begins with a block of quantifiers followed by a quantifier-free open sentence. But any block of quantifiers can be converted to a block of existential quantifiers sprinkled with negations; say that a sentence that begins with quantifiers and negations which are then followed by a quantifier-free open sentence is in *prenex existential form*. Now, *if* we can find some *n*-placed predicate equivalent to any quantifier-free sentence open in *n* variables, we have a straightforward way to paraphrase any first-order sentence ϕ: first, convert ϕ to prenex existential form

$$\exists x_1 \cdots \exists x_i \cdots \exists x_n(\ldots x_1 \ldots x_i \ldots x_n \ldots)$$

(with negations interspersed between the various existential quantifiers if needed), convert the open sentence '$\ldots x_1 \ldots x_2 \ldots x_n \ldots$' to the equivalent *n*-ary predicate P to get

$$\exists x_1 \cdots \exists x_i \cdots \exists x_n(P(x_1, \ldots, x_n))$$

and paraphrase the quantifiers as 'Δ'-functors in the natural way to get:

$$\Delta \ldots \Delta \ldots \Delta(P)$$

(with negations sprinkled in the appropriate way between the 'Δ's). This will always work, so long as we can turn every quantifier-free open sentence into a complex predicate.

The real work is coming up with a complex predicate for each open sentence. The Nihilist already has many of the resources he needs for this job. For instance, he can turn any sentence open in only one variable into a complex predicate using just the functors '$\sim$' and '&'. And, via a natural extension of '$\sim$' and '&' to multi-placed predicates, he can trade in some other sentences, too. We extend '&' so that, if A is an *n*-placed predicate and B an *m*-placed predicate, $\ulcorner A \,\&\, B \urcorner$ is an *i*-placed predicate, where *i* is the greater of *n* and

m, so that $\ulcorner(A \ \& \ B)x_1, \ldots, x_i\urcorner$ is equivalent to $\ulcorner Ax_1, \ldots, x_n \ \& \ Bx_1, \ldots, x_m\urcorner$.[32] Then, for instance, he can turn the open sentence

> *x* is a proton & *x* orbits *y*

into the predicate

> (is a proton & orbits)

and paraphrase

> $\exists x \exists y (x$ is a proton & *x* orbits *y*)

as

> $\Delta\Delta$(is a proton & orbits).

But some problematic first-order sentences remain. Begin with:

(39) $\forall x \exists y (y$ orbits $x)$.

This sentence, which says that everything is orbited by something, proves particularly difficult to paraphrase. Our current paraphrasing resources include the predicates of the target language, the 'Δ'-functor, (predicate and sentential) conjunction, and (predicate and sentential) negation. Assuming 'orbits' is the only predicate we use in paraphrasing (39), the natural candidates for that paraphrase are:

(40) $\Delta\Delta$(orbits)

> $\sim\!\Delta\!\sim\!\Delta$(orbits)

> $\Delta\!\sim\!\Delta(\sim$orbits)

> $\sim\!\Delta\Delta(\sim$orbits)

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[32]To say that one open sentence *P* is equivalent to another, *Q*, is to say that *P* can everywhere be replaced for *Q salva veritate* (at least in languages without opaque contexts). 'Equivalence', in this sense, is as dependent upon where variables are placed as it is upon where predicates are placed.

But each of these are already tagged as respective paraphrases for:

(41) $\exists x \exists y(x \text{ orbits } y)$

$\forall x \exists y(x \text{ orbits } y)$

$\exists x \forall y(x \text{ orbits } y)$

$\forall x \forall y(x \text{ orbits } y)$

Since (39) is not equivalent to any of the sentences in (41), unless the Nihilist wants to run together claims that ought to be distinct, he will look for a paraphrase not found in (40).

Here is another way to see the problem. Our initial paraphrase strategy tells us to take sentences of the form

$$\exists x_1 \cdots \exists x_i \cdots \exists x_n(\ldots x_1 \ldots x_i \ldots, x_n \ldots)$$

(perhaps with negations sprinkled through the block of quantifiers) and then find a complex predicate P so that

$$P(x_1, \ldots, x_i, \ldots, x_n)$$

is equivalent to the open sentence

$$x_1 \ldots x_i \ldots x_n.$$

But it's crucial that, in this equivalent one-predicate open sentence, the variables occur in the same order that they're bound in the original first-order sentence. If x_1 is the first variable bound in the block of quantifiers, it needs to be the first of P's arguments, if x_2 is bound second, it needs to be the second of P's arguments, and so on.

If the quantifiers in the sentence to be paraphrased are all existential, or all universal, then we can switch the order in which they bind variables without affecting the meaning of the sentence. But when the block has a

mixture of existential and universal quantifiers, as (39) does, such switching affects meaning. We get problems in precisely these cases.

In (39), x is bound first and y is bound second. So we need to find a predicate P where $\ulcorner P(x,y) \urcorner$ is equivalent to the open sentence 'y orbits x'. Clearly, 'orbits' is not such a predicate: 'orbits(x,y)' is not equivalent to 'y orbits x'. And almost as clearly, no truth-functional compound of 'orbits' will do the trick either. We need something else.

If we had, in addition to the predicate 'orbits', the predicate 'is orbited by', our troubles would be over: 'y orbits x' is clearly equivalent to 'x is orbited by y' (or, in other notation, 'orbited by(x,y)'). Then 'orbited by' would be just the predicate we have been looking for, and we could paraphrase (39) as

(42) $\sim\Delta\sim\Delta(\text{orbited by})$

But where will we find this oh-so-useful predicate? We might just add a new primitive predicate, 'orbited by', to our stock. But as we have seen time and again, we do better, avoiding ideological bloat and inferential brutality, if we find a way to build up 'orbited by' from 'orbits'. And indeed we can, by introducing another predicate functor: the *inversion functor*, 'INV'. Where R is any two placed predicate, $\ulcorner \text{INV}(R) \urcorner$ is a predicate that means 'is R-ed by. When we do this, (39) is easy to paraphrase: it becomes

(43) $\sim\Delta\sim\Delta(\text{INV}(\text{orbits}))$

For any two-placed predicate R, the open sentence $\ulcorner R(x,y) \urcorner$ is equivalent to $\ulcorner \text{INV}(R)(y,x) \urcorner$. 'INV' essentially tells the predicate's two positions to trade places. As a result, 'INV' is well-defined only for binary predicates.[33] Suppose that we have a predicate Q with, say, four places. We know that 'INV' tells predicates' positions to move around. But where will it tell them to move

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[33] And perhaps for unary ones: we might take $\ulcorner \text{INV}(P) \urcorner$ to be equivalent to P when P has only one place.

to? There isn't just a single rearrangement of positions that counts as 'trading places'; there are many.

