REFERENCE AND ONTOLOGY:
HOW CAN WE REFER TO ABSTRACT OBJECTS?

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by

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Abstract
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This dissertation asks and discusses answers to the question: how can we refer to abstract objects? The question is interesting because, like the question of how we know about abstract objects, the radically different nature of abstract objects seems to defy our ordinary theories of reference. In the first chapter I argue that if abstract objects are abundant and non-causal, we cannot refer to them. The non-causality entails that in order to establish reference, we must single them out by definite description, and the abundance prevents those descriptions from being definite. I further argue that this problem is not solved by reference magnetism. The remainder of the dissertation examines how one could solve this problem by denying either abundance or non-causality. In chapter 2 I examine solutions which attempt to only deny abundance and argue that most are either ad hoc, too abundant (and so still have the reference problem), or too sparse (and so have the problems of nominalism), though there is one sparse solution which could work, but comes with serious costs. In chapter 3 I argue that once we distinguish truth or instantiation in a world or time from truth or instantiation at a world or time, we can see that there is nothing absurd about abstract objects being contingent or temporal (since we will still be able to say all the same true things about other worlds and times). The purpose of this discussion is to pave the way for a causal theory of properties. Chapter 4 offers a
causal theory of properties, namely the view that all abstract objects are created by human mental activities. I argue that this is not only a good solution to the reference problem, but an attractive ontology in general.
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The following is a work in first-order ontology, specifically in ontology of abstract objects. First-order ontology appears to have fallen out of fashion in recent years. Contemporary projects are on meta-ontology, meta-ideology, metaphysical method, metaphysical theory choice, metaphysical data, and other projects concerning how we should solve first-order debates. One underlying assumption of these projects (sometimes implicit but often explicit) is that debates in first-order ontology have been shown to be unsolvable, and so we must do these second-order projects in order to have any hope of making progress in these first-order debates. These projects also sometimes endorse the stronger claim that once these second-order debates are solved, all first-order debates will be solved, so continued work on the first-order debate is unwarranted. This dissertation is my attempt to rebut these assumptions and show that there can still be progress in first-order debates, even if it is quite difficult.

This is not a repudiation of the second-order debates; in fact, I think they are quite useful and interesting. I do however claim that, one, solving these second order debates will not make all first order debates uninteresting, and two, that one need not solve these debates in order to make substantive progress towards a theory of abstract objects. Obviously, though, this does not mean I do not use assumptions from these second order debates, only that I hope these assumptions are shared by sufficiently many positions to make the work interesting. The primary assumption used is a neo-Quinean understanding of existence and ontological commitment, like that defended in van Inwagen (2009). I also put quite a bit of stock into preserving
ordinary things we take ourselves to know, but this will be largely shared by those who share the neo-Quinean method. Other assumptions crop up at various points, such as that non-	extit{ad hoc} theories are better than 	extit{ad hoc} ones, but I take these as usable without further defense.

This work is largely paving new ground and, as such, has fewer interlocutors than the average dissertation. The reference problem for abstracta was brought up by Benacerraf, but he only mentions it for a few sentences, and there has been little sustained discussion of it since. Most of the people I interact with have written for other purposes, and I have had to adapt what they say to my particular situation, such as Lewis’ defense of reference magnetism which was meant to solve the general problem of language being meaningful given global descriptivism, rather than meant as a way to refer to abstract objects. Because I am working in largely unexplored territory, I will take it as a success if the reader is merely convinced that we can have an intelligent discussion of the properties of properties, defending and critiquing different accounts of abundance, non-causality, aseity, contingency, and other features one might attribute to abstract objects. I have chosen the reference problem as a method for developing a more nuanced ontology. While I do believe it is a devastating objection to 	extit{platonism} (and have attempted to show as much), I consider the main importance of my work to be in attempting to spur creative work in ontology that can help us to understand this incredibly strange other category of things (concrete things like us being the category we are more familiar with).
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1.1 The Problem

An ontology is a general answer to the question “what is there?”—an answer in terms of what types or categories of things there are. An ontology of abstract objects is an ontology which includes a category of abstracta—things like properties, numbers, possible worlds, etc. There are two main (though not exhaustive) types of ontologies of abstract objects: relational and constituent. The distinctive characteristics of these types are most clearly seen by how they say an abstract object, such as the property redness, relates to a concrete object like a ball. For a constituent ontology, redness stands in a parthood or quasi-parthood relation (such as constituency) to the ball. Redness can be thought of as “making up” the ball in some sense of the word. Constituent ontologies include neo-Aristotelian views (including immanent universals), bundle theories, and trope theories. I list these views only to hereafter set them aside, as they are not the target of this chapter.

For a relational ontology, on the other hand, abstract objects are not parts or constituents of concrete objects. Instead, a ball has the property redness if it stands in a certain important relation, such as instantiation or set-membership, to that property. While not essential to the view, the vast majority of relational ontologists further endorse that abstract objects are abundant (within a category) and non-causal. Assuming that the category of abstract objects we are positing is that of

1An example of an ontology of abstract objects which falls outside of these two categories is L. A. Paul’s view (Paul (2002)) that there are only properties and no concrete objects.
properties, then we can offer the following two theses typically endorsed by relational ontologists:

**Abundance**  For any predicate P(x), if no contradiction follows from the sentence “there exists a property of being an x such that P(x)”, then that sentence is true.

**Non-Causality**  It is never the case that there is an abstract object which stands in a causal relation to anything.

Outside of picking a particular relational ontology as an example (e.g. Lewis’s sets of parts of worlds) I cannot provide an explicit argument for either of these two theses, but it is easy to imagine how such reasoning might go in general. **Non-causality** seems to follow both from the fact that we do not see any effects of abstract objects, and from the fact that abstract objects are not parts of the physical world in any way. At best we understand causal relationships between concrete things in the world; causal relationships between a spatial, concrete object and a non-spatial, abstract object, or between two non-spatial, abstract objects, on the other hand, are incredibly difficult to conceive. **Abundance** seems to follow from the fact that any argument we can give for a non-causal object will be a principled argument equally applicable to all objects of that kind. That is, if science gives us reason to believe in numbers, then it seems to give us reason to believe in all numbers, not just the numbers currently used in physical calculations; likewise, there do not seem to be reasons for believing in twelve properties, which are not also reasons for believing in indefinitely many properties. The details would have to be worked out in the individual theory, but it suffices for now to point out that a relational ontology combined with these two theses is an attractive and common ontology of abstract objects.\(^2\) While not the only way this

\(^2\)These are certainly affirmed by the two most well developed relational ontologies of abstract objects, those of David Lewis (Lewis (1986)) and Peter van Inwagen (van Inwagen (2004)). Various
term has been used, I will use the term *platonism* to refer to this combination of claims.

The thesis of this chapter is that, if one believes in a relational ontology of abstract objects, then one should deny *Abundance, Non-Causality*, or both (which of course entails that *platonism* is false). I aim to defend this thesis by showing that the following is a reductio of this combination of views (premises (1) and (2) below):

(1) There are abstract objects.

(2) *Abundance* and *Non-Causality*.

(3) There is (at least) one abstract object to which I am able to refer.

(4) For any object, if someone is now able to refer to it, then there is a person and a time such that at that time, that person establishes reference to that object.

(5) For any person, object, and time, if the person establishes reference to that object at that time, then either she stands in a causal relation to that object at that time, or she is able to pick out that object by definite description at that time.

(6) For any person, object, and time, if the object is abstract and the person is able to refer to it, then there is a person and a time such that the person is able to pick out the object by definite description at that time. (from (2), (4), and (5))

(7) There are abundant abstract objects, some of which we are able to refer to, and for each one we are able to refer to there is (was) a person at some time who is able to pick it out by definite description. (from (1), (2), (3), and (6))

In the first half of the paper I will show that (7) is false. I will do this by looking at five ways one might attempt to refer to abundant abstract objects by definite description and showing that they all fail. If (7) is false, it follows that one of (1)-(5) are false. Since the thesis of the paper is that if one accepts (1), one should deny other relational ontologies have been endorsed throughout the philosophy of math and philosophy of language literatures and the vast majority of these affirm both theses.

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3 For present purposes, *x establishes reference to y at t₁* iff *x refers to y at t₁* and for any time *t₂*, if *t₂* is earlier than *t₁*, then there does not exist anyone who refers to *y at t₂*.

4 The argument that we cannot refer to abstract objects seems to trace its modern history to Benacerraf (1973). In that article, Benacerraf suggests two problems for abstract objects: the problem of how we refer to them, and the problem of how we know about them. Since then, almost all discussion has focused on the knowledge problem, leaving the reference problem substantially underdeveloped.
(2), I will not need to defend (1). I believe premise (4) is uncontroversial, as all it is doing is allowing me to ignore cases of reference transfer and instead focus on cases of establishing reference. Unless one thinks reference to abstract objects has been transferred from person to person from eternity past, this premise should be acceptable. I further think premises (3) and (5) are both plausible, from which it would follow that premise (2) is the one to deny.

Premise (3) is initially plausible because whatever reasons one has for believing premise (1) can easily be transformed into reasons for believing (3). For instance, if one followed van Inwagen in believing (1) because it is implied by a great number of things we ordinarily believe (e.g. “there are anatomical features spiders and insects have in common,” “the royal armorer has created a new type of steel which has some but not all the characteristics of Damascus steel”), then one should accept (3) because it is also implied by a great number of things we ordinarily believe (e.g. “red is my favorite color,” “1+1=2”).

Premise (5) is initially plausible because establishing reference to a thing requires singling it out. If I say “let the tree in Montana be named ‘Alice’,” the name “Alice” will not be a name of anything, because there are way too many things fitting that description—it is a failed attempt at naming. If naming is to succeed, we have to be able to pick out the object to be named and (5) is giving the two ways we can do this.

Despite their initial plausibility, there are well-developed ways people have attempted to reject (3) and (5). In the second half of the paper, I will examine these.

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5 These examples come from [van Inwagen (2004)]. In that article, van Inwagen emphasizes two features of these sentences which imply we should accept the consequences of them, including the consequence that there are abstract objects. First, there are not generally available paraphrases. Second, there are seemingly valid arguments whose validity depends on these being quantificational sentences. Both of these are true of the examples referring to abstract objects as well—there are not generally available paraphrases of them, and there are apparently valid arguments whose validity depends on them being referential sentences. For an example of the latter, consider:
Red is my favorite color.
Therefore, there is something that is my favorite color.
rejections and show that they are ultimately unsuccessful. Given the *prima facie* case for (3) and (5), and the failure of their alternatives, I think one should ultimately conclude that they are true. If this is the case, then my central thesis follows: if one accepts that there are abstract objects, then one should deny *Abundance* or *Non-Causality*.

I turn first to attempts to accept (7)—attempts to refer to abstract objects by definite description.

1.1.1 Referring by Definite Description

1.1.1.1 Solution 1: Descriptions Which Depend on Abstracta

Suppose we were trying to establish reference to abstracta and we started with the following two examples: let “2” refer to the thing that is the successor of 1; let “red” refer to the property that is the complementary color of <is cyan>. Suppose we add that all reference to abstract objects will be by descriptions of this kind; it follows quite easily that this will fail to give us reference to abstracta.

The key is what is meant by “descriptions of this kind.” What I mean to distinguish is descriptions which either tacitly or explicitly refer to abstract objects within the description from those which do not. The two descriptions just given obviously fall into the former category since they refer to 1 and <is cyan> respectively. Call this the category of *nominalistically unacceptable* descriptions. These can be contrasted with descriptions like “the the thing that is even and prime” or “the property had by

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6I adopt the convention of using <is x> to refer to the property, if there is one, expressed by the predicate “x.” Of course, several properties such as <is red> are also commonly referred to by other names such as “redness,” but such canonical names do not always exist, so I find it easier to use the bracket notation.

7Note that this is not the same as a distinction between descriptions which would and would not describe something if nominalism were true. Were nominalism true, the description “the property had by any and all aardvarks” would be an empty description, but it would still be a meaningful and useful description, since it does not refer to any abstract objects in its description. Descriptions like this are crucial for the nominalist to be able to state her disagreement with the platonist.
this car and that rose,” which plausibly do not refer to any abstract objects within the description. Call this second category the *nominalistically acceptable* descriptions. My claim is that nominalistically unacceptable descriptions are inadequate in a particular way. Specifically, they are inadequate because they do not allow us to move from not being able to refer to abstract objects, to being able to refer to them.

There was a time in the past (say a few seconds after the big bang) at which no human nor human ancestor was able to refer to abstract objects. Since we are now able to refer to them, any adequate theory of abstract reference must make it possible for us to move from not being able to refer to abstract objects to being able to refer, and it is precisely this requirement that nominalistically unacceptable descriptions cannot meet. Consider the two descriptions given above. Were nominalism true, they would be equivalent to “the thing that is the successor of __” and “the property that is the complementary color of __.”[8] Obviously these are not definite descriptions, as they are not even complete descriptions. Nominalistically unacceptable descriptions, by their very definition, would not be meaningful if nominalism were true. Before we established reference to abstract objects, we were in the same linguistic position as the nominalist; hence, any description the nominalist would not be able to give, we would not be able to give prior to first referring to abstract objects. It follows that these descriptions alone would not allow us to refer to abstract objects.

While it is easy to see why “the successor of 1” would be problematic before

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[8] This isn’t strictly guaranteed by the absence of referents. An empty name might still supply some sort of content to the sentence; however, if it does contribute content, it is purely descriptive content, so the description merely becomes a roundabout way of expressing a nominalistically acceptable description. Consider the case of the planet Mercury being described as “the planet between Vulcan and Venus.” Since there is no planet Vulcan, this either means “the planet between __ and Venus,” or it means some sort of elaborate description based on how Vulcan is supposed to be picked out, such as “the thing such that if there were a planet between Mercury and the Sun, it would be between this planet and Venus.” The point is just that either way the description does not refer to Vulcan, just as the descriptions above would not refer to 1 and <is cyan> if nominalism were true. Thus, either they are equivalent to these unsaturated descriptions, or they are nominalistically acceptable. Since I am considering nominalistically acceptable descriptions in Solution 2, I will assume for now these are equivalent to simply leaving a blank in the description.
we were able to refer to abstracta, there are more subtle descriptions which are similarly problematic. One description which may fall into this category would be “the thing which is a natural number and counts the apples on the table.” It is not clear whether or not this is nominalistically acceptable. Whether or not it is depends on what is meant by the predicate “is a natural number.” If the predicate means something like “is a thing used to count discrete objects,” then this is perfectly nominalistically acceptable; however, if the predicate means something like “is one of the members of the series 1, 2, 3, 4, 5,...” then it is nominalistically unacceptable. If it is unacceptable, then it could not possibly be expressed by a person who was not yet able to refer to any abstract objects. Thus, this too is unusable to fully solve the reference problem if it is nominalistically unacceptable. Of course, I’m no linguist, and it might have a perfectly nominalistically acceptable meaning, so I will treat it as such going forward. I merely want to flag that any predicates used for nominalistically acceptable descriptions must be such that they are able to be expressed meaningfully by those who are not yet able to refer to abstracta.

1.1.1.2 Solution 2: Nominalistically Acceptable Descriptions

Nominalistically unacceptable descriptions will not by themselves provide a way to refer to abstract objects because they are only expressible by those who are already able to refer to abstract objects (they may be perfectly useful once we have referred to at least one abstractum). We thus need a definite description which does not depend on abstract objects for its meaningfulness—a nominalistically acceptable definite description. There are two things this type of description might consist in: nominalistically acceptable predicates, and nouns referring to concrete objects. While these are accessible to one who has not yet referred to abstracta, neither will supply

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9 Many predicates seem to have this duality of interpretations. Consider, “is a primary color,” which might express “is a color which can be combined with other colors to generate all visible colors” or “is either <is red>, <is blue>, or <is yellow>.”
enough information to single out a particular abstract object.

To see this, let’s first look at descriptions consisting only of predicates. Suppose we say, “let ‘2’ be the thing that is even and is prime.”\(^{10}\) We can see that this fails to be a definite description through a problem raised by Benacerraf\(^ {11}\). Benacerraf famously discussed a case of two children learning all of arithmetic from set theory up; they believe all the same things and can prove all the same theorems, except that they believe the numbers are different objects. The first child thinks that 1, 2, 3, 4,... is identical to ∅, {∅}, {∅, {∅}}, {∅, {∅}}, {∅, {∅}}, {∅, {∅}, {∅}},..., while the other believes that the same numbers are in fact identical to ∅, {∅}, {{∅}}, {{{∅}}}, .... The point is that both of these progressions (and infinitely many more) are consistent with all the axioms and all the derivable theorems of arithmetic. Nothing we can say mathematically will favor one progression of sets over the other, nor do any non-mathematical properties favor one over the other. But, if this is the case, then both {∅, {∅}} and {{∅}} have equal claim to being “the thing that is even, and is prime,” from which it follows that this description is not definite\(^ {12}\).

This problem is not limited to mathematical objects but extends just as easily to properties, possible worlds, and any other abstract objects (again assuming Abundance). For an easy example, how could we describe the color property <is red>?

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\(^{10}\)Here I am assuming that “even” and “prime” can be defined in some pre-mathematical way. E.g. “a term is even if the things it counts could be partnered up with each thing having exactly 1 partner.” If one instead is using the terms in a mathematically robust way, such as “a number is even if and only if it is divisible by 2”, then obviously this will cease to be a nominalistically acceptable description.

\(^{11}\)Benacerraf (1965)

\(^{12}\)It should become clear here why it was important to rule out the nominalistically unacceptable predicates above. If we could use those predicates, then we could have a definite description of the form “the thing that is even, is prime, and is a member of the von Neumann ordinals,” which would be a definite description of {∅, {∅}}. While this would be definite, it is also obviously cheating when it comes to the reference problem. We were only able to refer to {∅, {∅}} because one of the predicates in the description already referred to a series of abstract objects of which it was a part—it is borrowing reference from something that already refers to abstracta, and without this, it would be indefinite.
It is difficult to think of things to say other than logical descriptions such as “is self-identical,” which obviously does not single out anything. Perhaps we could describe it as “the thing that is a primary color,” but not only will this not distinguish it from <is blue> and <is yellow>, it also does not distinguish it from various gerrymandered properties like <is red and such that 1+1=2>, <is red and spatiotemporally connected to me>, or <is red and round, or red and not round>. *Abundance* guarantees that there are always multiple abstracta fitting any description of this kind.

The other linguistic category available for the nominalistically acceptable description is words referring to concrete objects. Suppose to pick out the number 2 we pointed to different pairs of objects and described it as the thing had in common by each pair, or to pick out <is red> we described it as “the thing had in common by this rose and that car.” Of course, multiple properties will be had in common by the various pairs or by the rose and the car, but the hope is that these other properties will drop away as we introduce more objects. For instance, “the thing had in common by this rose and that car” could refer to <is red> or <is smaller than Mt. Everest>, but we could rule out the latter with the description “the thing had in common by this rose, that car, and Mars.” While including more objects on the list limits the properties they all have in common, *Abundance* guarantees that it will never get to the point where there is only one property shared by a group of objects. The strongest description we could give of this kind would be “the thing had in common by all red objects;” however, even this description will still be indeterminate between <is red>, <is red and such that it is instantiated by Mars>, <is red and round, or red and not round>, <is red and such that 1+1=2>, and infinitely many more. There is thus no amount of objects which will allow us to refer to the only

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13 This is plausibly the view of Saul Kripke (see [Kripke, 1972, 136]) and Stuart Shapiro (see [Shapiro, 2011, 115])

14 The reader may be tempted here to scream “these are all the same property!” Certainly many of my critiques are committed to there being multiple coextensive and even necessarily coextensive
property they have in common.

Since predicates and referring to concrete objects cannot make descriptions definite on their own, it is worth asking whether they might work together to do this. Combining what was said above, one might say that "red" refers to the thing that is a primary color and is had by all red objects. Unfortunately, this is still indefinite between \(<\text{is red and such that } 1+1=2>\), \(<\text{is red and is called "red" in America in possible world } \alpha>\), etc. Likewise, we could let "2" refer to "the thing that is even, is prime, and is had by all pairs," but this will again be indefinite between the various things playing the 2-role in different progressions (e.g. \{\emptyset, \{\emptyset\}\} or \{\{\emptyset}\}). Given Abundance, there is no nominalistically acceptable description which singles out an abstract object.