It will, in fact, be useful to focus on two particular ways to trade predicates' positions' places. To see what they are, imagine our target language includes the primitive four-placed *congruence* predicate, 'Cong', which means '‗ ‗ ‗ is as far from - - - as . . . is from · · · ' (cf. Tarski 1959, Field 1980). Suppose we want to tell the 'Cong' predicate to move its positions around. One thing we might to is just tell it to swap the last two positions and leave the rest alone, so that ⌜Cong(w, x, y, z)⌝ will be equivalent to ⌜Inv(Cong(w, x, z, y))⌝. But we might want instead for it to move the last position up to the front and bump everything back a notch, so that ⌜Cong(w, x, y, z)⌝ will be equivalent to ⌜Inv(Cong(z, w, x, y))⌝.

Let's give ourselves predicate functors that will do each of these: *minor inversion*, 'Inv', will swap a predicate's last two positions, and *major inversion*, '𝕀nv', will move a predicate's last position to the front. It turns out that these two functors, wisely deployed, can generate *any* rearrangement of predicates' positions we might like.

For instance, suppose we wanted a predicate F so that ⌜$F(w, y, z, x)$⌝ is equivalent to ⌜Cong(w, x, y, z)⌝. We can build such a predicate out of 'Cong' and the two inversion functors: it is '𝕀nv(Inv(𝕀nv(𝕀nv(Cong))))'.

We are *almost* ready to paraphrase everything in the target language. But there is one final issue that needs to be resolved. Consider the open sentence

(44) x attracts y & y attracts z.

In order to paraphrase sentences involving (44), we need a predicate P where ⌜$P(x, y, z)$⌝ is equivalent to (44). But we have no way to build one out of 'attracts'. It is a two-placed predicate, and none of our functors let us get predicates with more places out of predicates with fewer. '∼', 'Inv' and '𝕀nv'

leave the number of places alone, 'Δ' takes a place away, and even '&' only produces a predicate with as many places as its biggest argument. So anything we care to make from 'attracts' with our current resources will have no more than two places.

We can solve the problem by adding a *padding* functor: a functor that adds a 'dummy' place to the beginning of a predicate. That is, for any predicate P and variable y, $\ulcorner P(x_1, \ldots, x_n) \urcorner$ will be equivalent to $\ulcorner \text{PAD}(P)(y, x_1, \ldots, x_n) \urcorner$. (The new variable, y, is a dummy because it simply does no work — as we ontologically minded folk would say, whether or not some objects satisfy $\ulcorner \text{PAD}(P) \urcorner$ has nothing to do with what object gets assigned to y, but only which objects get assigned to the various x_i's.)

Now we can handle (44). First, note that '$\text{PAD}(\text{attracts})(x, y, z)$' is equivalent to '$y$ attracts z', so (44) is eqivalent to

(45) x attracts y & $\text{PAD}(\text{attracts})(x, y, z)$.

But (45) will be equivalent to

(46) $(\text{attracts } \& \text{ PAD}(\text{attracts}))(x, y, z)$,

so '$(\text{attracts } \& \text{ PAD}(\text{attracts}))$' is just the predicate we're looking for.

5.6.2   A Nihilist's Paradise?

In fact, with these six functors — 'Δ', '$\sim$', '&', 'INV', '$\mathbb{I}\text{nv}$', and 'PAD'[34] — we can paraphrase absolutely any first-order sentence science might throw at us. And it gets better than that, for we have stumbled across Quine's (1960*a*, 1971) *Predicate Functor Language*, or *Functorese*. It not only has the expressive resources needed to translate anything we say in a first-order language, but it has its own attendant logic, besides. (Cf. Kuhn 1983, Bacon 1985)

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[34]And an identity predicate; I assume our paraphrasing language has one of those to work with.

Call the Nihilist who uses predicate functorese as his feature-placing language, best suited to show what reality's structure is *really* like and fitted to paraphrase science's first-order claims, the *Functorese Nihilist*. The Functorese Nihilist avoids the costs of Propositional Nihilism. For instance, he avoids the rampant ideological bloat that beset the Propositional Nihilist: where the Propositional Nihilist had to introduce indefinitely many new primitive expressions into his language to handle all of the first-order consequences of science, the Functorese Nihilist must introduce only six. And functorese has its own attendant, sound and complete logic, which mirrors the predicate calculus in the following way: if ϕ entails ψ in the predicate calculus, then the functorese paraphrase of ϕ will entail the functorese paraphrase of ψ in predicate functor logic. And this entailment is, intuitively, reflective of the interrelations of the meanings of the various complex predicates. So the Functorese Nihilist has no problems of inferential unsystematicity, either.

It is perhaps reasons such as these that have lead some (e.g., Jonathan Schaffer (2008) and David Chalmers (2008); see also Burgess and Rosen 1997: 185–188) to suggest that functorese is *the* feature-placing language of choice for the Nihilist. But I think the Nihilist's hopes are misplaced if they are placed in functorese, for — despite its other laudable features — I doubt that functorese has the primary qualification for the Nihilist's paraphrasing job: that of being *ontologically innocent*. For, even though it avoids the ills that beset Propositional Nihilism, it falls straight into the ills of Quiet Nihilism.

5.6.3 The Argument

The main thrust of the argument is that 'Δ' means 'there is' and therefore that Functorese is not ontologically innocent. The idea is that, of the six predicate functors Functorese uses, only 'Δ' does any of the (alleged) ontology-avoiding work. The other functors — '$\textsc{Inv}$', '$\textsc{Pad}$', and the like — just give us a fancy

way to handle variable-binding-like jobs in a variable-free way. But how we handle variable binding has nothing to do with ontological guilt, as we saw in section 5.3.2. So all the ontology-avoiding work must be done by 'Δ'. Unfortunately for the Functorese Nihilist, he will use 'Δ' exactly when we will say 'there is something', and he does so in a way that lets us conclude, by appeal to principle ($*$) from section 5.4.1, that 'Δ' means 'there is something' after all.

Now for the Argument more precisely:

The ($*$) Argument

Let F be the functorese language that the Nihilist wants to paraphrase the target language, T, into. The argument proceeds in three steps:

Step One: Begin with F, and introduce a new language $F\lambda$ as follows: it has all the same primitive predicates and sentential connectives as F, and it retains the feature-placing functor 'Δ'. And these expressions are to be interpreted in the same way as they are in F. But $F\lambda$ does not have the other four predicate functors; instead, it has variables and the abstraction operator 'λ' from section 5.3.2.