1.1.1.3 Solution 3: Intentional Content

A special instance of the above solutions is worth highlighting and discussing in its own section, namely attempts to refer to properties not by the features they have but by the things they represent. While 2 has the property \(<\text{is even}>\), it represents \(<\text{is two in number}>\), and some have thought that this intentional content is the more properties, which some want to deny. Here I just want to point out that, first, the existence of these properties is implied by Abundance, so really this is just an intuition that Abundance is false, and second, there are good reasons to think that there can be coextensive and necessarily coextensive properties. The classic example of the latter is \(<\text{triangularity}>\) and \(<\text{trilaterality}>\), but examples abound. Consider the properties \(<\text{is 1 in number}>\) and \(<\text{are 2 in number}>\); there is nothing which is not in the scope of both of these properties. To see this, consider the sets of things having these properties. The first will be the set of everything (ignoring paradoxes for the moment), while the latter will be the set of all pairs of objects, which will in turn include every object (more than once). Obviously these are different set-theoretic constructions, but they ultimately are "made up of" all the same things. Likewise, the properties \(<\text{is red}>\) and \(<\text{is red and round, or red and not round}>\) may be true of all the same objects, but they are different constructions (either in virtue of being expressed by different intentional content or in virtue of being different set theoretic constructions). Thus, I think it is quite plausible that these are distinct properties. For one last example, consider that if one insists that either coextensive or necessarily coextensive properties are identical, then the following properties will be identical: \(<\text{is the 44th President of the U.S. in } \alpha>\), \(<\text{is married to Michelle Obama in } \alpha>\), \(<\text{is the first African American President of the U.S. in } \alpha>\). It is very easy to move from these properties being identical to a very strong form of fatalism (among other problems), so I would advise being hesitant to endorse strong identity claims about coextensive properties.
distinctive feature of the number 2. I specifically have in mind here the view defended by Bernard Linsky and Edward Zalta.\(^{15}\)

The intuitive idea behind the solution is that predicates express properties, but predicates are also nominalistically acceptable (in that their meaning does not depend on particular abstract objects); thus, it seems we could say things about the world, such as “the blue car is mine,” and subsequently refer to the properties expressed by those predicates, such as with the description “the thing I said of my car when I said it was blue.” In similar ways, we can refer to any abstract object that has representational content (e.g. I can refer to 2 as “the thing I said of the desks when I said there were two of them.”)

Somewhat more formally (though still removing some of Linsky and Zalta’s formalisms), we can state the position as the endorsement of the following theses:

(i) Abundance.

(ii) Abstract objects have their representational character essentially.

(iii) If \(x\) represents \(\varphi\) and \(y\) represents \(\varphi\), then \(x=y\).\(^{16}\)

These collectively guarantee that if we can put any non-paradoxical condition on the world, then we can refer to the abstract object which represents that condition. We know that there is an abstract object whose essential nature is to represent that condition because of Abundance and (ii), and we know there is exactly one such object, because of (iii). Thesis (iii) avoids the problem of abstract objects with more content being candidates to represent a given condition. For instance, if \(<\text{is blue and round}>\) and \(<\text{is blue}>\) both represented something as “blue,” then they would be identical; since they are distinct, it follows that they represent distinct conditions on the world, from which it follows that \(<\text{is blue and round}>\) (and any property of the

\(^{15}\) Linsky and Zalta (1995)

\(^{16}\) (Linsky and Zalta, 1995, 536)
form <is blue and...>) will not be a candidate to represent “blue.”

Theses (ii) and (iii) also allow the view to avoid the Benacerraf problem. According to the Benacerraf problem, different sets can “play the 2-role” in different reductions of number theory to set theory, and the same set can play different number roles on different reductions. The former is ruled out by (iii), while the latter is ruled out by (ii). Of course, one could see the case in reverse—that the plausibility of the Benacerraf problem gives us reason to doubt (ii) and (iii)—but I will grant the point for the moment. Since this view can escape the Benacerraf problem faced by Solution 2, and the problem of first establishing reference faced by Solution 1, it seems to be a compelling solution to the reference problem.

In order to fully evaluate it as a solution to the reference problem, one needs to recognize and distinguish two crucial steps in picking out a particular abstract object: first, we are able to formulate a meaningful predicate; second, there is the 1-1 connection between any given predicate and a property. While there seem to be good reasons for accepting each of these steps, I claim each one provides a reason to reject the other. Either the 1-1 connection implies the property is in fact picked out at step one (making it nominalistically unacceptable), or our ability to formulate the predicate without referring to abstract objects implies that the connection between predicate and property is not 1-1. Either way the conjunction of both steps is not a consistent position.

In defense of of the first step, consider that the received view handed down to us from Quine is that predicates are nominalistically acceptable. Since a predicate like “blue” does not quantify over an abstract object, we should avoid reifying its “meaning.” Given that predicates can be meaningful apart from abstract objects, it seems plausible that humans could formulate various conditions on the world and then specify a predicate for things falling under those conditions. Given such a view,

\[ \text{Quine (1948)} \]
step one of the process is easy, but it is difficult to see how a unique property is then
picked out. The claim was that there was some relation <is the thing I said of>
(or <is the thing which represents something as>) which held between meaningful
predicates like “blue” and properties like <is blue> such that each predicate stands
in the <is the thing I said of> relation to exactly one property.

I am not aware of what relation <is the thing I said of> could stand for such that
each predicate stands in that relation to exactly one property, as opposed to several.
Consider a few examples. First, suppose the relation is some type of entailment re-
lation such that <is the thing I said of> obtains between a predicate and a property
if and only if falling under the predicate entails possession of the property (e.g. “x
is blue” being true entails x has <is blue>). While this relation certainly holds be-
tween predicates and the properties we want them to express, it also holds between
predicates and infinitely many other properties. The predicate “blue” being true of
x entails that x has the properties <is blue>, <is blue and round or blue and not
round>, <is blue and not a square circle>, <is blue and extended>, and infinitely
many others. Second, suppose that <is the thing I said of> is a relation much like
<is synonymous with> except that, whereas synonymy relates two linguistic things,
this relation holds between a linguistic and an abstract thing. One characteristic
of similarity relations is that, given abundance, they can be characterized by their
relata both having a certain property. That is, one thing <is the same color as>
another if there is some color property that each relata has. One thing <is synony-
mos with> another if there is one thing they both mean (or one meaning property
they both have). If two distinct objects are alike in a certain respect, Abundance
allows us to reify the respect in which they are alike. Thus, if “blue” and <is blue>
are representationally alike, then they must represent the same thing. It is highly
unnatural to say that each of “blue” and <is blue> has the property <represents an
object as blue>, which I take to be good evidence that <is the thing I said of> is
not a similarity relation, but even if we allow that they are alike in this respect, even
more properties than before are alike in this respect. Properties like <is blue and
round>, <is royal blue>, and <is a group which contains one blue object> will all
have the property <represents an object as blue> and so would stand in the <is the
thing I said of> relation to “blue.” There may be ways to narrow the representational
property that objects need to have to be similar in this respect, but I do not believe
this will help; in general, similarity relations hold between many objects, and if <is the
ting the thing I said of> is a similarity relation between a predicate and property, then
there is no reason to think that each predicate will relate to only one property.

Relations of entailment and similarity will not connect a predicate to a unique
property, so what kind of relations would do the trick? Here is one that would work:
<constitutes the meaning of> \[18\] If <is blue> just is the meaning of “blue,” then our
ability to use the predicate “blue” would obviously allow us to refer to <is blue>. However, if this is the relation conveyed by <is the thing I said of>, then this merely
shifts the burden back to how we formulated the predicate in the first place. If one
could not already refer to <is blue> when formulating the predicate, then the mental
process of creating the predicate “blue” is the same mental process that picks out
<is blue> among all the objects in the platonic heavens, which makes the process
a great mystery indeed. The process pictured here is not a process of formulating
whatever condition you want and then finding the abstract object it corresponds
to, but rather it is a process of mentally picking out an abstract object to be the
content of your predicate. How we pick out abstract objects is precisely the question
at hand, so unless one wants to ascribe magical “picking out” powers to humans, I
don’t see how this solution has helped in any way. If I ask how we refer to abstract
objects, and you respond that we pick them out mentally and then refer to the ones
we have picked out, has anything been explained? Couldn’t the same question be

\[18\] Michael Dummett attributes this view to Frege (Dummett, 1981, 479).
asked with the same force as to how we mentally pick out abstract objects (given that our descriptions of them are not definite and we do not stand in causal relations to them)?

The dilemma, as I see it, is that views on which a property is a meaning of a predicate have a natural unique connection between predicate and property, but cannot explain how one could start formulating predicates. By contrast, views on which predicates would be meaningful even if there were no properties cannot give us a relation which relates a predicate to a single, unique property. To put the point another way, either the theory falls into the problem of Solution 1—the descriptions depend on already being able to refer to abstracta—or it falls into the problem of Solution 2—the descriptions are not definite. Which way if falls depends on facts about the relation between predicates and properties, but either way it does not allow us to establish reference to abstract objects. As far as I can tell, it was intended as a way of using nominalistically acceptable predicates to refer to properties, but I am simply not aware of a relation that does this. The reader is welcome to take this as an open challenge: what relation could a nominalistically acceptable predicate stand in to a property that it does not stand in to other properties?^19

1.1.1.4 Solution 4: Nominalistically Unacceptable Descriptions Revisited

Thus far, we have concluded that we are not able to refer to abstract objects by singling them out by definite description and naming them. Perhaps, however, “singling out” is not what definite descriptions are supposed to do. One might think

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^19Of course, given Abundance for relations, we know there is some such relation. There is a relation R₁ such that the only two things that stand in R₁ to each other are “blue” and <is blue>. I ignore this relation because I don’t believe any human knows how to express it without referring to <is blue>, so it is nominalistically unacceptable. Note that Abundance also guarantees the existence of a relation R₂ such that the only two things which stand in R₂ to each other are “blue” and <is red>. If we could use these various Rₙ relations, then we could in fact refer to any property by its relation to “blue,” but this is clearly not a plausible solution and not the solution that defenders of this view had in mind.
there are other relationships between definite descriptions and reference to abstract objects, and it is to this possibility that I now turn.

I argued above that the description “the successor of 1” could not be used to pick out the number 2 by someone who was not able to refer to 1, because it would be lacking content. What if it was not trying to use pre-established content to pick out 2, but instead was stating a relational requirement on whatever plays the roles of “1” and “2”? Of course this would not be limited to just “1” and “2”; one could say that the meaning of all of language is determined in this way. The core idea of such a view is that our nominals refer to whichever objects make the most sentences we believe come out true (perhaps with weighting of certain important sentences), and that this accounts for how our words come to refer to both abstract and concrete objects; call this view *global descriptivism*. On such a view, our use of the descriptions “2 is the successor of 1” and “2 is the number which counts those tables” does not narrow down exactly one candidate for “2,” but instead gives sentences which must come out true on the “correct” or “intended” interpretation of our language. If, by giving enough descriptions of this kind, it came to be the case that there was a unique assignment of abstract objects to nominals which made these sentences come out true, then this assignment would supply the correct interpretation of our language, and our word “2” would refer to whatever got assigned to “2” on this assignment (hopefully the number 2).

Whatever else can be said for (or against) this theory of language, it will not ultimately allow us to refer to abstract objects. This is because, however many sentences we add, as long as the sentences are mutually consistent there will be

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20There have been and could be various things called “global descriptivism.” The version David Lewis seems to have in mind in [Lewis (1984)] is one according to which the best model not only assigns meanings to nominals but also to predicates. While the label has been used in different ways, I think my use of it here is fair. If one thinks otherwise, feel free to label the view I am talking about “global descriptivism*.” For more on the different versions of global descriptivism see [Bays (2008)] especially footnote 16.
multiple assignments which preserve the truth of whatever sentences we want. This is easiest to see in the mathematical case as it is just the Benacerraf problem all over again. Nothing we could say would ever make an assignment on which “1,” “2,” “3,” “4,” ... got assigned to \( \emptyset, \{\emptyset\}, \{\emptyset, \{\emptyset\}\}, \{\emptyset, \{\emptyset, \{\emptyset\}\}\}, \ldots \), preserve the truth of our sentences better than one on which they were instead assigned to \( \emptyset, \{\emptyset\}, \{\{\emptyset\}\}, \{\{\{\emptyset\}\}\}, \ldots \). Likewise, no more sentences would be made true by “red” being assigned to \(<\text{is red}>\) rather than \(<\text{is red and self-identical}>\). While this problem is different than the previous ones in that it depends on there being too many equally good assignments rather than there being too many candidates for reference, the same abundance problems will prevent it from allowing us to establish reference to abstract objects.

1.1.1.5 Solution 5: Experiential Content

The last solution supposes that we have some sort of direct, non-causal acquaintance with abstract objects. One way this has been proposed would be through the contents of our perceptual experience. If I have a visual experience whose content includes the proposition \(<\text{there is a red ball in front of me}>\), then I gain the ability to form singular thoughts about the ball; why couldn’t I also gain the ability to form singular thoughts about the property \(<\text{is red}>\) or the proposition \(<\text{there is a red ball in front of me}>\)?

The first obvious problem for the position is that I stand in a causal relation to the ball—its surface reflects light which enters my eye and is processed in a certain way—while I do not stand in any causal relation to the proposition or property, so it is easy and seemingly reasonable to treat the ball and the property \(<\text{is red}>\) differently. However, since this view is merely standing in as an example of a view on which we have a direct, non-causal acquaintance with abstracta, let’s ignore this problem for now.
The bigger problem for this type of view can be phrased as a dilemma: either my perception of the ball gives me direct, non-causal access to every property the ball has, or to only some of the properties the ball has. Suppose it gives me access to every property the ball has. It then follows from Abundance that this gives direct access to infinitely many properties. This seems strange, but more than that, I don’t see how this could possibly help me refer to an abstract object. For an analogy, suppose someone thought that I have direct access to every atom with which I causally interact. This means I have direct access to, and should be able to form singular thoughts about, every atom in my visual field. Does it follow that I can pick out any particular atom that I want? Of course not—I would need some way of singling out the one atom I wanted to refer to from all the others; otherwise the mere fact that there is a causal connection between me and the atoms does not help me refer to them. Similarly, if I am going to refer to one of the infinitely many properties the ball has, I will need to be able to single it out and refer to it. This reduces the “direct access” solution to a version of Solution 2—I am trying to describe a property and part of my description is that it is had by a particular concrete object, the ball. This description was not definite before, nor is it now. Since this view would give us access to infinitely many abstract objects, the direct access hasn’t improved the situation.

On the other hand, one might think that my perception only gives me direct access to some of the properties the ball has. If we were able to use perception to narrow down the candidate properties, it is reasonable to think we could pick out one property from among this smaller field. But, there does not seem to be any reasonable standard which would distinguish properties I perceive from properties I don’t. A natural thought might be to appeal to causality; it is <is red>, not <is red and such that 1+1=2> that causes me to perceive the ball as red. The problem is that this obviously violates our Non-Causality hypothesis. One might then try to
respond that the ball, not the property, causes my perception, but it is in virtue of the ball instantiating <is red> that I perceive it as red, so I have some sort of special access to <is red>. However, we are now faced with the same dilemma we were trying to escape: either, for every property <is X> which the ball has, we perceive it as X in virtue of its instantiating <is X> (meaning we perceive it as being red and such that 1+1=2 in virtue of the fact that it instantiates <is red and such that 1+1=2>), or we only perceive it as some of the ways it is. On the former, we again have the same direct access to every property the ball has, so we are again faced with the problem of sorting among them. On the latter, we are again in need of an explanation of why we see the ball as X in virtue of its having <is X>, but not as Y in virtue of its instantiating <is Y>—an explanation which causation is obviously not helping. One could try to appeal to a way my mind is involved (e.g. I care more about the property <is red> than <is red and such that 1+1=2>, so I perceive it as red but not as red and such that 1+1=2), but this will only work if I am able to care more about some features than others (even if unconsciously); this of course requires that I am able to refer to single out these various features in order to care more about them, which of course just reintroduces the original problem. Obviously far more details could be spelled out for a particular theory, but I will skip trying to spell them out because there does not appear to be any way for some form of direct access to help us refer to abstracta.

1.2 Solving the Problem

In the previous section I tried to show that

(7) There are abundant abstract objects, some of which we can refer to, and for each one we can refer to there is (was) a person at some time who is able to pick it out by definite description.

is false. What I in fact showed was five failed attempts to refer to abstract objects by
definite description. Ideally I could show that those attempts were exhaustive of the
ways one could try to refer to abstracta through definite descriptions, and my proof
would be complete. Unfortunately, I cannot do that since they are not exhaustive,
particularly of the alternative ways one might try to connect descriptions to abstracta
(e.g. solutions 4-5). One can always come up with slight variations or combinations
of views to formulate a view I did not specifically address. However, I believe that
these solutions are representative of the views one could take (and of the views taken
in the literature), and that the problems I raised are easily extended to the various
other views one could formulate. I thus think it is reasonable to conclude that (7) is
false.

Since there was a valid argument leading to (7), it follows that at least one of the
premises of that argument is false. Recall that my central claim is that if one accepts
(1), then one should deny (2), so what remains to be shown is that (3) and (5) are
in fact true. I gave initial arguments for these propositions earlier, so in particular I
want to now look at more complex, sustained defenses of their denials to see if these
are tenable.

1.2.1 Super-valuational Plenitudes

One way to respond to the reference problem is to deny that it is a problem at
all by simply denying that we refer to abstract objects (i.e. deny premise (3)). The
prima facie argument I gave for reference is that we believe a lot of propositions which
seem to refer to abstract objects, so denying that we can refer to abstracta would
seem to imply that all those propositions are false. Thus, the key to a solution which
denies reference is to show that the consequences are not all that bad—that it does
not require us to deny a majority of things we otherwise would believe.

The one way I know to accomplish this is to combine the denial of reference with
a supervaluationist view of the truth of sentences which appear to refer to abstracta.
This theory allows one to say that “2+2=4” is not true because there is a particular object 2 and another object 4 and they stand in a certain relation to each other, as the surface grammar would suggest. Instead, it is true because for any admissible assignment of objects to names (e.g. the von Neumann ordinals, the Zermelo ordinals), the object assigned to 2, when added to itself, equals the object assigned to 4. Since “2+2=4” is true on all admissible assignments, the sentence itself is true (the same way that “Harry is bald” is true if it is true for all precisifications of “bald”).

How do we know it is true on all admissible assignments?—because we build this into our philosophy of language. Any assignment of objects to names must make certain basic and definitional truths come out true (like the axioms of math and whatever follows from those axioms). The most natural way to think of this is in terms of the global descriptivist position discussed in Solution 4, but instead of assigning nominals to objects in the way that maximizes the total number of true sentences, they are merely assigned in any way that makes our axioms and definitions come out true.

While this view has only been defended with regards to mathematical objects, its extension to other abstracta is fairly straightforward. There is some difficulty in how we would specify the appropriate axioms or sentences which must come out true on any admissible assignment, but it is not difficult to imagine that this could be done (perhaps in a way similar to that envisioned by Carnap, but with a realist meta-ontology). Once one did this, we could affirm various sentences like “red is a color” or “red is one of the primary colors” or even “red is the color of my car” because on all admissible assignments these come out true.

I should reiterate that this view of ontology has only been defended in philosophy of math; this matters because the objection I want to raise to it only occurs once one

21Defenders of this view in math include David Lewis (see Lewis (1993)), Michael Resnik (see Resnik (1981)), and Mark Balaguer (see Balaguer (1999, 1998, 1995)).

22Carnap (1950)
extends it to cover all abstracta (as one must do if one wants a sufficient alternative to premise (3)), so this may still be a plausible theory for only mathematical objects. The problem I want to raise follows from two theses which I will prove below: first, if one is supervaluational over the referents of nominals referring to abstract objects, then one must also be supervaluational over the meanings of predicates; second, if one is supervaluational over predicates and nominals, then there is no way to specify a limited range of admissible assignments for our nominals—there is no limit to what is in the range of the supervaluation. What follows from these two theses is that the defender of this view cannot exclude Julius Caesar from being the number 2, the property <has an exoskeleton>, or any other abstract object. In fact, there is no reason that sufficiently many concrete objects could not play all the roles of abstract objects. While this is not the same as the classic Julius Caesar problem, these consequences seem unacceptable to me (cf. Heck (1997)).