Step Two: Define a new language, $F\delta$. $F\delta$ is just like $F\lambda$ except that, instead of having the 'Δ' functor and 'λ', it has one sentential variable-binding operator 'δ'. All of the expressions that $F\lambda$ and $F\delta$ share are to be interpreted the same way, and 'δ' is to be interpreted as '$\Delta\lambda$'.[35]

Step Three: We appeal to ($*$) from section 5.4.1. If L_1 and L_2 are languages that differ only in that L_1 has a term α where L_2 has a term β, this principle says:

($*$) If every term (other than α and β) is interpreted the same way in L_1 as it is in L_2, and if the speakers of L_1 utter ϕ_α in all and only the

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[35]More precisely, sentences of the form $\ulcorner \delta x\phi \urcorner$ are to be interpreted as $\ulcorner \Delta\lambda x\phi \urcorner$.

circumstances in which speakers of L_2 utter ϕ_β, then α and β have the same interpretation also.

Now consider the target language, T, that the Functorese Nihilist wants to paraphrase. It has all the same predicates as $F\delta$: F uses for primitive predicates the predicates of T, and $F\delta$ inherits its predicates from F. Furthermore, these predicates are to be interpreted in the same way in T and $F\delta$, for the same reasons. Also, T and $F\delta$ share the same truth-functional connectives, which are also to be interpreted in the same way. The only expressions that T and $F\delta$ differ about are 'δ' and '$\exists$', and the Nihilist will say that ϕ_δ is true in exactly the cases where we say that $\phi_\exists$ is true. So, by (∗), 'δ' in $F\delta$ is interpreted the same way as '$\exists$' is in T.

We finish the argument with the following observations. We know that '$\exists x$' in T is interpreted as 'there is something that is an x such that...'. So the appeal to (∗) in Step Three tells us that 'δx' in $F\delta$ must also be interpreted as 'there is something that is an x such that ...'. But, by the construction of Step Two, we know that 'δx' is interpreted in $F\delta$ as '$\Delta\lambda x$' from $F\lambda$. And we also know that 'λx' in $F\lambda$ is interpreted as 'is an x such that...'. So 'Δ' in $F\lambda$ must be interpreted as 'there is something that...'. But by the construction of Step One, 'Δ' in F has the same interpretation as 'Δ' in $F\lambda$; thus, 'Δ' in F is interpreted as 'there is something that...'. Hence, F is not ontologically innocent after all; its supposedly innocent expression 'Δ' is a quantifier proper in disguise.

5.6.4 An Objection

It is tempting to think that the (∗) Argument can't be right simply because, if it were, it would prove too much. The main idea runs something like this:

> We all agreed back in section 5.5 that when we attach 'Δ' to a one-placed predicate A we got an expression that meant ⌜It is A-ing⌝. And we all

agreed that ⌜It is A-ing⌝ did not mean, and did not entail, ⌜$\exists x Ax$⌝. But if the (∗) Argument were right, it would show that we were mistaken to even agree to this much — it would show that even the feature-placing language using only one-placed predicates was really quantificational all along. And this can't be right: surely we could use sentences like 'It is catting' and 'It is treeing' without thereby saying that there is a cat or that there is a tree!

We ought to agree with the objection that it is at least in principle possible for there to be an ontologically innocent, one-placed-predicate-only language like the one discussed in section 5.5.[36] If an appeal to (∗) shows that such a language is impossible, then we ought to reject (∗) and the anti-functorese argument given above.

But (∗) doesn't entail this impossibility. Suppose we came across a tribe of 'feature-placers' that spoke just such a language. That is, they had all of the same one-placed predicates that our target language T does, predicate-functors '&' and '∼', and an expression 'Δ_{FP}' that attaches to predicates to create sentences.

By mimicking the steps gone through above, we can transform their language into a similar one that has the same predicates, no predicate functors, and a variable-binding operator 'δ_{FP}' that means '$\Delta_{FP}\lambda$'. And then we can compare this new language to the fragment of our first-order target language that uses only one-placed predicates, T_1, to see whether or not the two satisfy the antecedent of (∗).

In order for both languages to satisfy this antecedent, the tribe must use 'δ_{FP}' in just the same way we use '$\exists$'. But recall from section 5.4.1 that 'use the same way' must be understood dispositionally: it's not enough that they *in fact* use 'δ_{FP}' whenever we use '$\exists$', but for any counterfactual situation C,

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[36]At least, we ought to agree insofar as we are not troubled by, or are setting aside, worries that (a) we can only make sense of the feature-placing languages on the model of weather sentences and (b) weather sentences are covert predicates of places as discussed in note 27.

they must be disposed to apply 'δ_{FP}' in C exactly when we are disposed to apply '$\exists$' in C.

We can ask, in particular, how the tribe is linguistically disposed to react to circumstances in which their language is enriched with all of the multiple-placed predicates that we have in our target language. That is, we can ask how the tribe is disposed to extend their language to one with many-placed predicates. And there is a number of ways it could go. The tribe *might* be disposed to extend their language in the predicate-functorese way, letting 'Δ_{FP}' turn n-placed predicates into $n - 1$-placed predicates.

If this is how the tribe is disposed, then ($*$) does indeed say that 'Δ_{FP}' in their mouths means 'there is'. But the tribe might not be thus disposed. They may, for instance, be disposed to extend their feature-placing language to many-placed predicates in the way suggested in section 5.7. Or they may have some other dispositions entirely, or have no such dispositions at all. And if their dispositions *aren't* to extend their language into functorese, then ($*$) gives us no reason to think that 'Δ_{FP}' in their mouths means 'there is'. But since it is in principle possible for there to be tribes like the one imagined with these sorts of dispositions, it is in principle possible for there to be an ontologically innocent feature-placing language like the one described in section 5.5. The argument does not prove too much after all.

But I anticipate a residual feeling of unease, along the lines of:

Isn't it just clear that Predicate Functorese is the natural extension of the innocent feature-placing language from section 5.5, and that its expression 'Δ' is the ontologically innocent multi-placed extension of 'It is ... -ing'?

In reply: no, it isn't clear at all. First, it is not clear that the functorese extension is the *natural* way to extend 'It is ... -ing'; perhaps the extension to be discussed in section 5.7 is more natural. But even if it were the natural extension, this might not make it ontologically innocent. A number of philosophers

have thought that ontologically guilty expressions *naturally emerge* out of an attempt to extend a feature-placing language to deal with troublesome cases. We start out saying things like 'it is catting over here' and 'it is dogging over there', but then run into various kinds of troubles expressing everything we want to express. For instance, we get into trouble deciding whether placed features 'go together' or not (Quine 1992, Evans 1975), or how features placed yesterday relate to features placed today (Evans 1975, Strawson 1954, 1963), etc. Then we extend our feature-placing language by adding some pegs to place these features on; we then know whether or not features go together, either right now or over time, based on whether they're on the same peg or not.

There is particular reason to think that something like this happens when we extend the one-placed version of the feature-placing language to full Functorese. We can think of 'placing features' as throwing rubber bands onto a peg-free board. If we say 'It is electroning', we throw the 'electron' rubber band on the board; if we say 'It is protoning', we throw the proton rubber band on the board; and so on.

The other predicate functors let us make complex rubber bands out of simpler ones. But there is still real conceptual difficulty understanding how 'Δ' is to be extended to deal with relational predicates. What have we done when we say '$\Delta(\text{orbits})$'? We have somehow thrown part of that rubber band down on the board while keeping the other part up. But what are we going to do with the part that we've kept off the board? Suppose we prefix it with '$\sim\Delta\sim$'. Intuitively, this tells us that, for any other place where we could throw a rubber band down, we must to make sure the other half of *this* (kind of) rubber band gets thrown there also. But now it no longer matters simply *that* thus-and-so a rubber band has been thrown on the board — it also matters *where* it's been thrown, and where it could be thrown, too. In other words,

certain locations of the board now matter. But that was the rationale behind using pegs in the first place: pegs mark out particular locations of the board as 'objects'. (They also keep the rubber bands stuck to these 'objects' by keeping them from sliding around.) Once it starts mattering where one part of a rubber band has been stuck, we've all but re-introduced pegs into the picture — we've smuggled in an ontology. So, even if the Functorese 'Δ' is in some sense a natural extension of the one-placed feature-placing language, there is good reason to think it is an extension that introduces ontology — and so good reason to think that the (∗) Argument was right all along.

5.7 Putting the Relations Inside the Functor

Let's recap. The above observations suggest that the Ontological Nihilist got into trouble by understanding 'Δ' as a functor that turns n-placed predicates into $n-1$-placed predicates. So let's go back to that point and try something else.

Instead of turning many-placed predicates into fewer-placed predicates, we could let it turn many-placed predicates into *sentences*. Just as 'It is raining' is understood as saying that rain is going on, and 'Δ(proton)' is understood as saying that protoning is going on, we can understand 'Δ(orbits)' as saying that orbiting is going on.

Saying that orbiting is going on will be the Nihilist's way of paraphrasing our claim that something is orbiting something else. Thus for any n-placed predicate R, $\ulcorner \Delta(R) \urcorner$ will be the Nihilist paraphrase of $\ulcorner \exists x_1 \ldots \exists x_n (R(x_1, \ldots, x_n)) \urcorner$.

As before, we need to deal with more complex expressions, such as

(47) $\exists x \exists y (x$ is an electron $\& \ y$ is a proton $\& \ x$ orbits $y)$,

(48) $\exists x \exists y \exists z (x$ orbits $y \ \& \ y$ orbits $z)$,

(49) $\exists x \exists y \exists z (x \text{ orbits } y \ \& \ x \text{ orbits } z),$

etc. And we can make considerable headway on this by helping ourselves to the predicate functors '$\sim$', '$\&$', 'Inv', $\mathbb{Inv}$', and 'Pad' from section 5.6.1. (After all, it was the interpretation of 'Δ', rather than these five functors, that gave the Nihilist troubles in the previous section; with 'Δ' re-interpreted, the Nihilist may now return to these faithful friends.) Then we can find complex predicates equivalent to the embedded open sentences, and paraphrase (47)–(49) as

(50) $\Delta(\text{electron} \ \& \ \text{Pad}(\text{Proton}) \ \& \ \text{orbits}),$

(51) $\Delta(\text{orbits} \ \& \ \text{Pad}(\text{orbits})),$

(52) $\Delta(\mathbb{Inv}(\text{Pad}(\text{orbits}) \ \& \ \text{Inv}(\text{orbits}))),$

respectively.[37] We do better by helping ourselves to the predicate functors '$\sim$', '$\&$', 'Inv', $\mathbb{Inv}$', and 'Pad' from section 5.6.1.

So long as the only sentences the Nihilist wants to paraphrase are of the form, or equivalent to sentences of the form,

(53) $\exists x_1 \ldots \exists x_n (A(x_1, \ldots, x_n)),$

this will do fine. But how will he paraphrase, for instance, 'Something orbits nothing'? He can use 'Δ', plus the predicate functors, to paraphrase any sentence beginning with a block of existential quantifiers. But 'Something orbits nothing' isn't this kind of sentence. It begins with a quantificational block like this:

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[37]A different option involves complicating the 'Δ'-functor, giving it extra 'slots' for more predicates and paraphrasing (47) as $\Delta(\text{electron}, \text{proton} \mid \text{orbits})$. The idea here is that the predicates on the left side indicate unary features to be placed, and the predicates on the right side indicate many-placed features to be placed 'in between' the unary features, as it were. But it is not clear how to extend this to more complex cases; see Hawthorne and Sider (2003) for a version of this proposal and a discussion of some of the difficulties involved.

(54) $\exists x \sim \exists y \ldots$

And the current proposal has nothing to say about sentences of this sort.

If we could prefix 'Δ' to n-placed predicates to get new predicates of a smaller adicy, we could paraphrase 'something orbits nothing' as '$\Delta \sim \Delta(\text{orbits})$'. But down that path lies predicate functorese and, as we saw, Quiet Nihilism. So that path must be avoided. And no other path presents itself; there is nothing left for it but to introduce a new expression, say 'Σ', that the Nihilist will use whenever we ontologically-minded folk would begin a sentence with a block of quantifiers of the form (54).

The Nihilist won't be able to stop at 'Σ', either. Consider the following two sentences:

(55) $\exists x \sim \exists y \exists z (x \text{ attracts } y \ \& \ x \text{ repels } z)$

(56) $\exists x \exists y \sim \exists z (x \text{ attracts } y \ \& \ x \text{ repels } z)$

The first of these says that something neither attracts nor repels anything else; the second says that something attracts at least one thing but repels nothing. The Nihilist ought to be able to distinguish cases in which it is good to say one of these but not the other. But he cannot paraphrase either of these sentences with 'Δ' or with 'Σ'.[38]

We can mix negations into a block of quantifiers in indefinitely many ways, so the Nihilist will need an indefinitely large stock of primitive expressions in order to paraphrase away all of these sentences. So this Nihilist paraphrase strategy is already committed to one of the costs of Propositional Nihilism noted above: an exploded ideology.

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[38] He might perhaps decide that, when prefixed to three-placed predicates, Σ will act in a way so as to paraphrase one of these two; but he then still needs a new expression to attach to the predicate in order to paraphrase the other.

This proposal is also susceptible to Propositional Nihilism's other difficulties: inferential unsystematicity and radical holism.