First, being supervaluational over nominals entails being supervaluational over predicates. This fact follows from the truth of various bridge principles which connect a nominal referring to an abstract object to a predicate. Bridge principles are vital for applying abstracta to the concrete world. Where this is easiest to see is in applied math—“if 2.6 measures the amount of paint we need in liters, then we need 2.6 liters of paint”—but it is just as necessary for any abstract object—“if <having a full valence shell> is true of an argon molecule, then that argon molecule has a full valence shell.” Bridge principles are crucial to any reasoning which connects the abstract realm to the concrete realm, so we have very strong reasons to accept them. But, if one accepts a bridge principle connecting a nominal to a predicate, and that nominal is indeterminate between several different objects, then it follows that the predicate is indeterminate over many different meanings. Proof:

Suppose there are abstract objects $A_1$, $A_2$, a nominal $N$, a true bridge principle “$x$ has $N$ iff $P(x)$” and that there are admissible assignments which assign $N$ to refer to $A_1$ and admissible assignments which assign $N$
to $A_2$. Then there could be predicates $P_1$ and $P_2$ such that $P_1 \neq P_2$ and “$x$ has $A_1$ iff $P_1(x)$” and “$x$ has $A_2$ iff $P_2(x)$” are both true. If so then $P(x)$ is neither determinately identical nor determinately non-identical to $P_1(x)$ or $P_2(x)$.

That is, assuming that there could be predicates which perfectly express the different abstract objects, then a predicate connected to an indeterminate nominal will itself be indeterminate. The claim on predicates is quite weak since it doesn’t claim their existence but merely the possibility of their existence, so it seems plausible. But, if this is true, our predicates will be as indeterminate in meaning as the nominals are. This is not particularly surprising if one is familiar with vagueness debates in which it is largely assumed that many predicates are indeterminate in meaning; the current point merely extends this to almost all predicates. Importantly though, if the predicates are indeterminate in meaning, then we can only say “4 is even” is true if it is true for all admissible assignments of “4” and “is even.”

Second, if one is supervaluational over both nominals and predicates, then one cannot specify what can and cannot be assigned as the referent of an abstract nominal. The argument here is that any attempt to specify the range of things playing a particular role will fall into an ungrounded regress. Consider that there are infinitely many progressions structurally isomorphic to the natural numbers in which the first member is $\emptyset$, the second member is the Eiffel Tower, and the third member is Julius Caesar. We would like to rule these out as not admissible natural number progressions, because if they were Julius Caesar would be the number 2 on some precisifications of “2.” Balaguer, one of the main defenders of this view for mathematical objects, is aware of this problem and says that we have a “full conception of natural numbers” and that only progressions meeting this full conception are eligible candidates for supervaluation. One might think that, for instance, part of the full conception of natural numbers includes that they are not partially composed of

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23 Balaguer, 1999, 77)
carbon, so we can safely conclude that Julius Caesar is not the number 2; however, the problem with this type of solution is that, given the above thesis, any attempt to specify the full conception of natural numbers must be done using terms which are themselves indefinite. While we can specify that the object assigned to “2” will fall within the range of the meaning assigned to “non-carbon-based,” this will only exclude Caesar from the “2” role if it also excludes predicates true of Caesar from the “non-carbon-based” role. Since we know we must be supervaluational over potential things expressed by “non-carbon-based,” how could we possibly know that none of them applied to Caesar? The only way we could know this, is if we could limit the admissible candidates for “non-carbon-based,” but what could be used to limit these candidates except another predicate or nominal referring to an abstract object? The regress here should be obvious—there are no ways to specify a definite range of admissible candidates for “2.”

Given that all our abstract object nominals are indeterminate between referring to many different objects, and that there is no way to specify the limit of what is and is not admissible as a referent of one of those nominals, what follows? One way to respond would be to say that there are no limits; absolutely anything (the Eiffel tower, Julius Caesar, this desk, etc.) can play the role of the number “2.” This seems obviously absurd. Surely we know enough about numbers and properties to know that no concrete object could ever be them. The tree outside my house, whatever its

24One might think that a distinction between object language and meta-language would be helpful here, but I do not think it is. If one could specify from a meta-language how our language determined admissible candidates for “2” or “non-carbon-based,” then this would address the current argument, but there simply do not seem to be any good ways to fill in an answer here. For instance, we can say from the meta-language that certain sentences must come out true in the object language, but this does not rule out Julius Caesar from making them true. Or, we can say from the meta-language that the totality of human linguistic use in certain circumstances gives meaning to words, but this does not specify what can or cannot be the referent of various nouns. We would could say that words should explain behavior in certain ways, but if Julius Caesar is the number 2, then the fact that the number of tables in the next room is Julius Caesar explains the fact that we think there is enough room for Amy and Bri to take an exam in that room (since of course, the number of students needing to take the exam is Julius Caesar, the same as the number of tables). As far as I can tell, meta-language moves seem to be a non-starter in solving this problem.
admirable qualities, could not play the role of <is a squirrel>. Additionally, if this were the case, then the only reason we would need to posit abstract objects at all is to make sure there are enough objects to make our sentences true. Imagine Smith has just presented an argument for abstract objects from the fact that there are anatomical features that spiders and insects have in common and that the only thing features could be is abstract objects, and Jones responds, “but don’t you see Smith, substantivalism about space-time points is true, as is mereological universalism; there are in fact enough space-time points to play all the roles you have for abstracta, so we do not in fact need to posit abstract objects at all!” Smith’s argument said nothing of the number of objects, and yet, if the no-limits view of abstract objects is correct, then all that is required for our sentences about numbers and properties to be true is for there to be enough objects and relations to satisfy them, so Jones’ response was completely applicable. Our arguments regarding abstract objects have nothing to do with parallel universes; it would be incredibly weird if a later scientific discovery of enough parallel universes to meet cardinality demands falsified the claim that there were abstracta. I thus find this view highly untenable.

The only alternative, given the two claims defended above, is to say that there are in fact limits on what can be the referents of our abstract object nominals, but that we cannot possibly assert what those limits are (from which it would seem to follow that we cannot know what those limits are). However, this seems hardly better. It remains the case that, for all we can specify, Caesar could be the number “2.” Likewise, for all we can specify, Jones’ response that there are enough concrete objects to make our sentences true is a good response to any argument for abstract objects. This position, while better than the previous one, seems likewise untenable.
1.2.2 Reference Magnetism

One last way to defend *platonism* is to deny that the only ways to establish reference to something are by causal connection or definite description (i.e. to deny premise (5)). The only alternative to these options of which I am aware comes from David Lewis and is usually referred to as “reference magnetism.” The central claim of reference magnetism is that reference is determined by a combination of *indefinite* descriptions and the inherent eligibility of certain things to be referred to. There is a strong tendency for our words to refer to highly natural objects and properties, so in any instance of referential indeterminacy, we in fact refer to the most natural (or joint-carving) of the potential referents.

It is one thing to say *that* the referents are involved in establishing reference, but far more complicated is stating *how* they get involved. The theory’s name is perhaps misleading in making it seem like the referents are involved in some sort of causal way, which would obviously be inconsistent with our assumption of *Non-Causality*, but this is not what Lewis has in mind (Lewis himself having never used the term “reference magnetism”), nor is the theory a psychological claim about what we as humans are disposed to refer to. Rather, reference magnetism is best viewed as a claim about how language works. Lewis compares his background view of language to that of a regularity view of laws of nature. Just as in a regularity view, something is a law if and only if it is a law in our best theory, so too, according to Lewis’s view of language, having a semantic property amounts to having that semantic property in our best theory, or as Lewis puts it, “contenthood just consists in getting assigned by a high-scoring interpretation.” There is nothing more to word W having meaning X

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26 (Lewis, 1983, 377)
27 (Lewis, 1983, 377). This interpretation of Lewis is heavily influenced by J.R.G. Williams. For his full exegesis and critique of Lewis see Williams (2007).
than $W$ meaning $X$ within the best semantic theory—the theory which best explains the totality of human linguistic use.

Reference magnetism is the conjunction of this view of language, with the claim that part of what makes a theory best is the naturalness of the referents it assigns to words. If theories which assign relatively natural abstract and concrete objects to the meanings of our words are always better \textit{mutatis mutandis} than theories which assign relatively unnatural objects to our words, and if the meaning of our words is determined by which theory is best, then our words will strongly tend to refer to relatively natural abstract and concrete objects. Because naturalness of referents is only a virtue of a theory and not a guarantee of a theory, we are still able to refer to relatively unnatural things (such as trout-turkeys or the property $<$is grue$>$), but there is a strong tendency for our words to refer to more natural things.

There are plenty of foundational worries one could raise against Lewis’s view of language.\footnote{I myself do not share the Humean assumptions that underly this view. I think our scientific theories describe the causal powers that things have independent of our theories, and I likewise think semantics describes the meanings that words have independent of our theories. In more technical terms, I think productivist meta-semantics are better than interpretationist meta-semantics (for a discussion of these two theories see \cite{Simchen2015}). If one agrees with me that words have semantic properties which semantic theories are merely trying to represent, then reference magnetism is a non-starter for referring to abstracta. For objects to affect the meaning of a word in a non-Humean metasemantics, the object must be causally effective, which would make reference magnetism violate the \textit{Non-Causality} requirement of \textit{platonism}.} Granting these foundational issues for the moment, we can ask the more focused question of why one should think that naturalness of referents is a theoretical virtue? The reason Lewis explicitly gives is that he believes it is the only viable solution to Putnam’s paradox (since he does not think causal solutions or accepting the conclusion of the paradox are viable options). Absent independent reasons, it would seem a bit \textit{ad hoc} to posit a never before discovered theoretical virtue merely to solve a paradox (or perhaps a few paradoxes if we include the Kripkenstein paradox). However, we are not entirely without independent reasons. Ted Sider and J.R.G. Williams have both offered independent arguments for the naturalness of referents.
being a theoretical virtue. While these arguments are complex, interesting, and worthy of attention, I propose bypassing them here and simply granting Lewis his point—naturalness of referents is a virtue of a theory (though obviously this is one more point where someone could get reject the theory).\textsuperscript{30} Granting this point, we can turn to the more relevant question for this paper, namely does this allow us to establish reference to abstract objects by means of this combination of indefinite descriptions and reference magnetism? I will argue it does not, because it falls prey to the problem of isomorphisms.