On inferential unsystematicity: note that his indefinitely many expressions will each be associated with inferences of their own type. And these inferences will resist any explanation, for the expressions 'Δ', 'Σ', and so on are for him a sort of semantic black box — he has nothing to say about them except that, when attached to predicates of a certain sort, they produce sentences fit for certain sorts of paraphrases. But devoid of any further explanation of what these expressions mean, he has no resources for explaining the inferences they participate in.

On holism: consider the sentence

(57) $\exists x \exists y \exists z (x \text{ attracts } y \ \& \ y \text{ repels } z)$.

We noted in section 5.4.2 that we ontologically minded folk can think of the more global fact expressed by (57) as being somehow 'built up' out of the fact that an x attracts a y, the fact that a y repels a z, and the fact that the y being attracted in the first instance is the same y as the one doing the repelling in the second.

But a Nihilist who paraphrases (57) as

(58) $\Delta(\text{attracts} \ \& \ \textsc{Pad}(\text{repels}))$

thinks of this fact as essentially 'placing' a complex feature in reality — of deploying, in a peg-free way, a complex rubber-band of the shape in figure 5.7. But, although we make this complex feature by gluing together the 'attracts' and 'repels' rubber bands, we cannot think of the deployment of this complex rubber-band structure as being somehow 'built up' out of the deployment of the 'attracts' and 'repels' rubber bands. The mere fact that these two rubber bands have been thrown on the board isn't enough to guarantee that they overlap in the required way. The fact that the 'attracts' rubber band has been

Figure 5.7: A Rubber Band for (58)
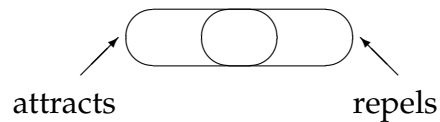
attracts   repels

deployed corresponds to our observation that an *x* attracts a *y*, and the fact that the 'repels' rubber band has been deployed corresponds to the fact that a *y* repels a *z*. But in order to 'build up' the right complex fact, the Nihilist will also need a fact that corresponds to 'the *y* being attracted in the first instance is the *y* doing the repelling in the second'. But there is no Nihilistically acceptable, object-free way to make sense of that claim.[39] That is, there is no way to *identify* the different parts of the 'attracts' and 'repels' rubber bands to say that they hook together in the right way — unless we plunk a peg down onto the board and say that the two rubber bands are each attached *to the same peg*. But this is precisely what a Nihilist cannot say.

5.8 Conclusion

Ontological Nihilism seems to face a dilemma: if it is to be viable, avoiding the ills of Quiet Nihilism, it must embrace a particularly holistic picture of reality with an attendant bloated ideology and brute entailments.

We have not, of course, canvassed every way an Ontological Nihilist might try to paraphrase away our target language. But, on reflection, it looks unlikely that any way of making Nihilism work will be able to avoid these ills.

If this is right, then we have some reason to reject Ontological Nihilism.

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[39]Simply throwing two rubber bands on the board so that they look like figure 5.7 cannot do the trick — if we said it did, we would make 'places' on the board important and thereby smuggle ontology back into the picture, as discussed at the end of the last section.

But this, of itself, may not be entirely surprising; after all, it is only metaphysicians, and a very small number of them at that, who would have ever suspected Ontological Nihilism of being true in the first place.

There is a deeper lesson, though. By seeing what evils we must embrace in order to make Ontological Nihilism work, we gain a better appreciation for our ontology. Because we have one of those, we can think of the global structure of reality as being built up out of more local structures. It turns out that having an ontology — a set of 'pegs', of *things* — is crucial for this sort of bottom-up picture. For it is by *identifying* things across different local structures that we can build up more global structures. By picking out which things in *this* local structure are identical to which things in *that* one, we have a way to link those two structures together to come up with a more global one. And it is by thinking of the world ontologically that we can understand the validity of certain inferences: they are valid because the pegboard structure described by one claim fits or doesn't fit in fairly straightforward ways with the structures described by the other.

It is, in short, by thinking of the world ontologically that we can think the world has the nice, systematic, reasonable features we so hope it has.

Appendix

Completeness of Ontologically Plural Logic

In section 3.5, I argued that ontological pluralists ought to think their multiple quantifiers obey free-logic inspired inference rules, and I made some claims about the resulting logical system. This appendix is to spell out in more detail what such a logic would look like and make good on those claims.

A.1 Ontologically Plural Language

Let an *ontologically plural language* be a first order language[1] with names ('a', 'b', ...), variables ('x', 'y', ...), predicates ('P', 'Q', ...), truth-functional connectives ('$\supset$', '$\sim$', ...), and a finite stock of universal quantifiers '$\forall_1$' ,..., '$\forall_n$'. (In the text we always talked about pluralist languages having multiple existential quantifiers, but for our purposes here it will be simpler to take the universal quantifiers as primitive and define the existential quantifiers in terms of them.) Sentences are formed from these bits of language in the usual way.

If P is an ontologically plural language, let L be a *classical counterpart* of P iff L is just like P except that it has n additional unary predicates 'Q_1',...,'Q_n' and only one quantifier, '$\forall$'.

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[1]In the introduction, I said we should think of languages as interpreted. In keeping with common metalogical practice, though, this appendix treats languages as purely syntactic entities.

A.2 Ontologically Plural Logic

The axiom system for ontologically plural logic is derived from that for *positive free logic*, a free logic that allows sentences with empty names to sometimes be true (as opposed to a *negative* free logic in which atomic predications with empty names are always false or a *neutral* free logic in which such predications are truth-valueless). It is worth first presenting an axiomatization for positive free logic before presenting the ontologically plural logic derived from it.

A.2.1 Positive Free Logic

If L is a classical first-order language, let a *positive free axiom*, or *PF*-axiom, be a tautology of L or any closed sentence of L which has the following form:

(FA1) $\phi \supset \forall \alpha \phi$[2]

(FA2) $\forall \alpha (\phi \supset \psi) \supset (\forall \alpha \phi \supset \forall \alpha \psi)$

(FA3) $\forall \beta (\forall \alpha \phi \supset \phi[\beta/\alpha])$

(FA4) $\forall \alpha \phi[\alpha/\beta]$ if ϕ is an axiom.

(FA5) $\alpha = \beta \supset (\phi \supset \phi[\beta//\alpha])$

(FA6) $\alpha = \alpha$

(This axiom system is essentially that given for the system $\text{PFL}_{2=}$ in Lambert 2001: 265.)

  The only inference rule of PF is that of modus ponens:

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[2]For this appendix, I revert to full Quinean notation — greek letters are metalinguistic variables — since italicized letters will be doing other work here. I still omit the corner quotes when no confusion will occur, though, which is almost always. Note also that $\phi[\alpha/\beta]$ is the result of replacing every instance of β in ϕ with α, and $\phi[\alpha//\beta]$ is the result of replacing at least some instances of β in ϕ with α.

(MP) From ϕ and $\phi \supset \psi$, deduce ψ

A *PF-proof* from a set of sentences Δ is a sequence of sentences of L where each sentence is either a *PF*-axiom, a member of Δ, or follows from earlier sentences in the sequence by MP. We say that Δ *PF-proves* ϕ, or $\Delta \vdash_{PF} \phi$, iff there is a *PF*-proof from Δ with ϕ as the last sentence in the sequence. And if the empty set *PF*-proves ϕ, we say that ϕ is a *PF-theorem*, or $\vdash_{PF} \phi$.

A.2.2 Ontologically Plural Logic

We get an ontologically plural logic by taking each *PF*-axiom and replacing each instance of '$\forall$' with one of the pluralist's multiple quantifiers. In other words, where P is an ontologically plural language with n universal quantifiers, an *ontologically plural axiom*, or *OP*-axiom, is a tautology of P or any closed sentence of P which has the following form:

(OPA1) $\phi \supset \forall_i \alpha \phi$[3]

(OPA2) $\forall_i \alpha (\phi \supset \psi) \supset (\forall_i \alpha \phi \supset \forall_i \alpha \psi)$

(OPA3) $\forall_i \beta (\forall_i \alpha \phi \supset \phi[\beta/\alpha])$

(OPA4) $\forall_i \alpha \phi[\alpha/\beta]$ if ϕ is an axiom.

(OPA5) $\alpha = \beta \supset (\phi \supset \phi[\beta//\alpha])$

(OPA6) $\alpha = \alpha$

Again, modus ponens is the only inference rule. An *OP-proof* from a set of sentences Δ is a sequence of sentences of P where each sentence is either a *OP*-axiom, a member of Δ, or follows from earlier sentences in the sequence

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[3]'$\forall_i$' is a functor of the metalanguage, denoting a function from numbers to the pluralist's various universal quantifiers.

by MP. We say that Δ *OP-proves* ϕ, or $\Delta \vdash_{OP} \phi$, iff there is an *OP*-proof from Δ with ϕ as the last sentence in the sequence. And if the empty set *OP*-proves ϕ, we say that ϕ is an *OP-theorem*, or $\vdash_{OP} \phi$.

A.3   Ontologically Plural Semantics

Now we will present a semantics against which the system *OP* is sound and complete. The completeness proof I sketch here relies on the completeness of *PF*. So we will also need to see what kind of semantics makes *PF* complete. As before, we will first present the free-logical side of the story, and then show the ontologically plural version we build from it.

Note two things about the following semantics. First, both the free-logical and the ontologically plural semantics given in this section rely on an 'outer domain' — a domain of things that 'empty' names are assigned to. Intuitively, this is the domain of things that don't exist.

Many philosophers find this problematic. I am one of them. There are various ways we might try to solve the problems for *PF*, but I am not going to examine them here. We will see in section A.5 that the *OP*-models' reliance on an outer domain is a ladder we can eventually kick away: once we have proven the completeness of *OP* with an outer-domain semantics, we can easily prove the completeness of a sligtly modified system, *OPC*, which does not use an outer domain.

Second, the semantics for *OP* is presented in an ontologically monistic metalanguage. As such, it isn't the semantics ontological pluralists would put forth as the *intended* semantics for their ontologically plural language. But this does not make the semantics irrelevant. The ontologically monistic models we provide for *OP* should be thought of as just that: *models*, set theoretic pictures of how ontologically plural languages work. The interpretations we

give of a pluralist language's many quantifiers won't be joint-carving ones; nonetheless, pluralists can take them to *represent* joint-carving quantifiers, and provide an accurate depiction of their interrelations and relations to other bits of the pluralist language.

A.3.1 Positive Free Semantics

Let a *PF*-model M be an ordered triple $\langle O_M, D_M, I_M \rangle$ of an *outer domain* O_M, an *inner domain* D_M, and an *interpretation function* I_M that assigns elements of $O_M \cup D_M$ to names of L and n-tuples of elements of $O_M \cup D_M$ to n-ary predicates of L.

If M is a *PF*-model, let a *variable assignment on M* be a function that assigns elements of D_M to variables of L. Since the variable assignments only assign things from the inner domain to variables, the quantifiers will range only over things in that domain.

If α is a term of L, let the *denotation* of α with respect to an assignment g, $d_g(\alpha)$, be $I_M(\alpha)$ if α is a name or $g(\alpha)$ if α is a variable.

If M is a *PF*-model, a sentence ϕ is *true on a model M and variable assignment g* iff:

i) $\phi = \Pi(\alpha_1, \ldots, \alpha_n)$ and $\langle d_g(\alpha_1), \ldots, d_g(\alpha_n) \rangle \in I_M(\Pi)$; or

ii) $\phi = \ulcorner \alpha = \beta \urcorner$ and $d_g(\alpha) = d_g(\beta)$; or

iii) $\phi = \sim\psi$ and ψ is not true on M and g; or

iv) $\phi = \psi \supset \chi$ and either ψ is not true on M and g or χ is true on M and g; or

v) $\phi = \forall\alpha\psi$, and for every assignment h that is just like g except that it might assign something else to α, ψ is true on M and h.

If, for every variable assignment g, ϕ is true on M and g, then we say that ϕ *is true on M*. If Δ is a set of sentences, then if ϕ is true on every *PF*-model M on which every member of Δ is also true, then we say that Δ *PF-entails* ϕ, or $\Delta \models_{PF} \phi$. If the empty set *PF*-entails ϕ, we say that ϕ is *PF-valid*, or $\models_{PF} \phi$.

A.3.2 Ontologically Plural Semantics

If an ontologically plural language P has n quantifiers, then ontologically plural semantics will have n domains, one for each of these quantifiers. For right now, it will also have an outer domain.

An *OP*-model N is an ordered sequence $\langle O_N, D_N^1, D_N^2, \ldots, D_N^n, I_N \rangle$ with an *outer domain* O_N, n *inner domains* $D_N^1, \ldots, D_N^n$, and an *interpretation function*. Let $\mathfrak{D}_N = D_N^1 \cup \ldots \cup D_N^n$. Then I_N assigns elements of $O_N \cup \mathfrak{D}_N$ to names of P and n-tuples of elements of $O_N \cup \mathfrak{D}_N$ to n-ary predicates of P.

If N is an *OP*-model, let a *variable assignment on N* be a function that assigns elements of $\mathfrak{D}_N$ to variables of L. If α is a term of P (predicate or variable), let the *denotation* of α with respect to an assignment g, $d_g(\alpha)$, be $I_N(\alpha)$ if α is a name or $g(\alpha)$ if α is a variable.