It has been noted elsewhere that even if we assume reference magnetism, there is no guarantee that our words are referential.\textsuperscript{31} Suppose there are two semantic theories $T_1$ and $T_2$ which are such that, one, they explain all the same data (e.g. the same sentences come out true), two, they have all the same semantic values (e.g. the same objects are referred to in each theory), but three, individual words have different semantic values in the two theories—call such theories isomorphic. Since reference magnetism depends on the claim that our words mean whatever they mean in our

\textsuperscript{29}Sider (2011); Williams (2007)

\textsuperscript{30}I will briefly add that I do not find either of Sider’s or Williams’ arguments convincing. Sider argues that reference is explanatory, and therefore must be highly natural; however, the naturalness of the reference relation does not guarantee naturalness of the relata. A causal reference relation would be highly natural, but it would still allow us to refer to trout-turkeys, if there are any. Since the unnaturalness of the relata does not affect affect the naturalness of the the relation, we cannot conclude from the fact that reference is highly natural that the things referred to will be highly natural. Williams argues that if we define simplicity in terms of length of definition in perfectly natural terms, then our lexicon will be more simple if it refers to more natural things, so the theoretical virtue of natural referents is really just a species of simplicity. This is a more complex argument, but I will say two things here against it. First, it seems highly likely to me that many of our words will have infinitely long definitions in terms of perfectly natural properties, since they can apply to infinitely many different combinations of fundamental particles (though Sider (2011, 130) would disagree). Assuming that all infinite definitions are countably infinite, then they will all be equally simple, so simplicity will not favor more natural referents. Second, it seems incredibly strange to me for simplicity to be a theoretical virtue for a lexicon, in the same way it would seem strange to me for simplicity to be a virtue of the half-life of U-235. It is just a fact that U-235 has a half-life of 700 million years, and it is just a fact that “dog” has a certain meaning. Simplicity is a virtue of laws, not of statements of empirical fact. If simplicity is not a virtue of a lexicon, then naturalness of referents is not a form of simplicity.

\textsuperscript{31}Hawthorne (2007); Williams (2007)
best semantic theory, if there were two isomorphic theories competing to be the best, there would be no best semantic theory, and our words would be meaningless. Thus, the possibility of isomorphic semantic theories is a very serious problem for reference magnetism—and we know they are possible. For the simplest example, suppose the universe were perfectly symmetrical so that for any occurrence on or around Earth, there was a duplicate occurrence on or around twin-Earth (the planet on the other side of the universe). Were the universe this way, then there would be two isomorphic “best” theories which explained all human linguistic use, the traditional way we think of in which our word “Obama” refers to Obama and twin-Earth’s homophonic word “Obama” refers to Obama’s counterpart, and the isomorphic theory in which our word “Obama” refers to Obama’s counterpart and twin-Earth’s word “Obama” refers to Obama. Obviously the eligibility of referents cannot favor one of these theories over the other, because they share the same referents. Thus, these seem to be equally good semantic theories, from which it follows that, were the universe this way, there would be no best theory.

This only shows a possibility of failure for reference magnetism, but still the possibility is worrisome. Rather than discuss exactly how worrisome it should be, I propose to strengthen the theory of reference magnetism in a way proposed by Sider. Specifically, though for slightly different concerns, Sider proposes adding a requirement of “counterfactual robustness” to the theory—the best theory “must make sentences which would be believed in certain counterfactual circumstances come out true in those circumstances.”32 Call the revised theory which adds in this requirement on the best semantic theory “reference magnetism+.” According to reference magnetism+, the best semantic theory is one which maximizes naturalness of referents while explaining not just the actual data of human linguistic use, but would also do the best job of explaining human linguistic use in the nearest counterfactual situa-

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32(Sider, 2011, 32)
tions. The symmetric universe fails at just this point, because in the vast majority of counterfactual situations, Obama and his twin-Earth counterpart will do different things, and in those scenarios the theory in which “Obama” refers to Obama will quickly become explanatorily better than its rival. Symmetric universes rest on a very precise coordination in order to make both semantic theories equally good at explaining human linguistic use, so the theories are not counterfactually robust.

What would be needed for reference magnetism+ to fail to imply a best semantic theory is for there to be two semantic theories with the same set of semantic values which explain all the same human linguistic use and which would still explain all the same linguistic use in close counterfactual situations. If that situation obtained, then both reference magnetism and reference magnetism+ would fail to give us a unique best semantic theory, and thereby would fail to give definite semantic properties to words. Abstract objects create just such a situation.

This is easy to see in a number of cases. First, consider a theory in which 1, 2, 3, 4,... are defined to be the sets $\emptyset$, $\{\emptyset\}$, $\{\{\emptyset\}\}$, $\{\{\{\emptyset\}\}\}$,... and another theory in which they are defined to be $\emptyset$, $\{\{\emptyset\}\}$, $\{\emptyset\}$, $\{\{\emptyset\}\}$,..., these will obviously be isomorphic theories since they refer to all the same sets and explain all the same human linguistic use, even in counterfactual situations. Second, consider necessarily coextensive properties. If we can refer to both $<$is red$>$ and $<$is red and self identical$>$, then they could be flipped so that “is red” referred to $<$is red and self identical$>$ and “is red and self identical” referred to $<$is red$>$, and this would not affect the explanatory power of the theory or the naturalness of the referents. A third example exists if we can refer to equally natural, symmetric properties. Given current science, it is quite conceivable that our fundamental theory of reality will involve bivalent on/off-type properties such as $<$having unit negative charge$>$ and $<$having unit positive charge$>$, or $<$up-spin$>$ and $<$down-spin$>$, but if it does, then we can again get isomorphic theories which switch which one is referred to in any
given context. All these examples involve the simple flipping of two referents, but it is also quite imaginable (though more difficult to describe) that there are more complex permutations which preserve truth and refer to the same things, but which drastically switch which words refer to which things. Since the rules regarding how the semantic values of words combine to give the semantic value of the sentence will be the same for all theories, the truth and falsity of all the same sentences guarantees that these various permutations do not affect the simplicity or explanatory power of a semantic theory. There is thus a vast multiplicity of isomorphic semantic theories referring to abstract objects which will all have equal claim to being the best semantic theory.

It is reasonable to conclude from the above examples that even with naturalness of referents being a theoretical virtue, there is no uniquely best semantic theory which refers to abstract objects. Given the assumption that our words mean whatever our best semantic theory says they mean, it follows that our words don’t have definite meaning. It may be tempting here to respond, as Lewis himself responded in the mathematical case, by saying that the fact that there are equally good semantic theories does not matter, since all the same sentences come out true in each theory. While it is true that this would mean words do not have definite semantic properties, we could still know to be true all the same sentences about abstract objects, and this is all we really wanted in the first place. However, this response simply returns to the supervaluationism of the previous section, which is to concede that reference magnetism itself has not given us a solution to the reference problem. I thus do not think reference magnetism provides a viable alternative to premise (5)—establishing reference (at least to abstract objects), if it occurs, occurs by causal connection or definite description.

33 (Lewis 1993, 15)
1.2.3 Is All Reference in Trouble?

At this point I have defended, at least against their major alternatives, the two most controversial theses of my argument. If they are true, and if the various failed attempts at reference show that one cannot refer to abstracta given \textit{Abundance} and \textit{Non-Causality}, it follows that \textit{platonism} is false. If one wants to believe in a relational ontology of abstracta, one should give up either \textit{Abundance} or \textit{Non-Causality} or, in my opinion, both. While the vast majority of relational ontologies could be classified as versions of \textit{platonism}, this is not true of all of them. It is perhaps noteworthy that Plato’s theory of forms would not be a version of \textit{platonism} since he posited a causal connection between ourselves and the forms in order to explain our knowledge of them. More recent relational ontologies which would allow for a causal connection would include Amie Thomasson’s view that we create fictional characters and Penelope Maddy’s early views according to which we perceive sets.\footnote{Maddy (1990); Thomasson (2003)} Obviously much more can and should be said regarding such views, but for now I think these illustrate that there is at least logical space for a solution to this problem.

One last response to my argument which I want to consider is a Moorean response which says that, obviously my claims about reference must be wrong because they would imply that we could never refer to anything. For instance, one might be inspired by Quine’s “gavagai” argument to claim that the problem raised here equally proves that we can never refer to a rabbit (as opposed to an undetached rabbit part, a one-second rabbit stage, or some other object in the area of the rabbit). The fact that we can refer to rabbits is more certain than any of the claims of my argument, so there must be a problem with something I have said.

While I agree that I would reject my argument if it implied we could never refer to rabbits, I simply don’t think it carries that implication. The fact that there are
problems referring to abundant, non-causal things does not imply that we cannot refer to sparse, causal things like rabbits. At worst, my argument might imply that we could not refer to rabbits if the doctrine of arbitrary undetached parts or universal composition is true, because they create situations similar to Abundence (though this is far from clear, since one still might stand in interesting causal relations to a rabbit which could secure reference). However, if this is the case, then so much the worse for those metaphysical theories. The Moorean fact is only that we can refer to things, not that we can refer to things and that these other metaphysical theories are true. Unless one had an extremely compelling argument for one of these theories, and an argument that reference to rabbits couldn’t occur causally or by some other means, then I simply don’t think the Moorean response exempts the platonist from having to deal with my argument.
CHAPTER 2

SPARSE SOLUTIONS TO THE REFERENCE PROBLEM

In the first chapter I attempted to show that a relational ontologist should either give up Abundance, Non-Causality, or both, because if both were true we would not be able to refer to abstract objects. In the present chapter, I want explore the potential for solving the reference problem by rejecting only Abundance. Could we develop an ontology according to which abstract objects were sufficiently sparse as to be singled out by definite descriptions, or, in order to have a more particular target, could we develop an ontology of properties which was sufficiently sparse to allow for reference?

Ultimately, I want to defend that yes, there is a way to have a sparse solution to the reference problem, but that there is only one reasonable such way\(^1\). The task of this chapter is to argue that other sparse ontologies face insuperable objections, and to attempt to measure the costs of the view I think could succeed.