If N is an *OP*-model, a sentence ϕ is *true on a model N and variable assignment g* iff:

i) $\phi = \Pi(\alpha_1, \ldots, \alpha_n)$ and $\langle d_g(\alpha_1), \ldots, d_g(\alpha_n) \rangle \in I_N(\Pi)$; or

ii) $\phi = \ulcorner \alpha = \beta \urcorner$ and $d_g(\alpha) = d_g(\beta)$; or

iii) $\phi = \sim\psi$ and ψ is not true on N and g; or

iv) $\phi = \psi \supset \chi$ and either ψ is not true on N and g or χ is true on N and g; or

v) $\phi = \forall_i \alpha \psi$, and for every assignment h that is just like g except that it might assign something else to α, if $g(\alpha) \in D_n^i$, then ψ is true on N and h.

If, for every variable assignment g, ϕ is true on N and g, then we say that *ϕ is true on N*. If Δ is a set of sentences, then if ϕ is true on every *OP*-model N on which every member of Δ is also true, then we say that Δ *OP-entails* ϕ, or $\Delta \models_{OP} \phi$. If the empty set *OP*-entails ϕ, we say that ϕ is *OP-valid*, or $\models_{OP} \phi$.

A.4 Completeness

Here are the two completeness theorems for the relevant systems:

PF-Completeness: $\Delta \vdash_{PF} \phi$ iff $\Delta \models_{PF} \phi$.

OP-Completeness: $\Delta \vdash_{OP} \phi$ iff $\Delta \models_{OP} \phi$.

The really hard work, proving the completness theorem for positive free logic, has already been done (see Leblanc 1982). We can piggyback the proof for *OP*'s completeness on this result.

The general strategy is that often used for proving the completeness of many-sorted logics (see Manzano 1996: 257–262). We first define a translation function T from sentences of P to sentences of its classical counterpart L, and then prove the following theorems for this function:

Theorem 1: $\Delta \models_{OP} \phi$ iff $T(\Delta) \models_{PF} T(\phi)$.

Theorem 2: $\Delta \vdash_{OP} \phi$ iff $T(\Delta) \vdash_{PF} T(\phi)$.

The proof of *OP*-Completeness then runs as follows: $\Delta \models_{OP} \phi$ iff $T(\Delta) \models_{PF} T(\phi)$ (by Theorem 1) iff $T(\Delta) \vdash_{PF} T(\phi)$ (by PF-completeness) iff $\Delta \vdash_{OP} \phi$ (by Theorem 2). QED

The real work, of course, is proving Theorems 1 and 2.

A.4.1 The Translation Function

The basic idea of the translation function is simple: it exchanges the pluralist's many quantifiers for explicit restrictions of the free logician's single quantifier. The additional 'Q_i's of P's classical counterpart are the restricting predicates.

More precisely, if ϕ is a sentence of P, then $T(\phi)$ is a sentence of P's classical counterpart, L, given by the following recursive definition:

Definition of T:

    i) If ϕ is an atomic predication, $T(\phi) = \phi$.

    ii) If $\phi = \sim\psi$, $T(\phi) = \sim T(\psi)$.

    iii) If $\phi = \psi \supset \chi$, $T(\phi) = T(\psi) \supset T(\chi)$.

    iv) If $\phi = \forall_i \alpha \phi$, $T(\phi) = \forall \alpha (Q_i(\alpha) \supset T(\phi))$.

T is a one-to-one function: every sentence of P maps to a unique sentence of L.

We also need to define the translation of a set Δ of sentences of P. $T(\Delta)$ will contain a translation of every sentence in Δ. But it needs one extra sentence, too. Anything ranged over by any of P's quantifiers is, well, ranged over by one of P's quantifiers. But there is no guarantee that everything ranged over by L's one quantifier will satisfy one of the restricting 'Q'-predicates. This can cause problems. In order to avoid these problems, we include the following sentence in $T(\Delta)$ as well:

($\mathcal{Q}$) $\forall x(Q_1(x) \vee \ldots \vee Q_n(x))$

More precisely, if Δ is a set of sentences of P, then $T(\Delta)$ is the set that contains $T(\phi)$ for every $\phi \in \Delta$, $\mathcal{Q}$, and nothing else.

A.4.2 Theorem 1

Sketch of proof. We prove this theorem by finding, for every *OP*-model on which some set of *P*-sentences Δ is true, a *PF*-model that makes exactly $\mathcal{Q}$ and the translations of the sentences in Δ true.

First, if N is an *OP*-model, let $f(N)$ be the *PF*-model gotten by mashing N's many inner domains into a single one and then putting an object x in the extension of 'Q_i' if and only if x was in '$\forall_i$'s domain in N. N and $f(N)$ are to have the same outer domain, and other than differences forced upon them by the 'Q_i's, their interpretation functions are supposed to be the same. Here are two facts about such models:

Fact 1: For any *OP*-model N and sentence ϕ of P, $N \models_{OP} \phi$ iff $f(N) \models_{PF}$ $T(\phi)$.

Fact 2: For any *OP*-model N, $f(N) \models_{PF} \mathcal{Q}$.

Given these facts — the proofs of which are left to the reader — the theorem follows.

From left to right: Suppose $\Delta \models_{OP} \phi$. Then for every *OP*-model N, if $N \models \Delta$, then $N \models \phi$. Let M be an *PF*-model such that $M \models_{PF} T(\Delta)$. Let K be the *OP*-model made by turning the extension of each 'Q_i' in M into an inner domain for a quantifier '$\forall_i$' and keeping everything else the same. Then $M = f(K)$, so by Fact 1, $K \models_{OP} \Delta$. But then $K \models_{OP} \phi$, so by Fact 1, $M \models_{PF} T(\phi)$.

From right to left: Suppose $T(\Delta) \models_{PF} T(\phi)$. Then for every *PF*-model M, if $M \models T(\Delta)$, then $M \models T(\phi)$. Suppose $N \models_{OP} \Delta$. Then by Fact 1, every translation of a sentence in Δ is true on $f(N)$, and by Fact 2, $\mathcal{Q}$ is true on $f(N)$. So $f(N) \models_{PF} T(\Delta)$, so $f(N) \models_{PF} T(\phi)$, in which case, by Fact 1, $N \models_{OP} \phi$. QED.

A.4.3 Theorem 2

Sketch of proof. We prove this theorem by first showing that, for each axiom in one system, the translation of that axiom is a theorem in the other. But, going in the right-to-left direction of the biconditional, there is a wrinkle. Although every sentence of P has a translation in L, not every sentence of L is a translation of some sentence in P.