2.1 Too Abundant Ontologies

Let (SO) denote the sparse ontology being proposed as a solution to the reference problem. What we would like is to specify the properties are in (SO) such that, if it were the correct ontology, reference would be possible. A natural place to start

\(^1\)It is trivially easy to give ridiculous ontologies which are such that, if true, the reference problem may well be solved. Here’s one, “the only property is \(<\text{is a cow}>\) which is had by all cows; no other objects have any properties.” Here’s another, “the only property is \(<\text{is a horse}>\) which is had by all horses; no other objects have any properties.” While these examples can be multiplied, I will set them aside as not worth considering.
specifying (SO) is to say what is not in it, to exclude certain “bad” categories of properties for being too gerrymandered, gruesome, or otherwise weird. Many of the properties which make our descriptions indefinite and which exist according to Abundance are properties that one would not have reason to posit apart from trying to give a systematic metaphysical thesis (like Abundance). It seems like <is grue>, <is positively charged and such that 2+3=5>, <is red an first seen more than 10 seconds after the Big Bang>, and properties like these could be safely excluded from (SO) without falsifying other things we want to say. Obviously trying to specify our ontology by starting with Abundance and removing one property at a time is a fool’s errand given the infinite size of an abundant ontology; instead, we need to determine the general categories of these properties so that we can exclude infinitely many of them at once. A natural starting place is properties which are extrinsic (meaning they can fail to be shared by duplicates (e.g. <is within 10 meters of a dachshund)) and properties which are impure (meaning they essentially depend on particular concrete objects (e.g. <is the teacher of Plato>). Thus, we can start by saying that all properties in (SO) are intrinsic and pure. While this is a start in excluding some of the “bad” properties, it will leave untouched most of the gerrymandered ones including <is grue> and <is positively charged and such that 2+3=5>.  

The next place one may want to cut would be disjunctive and negative properties. While typically we associate the categories of disjunctive properties and negative properties with properties expressed with the words “or” and “not” respectively, these are not essential features of these properties. If one wants to define one’s ontology in terms of these categories, one needs to provide a more robust definition of them. I am aware of two attempts at giving such a definition, so let’s consider

\footnote{The classic example of this is the fact that one could either define <is grue> disjunctively in terms of <is green> and <is blue>, or one could define <is green> disjunctively in terms of <is grue> and <is bleen>, so either <is green> or <is grue> could be taken to be a disjunctive property depending on one’s language. Similar concerns could be raised for negation and conjunction.}
each of them in turn.

First, one could follow Chisholm in defining disjunction in terms of how we conceive of the property. Adapting his definition slightly, one can define disjunctive properties thus:

\[ \text{Disjunction}_1 \text{ D is a disjunctive property } \iff \text{ there exist properties G and H such that (1) It is impossible for there to be a being that conceives D without conceiving G and conceiving H, but it is possible to attribute D to a thing without attributing G or attributing H to that thing; (2) one can attribute G to a thing without attributing H to that thing and vice versa; (3) D is necessarily such that, for every x, x has D, if and only if either x has G or x has H.} \]

Notice that the default on this view is for a property to be non-disjunctive, and it is only if we cannot conceive of it in a non-disjunctive way that we say it is disjunctive. The fact that we can define \( <\text{is green}> \) disjunctively in terms of \( <\text{is grue}> \) and \( <\text{is bleen}> \) does not entail that it is disjunctive, since we can also conceive of it non-disjunctively. However, there may well be some properties that it is simply impossible to conceive of without thinking of them in terms of their disjuncts; possible examples include \( <\text{is green or is not green}> \), \( <\text{is green and first seen before the year 3000 or is blue and first seen after 3000}> \), \( <\text{is square or is circular}> \), and \( <\text{is a proton or is an electron}> \). The plausibility of these examples depends on limits of conceivability. As a heuristic we can think of how different alien races could conceive of and talk about the world; if there could be a race that genuinely spoke or thought in a grueness language, then grue-like properties will not be counted as disjunctive here, but it is not just obvious that any way of conceiving the world is possible. It certainly seems

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\(^3\)(Chisholm 1989, 146)
impossible to conceive the property <is green or is not green> without conceiving its disjuncts, and perhaps more properties share this impossibility.

The second way one might attempt to define disjunctive properties follows Sider and Lewis in defining things in terms of predicates which are “perfectly natural” or “joint-carving.” In particular, using the notion of a perfectly natural language from Sider (2011), we can offer the following definition:

\[ \text{Disjunction}_2 \ D \text{ is a disjunctive property } =_{df} \text{ it is not possible to express } D \text{ in a perfectly natural language without using disjunction.} \]

The idea here is that we take our terms for referring to the properties expressed by predicates (<is green>, <is grue>) and we replace the predicates with perfectly natural predicates and perfectly natural connectors among those predicates which collectively express the way the world would have to be at a fundamental level for the original predicate to apply; if the new expression involves disjunction, then it is a disjunctive property. For example, if <is grue> is replaced by <is } P_1(x)\ldots \text{ or is } P_n(x)\ldots>, then it is disjunctive. While it will depend on exactly what one takes to be the perfectly natural properties, it is plausible that this definition will count far more properties as disjunctive than Chisholm’s definition. Since <is green> can be realized in multiple ways, it will likely be counted as a disjunctive property on this definition. The advantage of this definition is that it has a clear, objective standard that does not depend on notions of what beings could conceivably do. The disadvantages are first that it is incredibly difficult to know for sure what properties are disjunctive on this view (at least not without much more by way of spelling out the perfectly natural predicates), and second, though this may seem somewhat at odds with the first, it seems to count far more properties as disjunctive than we would like to count. If one wanted to exclude disjunctive properties from one’s ontology, it is likely that one had in mind properties like <is grue>, not properties like <is a Homo sapiens>,

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but both appear to be disjunctive on this definition\(^4\).

Similar definitions can be offered for negative properties. Again, an adapted Chisholm definition of a negative property would be:

\textit{Negation}_1 \text{ P is a negative property } =_{df} \text{ there exists a property Q such that}

\begin{enumerate}
  \item P is necessarily such that, for every x, x instantiates P if and only if x does not instantiate Q;
  \item it is impossible for there to be a being that conceives P without conceiving Q;
  \item it is possible for there to be a being that conceives Q without conceiving P.
\end{enumerate}

On the other hand, a Siderian-style definition of a negative property would be:

\textit{Negation}_2 \text{ P is a negative property } =_{df} \text{ it is not possible to express P in a perfectly natural language without using negation}

Again, one can see that plausibly \textit{Negation}_2 will count more properties as negative than \textit{Negation}_1. On \textit{Negation}_1, \textit{is red} will count as a positive property while \textit{is nonred} will count as negative (and note that being nonred is not the same thing as having some color other than red); it is difficult to give clear examples of negative and positive properties on \textit{Negation}_2.

\textit{Disjunction}_1 and \textit{Negation}_1 face serious concerns that they are not precisely defined (given the looseness of conceivability and attribution) and that they do not count any properties as disjunctive or negative because any property could have been conceived as non-negative or non-disjunctive. Despite these concerns, I want

\textsuperscript{4}My thought in saying \textit{is a Homo sapiens} is disjunctive on this definition comes from an assumption that a perfectly natural language will speak primarily about fundamental particles and properties shared between them; since many different combination of fundamental particles could realize the property \textit{is a Homo sapiens}, it appears to be disjunctive. This method will be discussed more in the next section. If, however, a perfectly natural language includes many more predicates (such as “is rational”, “is manmal” etc.), then it will be able to define \textit{is a Homo sapiens} non-disjunctively. The more of these predicates one includes in the perfectly natural language, the more \textit{Disjunction}_2 will sound like \textit{Disjunction}_1.

\textsuperscript{5}(Chisholm 1989, 147)
to adopt this definitions for the moment because I think they give us a more plausible ontology than the other definitions. If one excludes all negative and disjunctive properties given Disjunction\textsubscript{2} and Negation\textsubscript{2}, then one is going to have an extremely sparse and, in my opinion, implausible ontology. I will discuss problems facing ontologies this sparse in the next section, so for the moment suppose we add to our description of (SO) that it does not contain any properties that would be classified as disjunctive or negative given Disjunction\textsubscript{1} and Negation\textsubscript{1}.

I haven’t yet talked about properties which could be classified as “conjunctive” because they are largely considered more acceptable than disjunctive or negative properties and so typically they are not excluded from an ontology; however, I now want to argue that without removing at least some conjunctive properties from (SO), one cannot possibly solve the reference problem. First, using our previous definitions as inspiration, we can define a conjunctive property as one for which there exist properties it is the conjunction of, and we can define a property as being the conjunction of two other properties as:

Conjunction C is a conjunction of properties P and Q =\textsubscript{df} (1) it is not possible for there to be a being which attributes C to an object without also attributing P and attributing Q to that object; (2) it is possible for there to be a being which attributes P to an object without attributing Q to an object and vice versa; (3) for any property R which is such that it is not possible for there to be a being which attributes C to an object without also attributing R to that object, either P or Q is such that it is impossible to attribute it to an object without also attributing R to that object\textsuperscript{6}

\footnote{Chisholm 1989, 147}
Notably, this definition makes use of an intentional notion, attributing, rather than merely modal notions like entailment; this allows it to avoid problems of necessarily instantiated properties and of mutually exclusive properties. For instance, if one attributes the property \(<\text{is red and green}>\) to an object, it is plausible that one must also attribute \(<\text{is red}>\) and \(<\text{is green}>\) to that object, but, assuming that nothing could be red and green, it is false that possessing \(<\text{is red and green}>\) entails (in the modal sense) possessing the property \(<\text{is red}>\) since possessing \(<\text{is red and green}>\) is impossible. Of course, there are various other attempts to address these types of worries for the traditional entailment relation; if one has a notion of “analytic entailment” or “entailment in all possible and ‘good’ impossible worlds” or something along these lines, feel free to use this to supply a better definition of Conjunction. Hopefully the notion of attribution is clear enough for the present purpose, which is only to define a class of properties I believe the sparse ontologist should exclude.

Consider then the following claim

\textit{Conj} For any two properties, if they are such that it is possible to attribute one to a thing without attributing the other to that thing and vice versa, then there exists a property that is the conjunction of those two properties.

I claim that for any plausible ontology, \textit{Conj} entails that the reference problem remains.

Specifically, I maintain that any plausible ontology will include a property that is necessarily had by everything (here the necessity is \textit{de dicto}, not everything will have the property necessarily). Purported examples of such properties include \(<\text{is self-identical}>\), \(<\text{has a consistent set of properties}>\), \(<\text{is possible}>\), and \(<\text{is such that }2+2=4>\). I find it quite natural to think there are such properties, but I also think there are good mathematical reasons to posit at least one universally instantiated property. If there are numbers, then those numbers have to be related to objects in order for us to apply math. One can think of the \(<\text{is counted by}>\) relation as a
relation between numbers and objects. The U.S. Presidents stand in this relation to
the number 45, and the current U.S. Presidents stand in this relation to 1. If we fill in
1 as one of the relata, we get the property \(<\text{is counted by} \, 1\>\), which is a universally
instantiated property. On the other hand, if one does not want to posit \textit{sui generis}
numbers, then whatever analysis one gives of mathematical statements will require a
universal property. For instance, if one wanted to reduce numbers to properties and
relations, the most natural reduction is to say that natural number theory is actually
modeled in the property and relations \(<\text{is one in number}\>, \,<\text{are two in number}\>,
etc., which of course implies a universal property \(<\text{is one in number}\>\). I thus think
any adequate ontology will posit a universally instantiated property.