Fortunately, though, we can define a *back-translation B* from sentences of L to sentences of P that has the following property: for any ϕ of P, ϕ and $B(T(\phi))$ are OP-logically equivalent (that is, each one OP-proves the other). We define the back-translation with this property as follows:

Definition of B:

    i) If ϕ is an atomic predication of a predicate shared by both languages, $B(\phi) = \phi$.

    ii) If $\phi = Q_i(\alpha)$, then $B(\phi) = \exists_i \beta(\beta = \alpha)$.

    iii) If $\phi = {\sim}\psi$, then $B(\phi) = {\sim}B(\psi)$.

    iv) If $\phi = \psi \supset \chi$, then $B(\phi) = B(\psi) \supset B(\chi)$.

    v) If $\phi = \forall \alpha \phi$, then $B(\phi) = \forall_1 \alpha B(\phi) \ \& \ \ldots \ \& \ \forall_n \alpha B(\phi)$.

If Δ is a set of sentences of L, we let $B(\Delta)$ consist of all the back-translations of sentences in Δ.

The proof that the back-translation has the important property goes by induction on the length of $T(\phi)$, and the only interesting case is when $T(\phi)$ is of the form $\forall \alpha(Q_i(\alpha) \supset T(\chi))$. In this case, $\phi = \forall_i \alpha \chi$ and $B(T(\phi)) = \forall_1 \alpha(\exists_i \beta(\beta = \alpha) \supset T(\chi)) \ \& \ \ldots \ \& \ \forall_n \alpha(\exists_i \beta(\beta = \alpha) \supset T(\chi))$. We finish the proof by constructing OP-proofs (omitted here) from each of these to the other.

We prove Theorem 2 with the help of two more facts:

Fact 3: If ϕ is an OP-axiom, then $\{Q\} \vdash_{PF} T(\phi)$.

Fact 4: If ϕ is a *PF*-axiom, $\vdash_{OP} B(\phi)$.

The proof of each of these facts is tedious, consisting in simply constructing proofs of the translations of each axiom or sentence in the given systems. I omit the details here.

With these facts in hand, we can prove Theorem 2 as follows.

From left to right: Suppose $\Delta \vdash_{OP} \phi$. By induction on the length of the proof: since ϕ is a line in the proof, it must either be an axiom, a member of Δ, or have gotten in by MP. If it's an axiom, then $\{\mathcal{Q}\} \vdash_{PF} T(\phi)$ by Fact 3, in which case $T(\Delta) \vdash_{PF} T(\phi)$. If it's a member of Δ, then $T(\phi)$ is a member of $T(\Delta)$, so $T(\Delta) \vdash T(\phi)$. Finally, suppose it got in by modus ponens. Then there are lines ψ and $\psi \supset \phi$ that occur earlier in the proof. By the induction hypothesis, $T(\Delta) \vdash_{PF} \psi$ and $T(\Delta) \vdash_{PF} \psi \supset \phi$, so $T(\Delta) \vdash \psi$.

From right to left: the proof begins the same way, showing that if $T(\Delta) \vdash_{PF} T(\phi)$, then $B(T(\Delta)) \vdash_{OP} B(T(\phi))$. Then we note first that the back-translation of $\mathcal{Q}$ is an *OP*-theorem, and that this plus the special properties of back-translations noted above mean that $\Delta \vdash_{OP} B(T(\Delta))$ and $B(T(\phi)) \vdash_{OP} \phi$. Putting these together, we get that $\Delta \vdash_{OP} \phi$. QED.

A.5 Getting Rid of Outer Domains

Not every ontological pluralist will like the sound and complete system *OP*. This is because, in a sense, *OP* is not just an ontologically plural logic, it is a *free* ontologically plural logic. Not only can names be empty from the perspective of this or that quantifier, they can be *absolutely* empty — that is, have no referent from the perspective of *any* quantifier.

On the logic side of things, we might object that inferences have to always be inferences between fully interpreted expressions, and that sentences with empty names aren't fully interpreted expressions. (See section 3.5.1.)

And from the model-theoretic side, we might object that there is no feature of reality for the outer domains to represent — the idea of a set of things that don't exist, even as a set-theoretic picture of reality, is fundamentally misguided. (See section A.3.) Even if our models are only ontologically monistic set-theoretic representations of the way ontological pluralists think the world is, pluralists ought to think there isn't any part of reality to be represented by the empty domain. It's a nice technical tool, but none the less problematic for that.

Ontological pluralists who feel this way are in luck. When you remove the possibility of empty names from a system such as PF, the logic collapses into classical logic. But when you disallow empty names from OP, you get a system (OPC) which is still distinct from classical logic and also has no need for an outer domain.

We get this system by simply adding the axiom

(OPA7) $\exists_1 \alpha (\alpha = \beta) \vee \ldots \vee \exists_n \alpha (\alpha = \beta)$

to (OPA1)–(OPA6). An OPC-proof is just like an OP-proof except that it might also have an instance of (OPA7) as an axiom.

To model the system OPC, we simply remove the outer domain from the definition of a model and leave everything else the same. That is, an OPC-model for an ontologically plural language with n quantifiers will have n domains (one for each quantifier) and an interpretation function — but no outer domain.

We can show that OPC is sound and complete relatively easily. It follows from the completeness of OP plus two observations. If $\mathcal{C}$ is the set of all sentences of the form of (OPA7), then

Observation 1: $\Delta \vdash_{OPC} \phi$ iff $\Delta \cup \mathcal{C} \vdash_{OP} \phi$

Observation 2: $\Delta \models_{OPC} \phi$ iff $\Delta \cup \mathcal{C} \models_{OP} \phi$.

The first observation is straightforward: adding an axiom is just like giving yourself a new (infinitely large) set of premises.

The second observation is a little more complex, but here is the basic idea. Any *OP*-model on which all of the sentences in $\mathcal{C}$ are true is one on which the outer domain is not doing anything. The only thing you can do with an outer domain is assign it referents for names, and the $\mathcal{C}$ sentences are keeping you from doing that. So if a sentence is true on an *OP*-model on which $\mathcal{C}$ is also true, the outer domain is not doing anything, and the sentence would still be true even if the outer domain were not there — as it isn't in an *OPC*-model. Furthermore, the $\mathcal{C}$-sentences are not doing anything *else* — the only thing they do is keep names from getting outer-domain assignments. As a result, the $\mathcal{C}$-sentences are true on *every OPC*-model. So, if every *OP*-model on which Δ and $\mathcal{C}$ are true is also one on which ϕ is true, then every *OPC*-model on which Δ is true will be one on which ϕ is true also — and *vice versa*.

But Observations 1 and 2 let us prove that *OPC* is complete. $\Delta \vdash_{OPC} \phi$ iff $\Delta \cup \mathcal{C} \vdash_{OP} \phi$ (by Observation 1) iff $\Delta \cup \mathcal{C} \models_{OP} \phi$ (by OP-Completeness) iff $\Delta \models_{OPC} \phi$ (by Observation 2). QED.

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