If there is a universally instantiated property and \(\textit{Conj}\) is true, then for any
property \(P\), there is property distinct from \(P\) which is the conjunction of \(P\) and
the universally instantiated property. For instance, if there is a property \(<\text{is self-}
identical}\>\), then there is a property necessarily coextensive with \(<\text{is red}\>\) namely
\(<\text{is red and self-identical}\>\), and there is a property necessarily coextensive with \(<\text{is}
eg\text{atively charged}\>\) namely \(<\text{is negatively charged and self-identical}\>\), etc. Given
the fact that for each property there is at least one property necessarily coextensive
with it, no ontology will be sparse enough to allow for reference. I will leave this as
a bit of an open challenge—show me how this could work—but I think it is relatively
clear that this follows from the nature of a sparse solution to the reference problem.
The reference problem follows from the fact that since abstracta are non-causal, we
must establish reference to them via definite descriptions, and from the fact that
no descriptions of abstract objects are definite since there is always more than one
thing fitting a given description. The idea of a sparseness based solution is that if
there were fewer abstract objects than were appealed to in the first chapter, one
of our descriptions may well be definite. It seems relatively clear that we do not
have descriptions that distinguish between necessarily coextensive properties, so any
ontology in which every property has a necessarily coextensive counterpart will not be sufficiently sparse to make our descriptions definite. Thus, any sparse solution to the reference problem will need to have some sort of limitation on which properties can be conjoined to make a third property (thus rejecting \(\text{Conj}\)).

While I have only argued that one should not accept all conjunctive properties, one might then forgo trying to put a precise boundary on which conjunctive properties there are and instead simply deny that there are any. Specifically, suppose we now add to our earlier claims that (SO) does not contain any properties which are classified as conjunctive given \(\text{Conjunction}\). While there may now be worries about this ontology being too sparse, I instead want to argue that it is still too abundant to allow for reference, since there will still be necessarily coextensive properties even without conjunctions. Consider first physical properties like \(<\text{is water}>, <\text{is red}>, \text{and } <\text{is gold}>; \text{it is a commonly accepted scientific principle that properties like this are had in virtue of something micro-physical properties like } <\text{is H}_2\text{O}>, <\text{reflects light with wavelengths between 620nm and 750nm}>, \text{and } <\text{has 79 protons in the nucleus}> (though I am not claiming these could not be reduced further to more fundamental physical properties). If these properties are not equivalent, and nothing we have said so far would indicate that they are, then every physical property which is not about fundamental physical particles will have a micro-physical property which is necessarily coextensive to it. As argued above, if there are necessarily coextensive properties, the reference problem is not solved (at least not by sparseness).

Of course, for all that was said in the previous paragraph, we may well be able to establish reference to fundamental physical and non-physical properties. While I think these categories may too fall prey to a reference problem, I think it is more instructive to consider whether or not we should just give up on non-fundamental properties altogether. Many are attracted to desert landscapes and fundamentality,

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7To see how one might argue that these other categories will include necessarily coextensive
so why not follow the Lewis-Sider definitions and say that (SO) includes no properties that would require negation, disjunction, or conjunction in order to be expressed in a perfectly natural language? It is to that view I now turn.

2.2 Too Sparse Ontologies

In reading the previous section, there will be some who are convinced that “conceiving” and “attributing” are too flimsy of notions to be used in a robust definition of ontology; after all, Sider has shown us how aliens could grow up speaking a “rue and bleen” language, so why should contingent patterns of thought tell us anything deep about the properties there are?[^8] I am sympathetic to this line of reasoning; it would be nice to define our ontology in terms of some perfectly objective features of properties, features which did not depend on conceptual beings like ourselves. The only feature which stands out as a candidate for this role is that of “naturalness” or “joint-carvingness.” According to Sider and Lewis, there are some predicates which are maximally perspicuous in how they describe reality; Lewis even goes so far as to consider positing special universals to correspond to these predicates in addition to the abundant properties he posits[^9]. If one thought that naturalness was a real, objective feature of things and that we could use it to classify properties into more and less natural (either directly or by the naturalness of the predicates expressing them), then it would make sense to define a sparse ontology in terms of naturalness. While one could include properties of any degree of naturalness or properties of at least X degree of naturalness, the position I currently want to consider is that one

[^8]: Sider (2011)
[^9]: Lewis (1983)
could posit an ontology of only natural properties:

(PSO) The only predicates which correspond to properties are the perfectly natural predicates.

Why think that (PSO) is true? One could argue for it from concerns of parsimony or fundamentality, but I think the best argument is that it is one of two non-arbitrary ontologies defined in terms of naturalness. If one thought that only predicates of degree of naturalness $X \in (0,1)$ expressed properties, then there can be a sorites series of predicates in terms of degrees of naturalness and one must define a sharp cutoff between two predicates of arbitrarily close degrees of naturalness. This is similar to the sorites problem for composition; just as it is weird that in two arbitrarily similar arrangements of particles one would result in the existence of an additional object (the composite) while the other would not, it is equally strange that for two arbitrarily similar predicates one would express a property while the other would not. The way to avoid this arbitrariness is to set the cutoff at an endpoint—either only perfectly natural predicates express properties (which is (PSO)), or all predicates of any degree of naturalness express properties (which is Abundance). Since we are trying to establish reference by denying Abundance, (PSO) seems to be the best way to define sparseness in terms of naturalness while avoiding arbitrary cutoffs.

The principal case against (PSO) will be that it is too sparse. Whatever reasons one had for denying nominalism would seem to be equally good reasons for denying (PSO). If one thought that nominalism was false because our ordinary language quantified over abstracta and we should take our ontological commitments seriously, then one will have equal reason to think (PSO) is false since it denies the existence of

\[\text{\[10\] Sider (1997)\]

\[\text{\[11\] A secondary worry is that it will still not allow for reference to these few objects. First of all, if we have not gotten to a fundamental physical theory, then we have never referred to any properties. Second, if we are right is saying that electrons are fundamental, this view will only be able to establish reference if there is exactly one property had in common by only and all electrons, which is not obvious.} \]
abstracta quantified over in ordinary language. While there would be a few sentences saved by positing perfectly natural abstract objects, it would seem a poor theoretical trade to introduce a new category of objects (abstract) merely to save a few sentences. If we are to consider this a plausible view, the burden is on the PSOntologist to show that her view fares better than nominalism. How might she do this?

If one takes the analogy with compositional nihilism seriously, then one might also think that the resources the composition debate has for saving the truth of sentences about non-existent composite objects could also be employed by the PSOntologist to save the truth of sentences about non-existent less-than-perfectly-natural abstracta. The remainder of this section investigates this question: can the PSOntologist preserve the truth of ordinary claims which seem to entail the existence of less-than-perfectly-natural properties? In particular, can she use the same methods as the nihilist to do this? At a high level of generality, the method I am talking about, used by many but not all nihilists, is to deny the existence of an object O while still accepting sentences about O by analyzing these sentences as really being about some xs arranged O-wise (where the xs are the simples). For the moment, we can assume that “there are xs arranged O-wise” serves as a paraphrase of “there is an O.”\(^{12}\)

The simples the PSOntologist appeals to are the perfectly natural properties, so can she give us a general paraphrase strategy in terms of sentences which only appear to entail the existence of perfectly natural properties?

As a flat-footed starting point, suppose the PSOntologist wants to offer a paraphrase of the sentence “there is something had in common by all water molecules” and she gives us,

\(^{12}\)In my discussion I take myself to primarily be following the method from van Inwagen (1990). Alternatives to this method include saying that “there are xs arranged O-wise” is what a metaphysical semantics would say must be true at a fundamental level for “there is an O” to be true at a non-fundamental level (Sider (2011)), or saying that “there is an O” is false but has some other positive status in virtue of the arrangement of xs O-wise, such as its being correct to assert. As far as I can tell, everything I say here in developing and critiquing PSOntology would not be affected by one of these alternative accounts of the method.
(P1) There are perfectly natural properties arranged iswaterwise which are had by all water molecules.

The obvious question for such a paraphrase is, what does it mean for properties to be “arranged iswaterwise”? The locution “arranged tablewise” was coined by van Inwagen as shorthand for whatever range of spatial relations would make it correct to assert that there was a table, and while we cannot spell this out in explicit detail, we know what the relation will consist in, and it is reasonable to think that the only obstacle to being able to spell out such a relation is epistemic. “Iswaterwise” on the other hand, does not have any obvious content. Since it cannot be about the spatial arrangement of properties (since properties are non-spatial), and it cannot be some sort of composition-like relation among properties (since this would imply the existence of non-perfectly-natural properties, namely the composite ones), it is not at all clear that any content can be assigned to the adverb. Without some sort of reason to think this adverb could be given content by an all-knowing being, it would be unfair to assume that (P1) gives us an adequate paraphrase.

While I cannot start to fill in a meaning for “iswaterwise” that makes (P1) meaningful, I can suggest a slightly different paraphrase for which “iswaterwise” can be given at least some meaning.

(P2) There are perfectly natural properties instantiated iswaterwise by all water molecules.

The crucial difference in (P2) is that if “iswaterwise” is meant to be a way of instantiating properties, then we are not merely speaking about relations among properties but about relations between those properties and a water molecule instantiating them. Given that water molecules are composite, there are lots of relations properties could stand in to a given water molecule such as “is instantiated by half the parts of” or “is instantiated on Wednesdays by.” Under this assumption, we can give a toy example of what (P2) might be trying to express. In lieu of full scientific rigor, suppose
that atoms are fundamental and properties like <is hydrogen> are perfectly natural properties. We can then say that (P2) is expressing something like:

(P3) For any W, if W is a water molecule, then the following relations hold of the ordered triple (<is hydrogen>, <is oxygen>, W): <z has a part which has y>, <z has twice as many parts which have x as y>, and <every part of z either has x or y>.

This may not be perfect, but I think this gives us enough to generally see how a paraphrase of this kind might work. The method of this paraphrase seems to be, first, to connect each particle with a property had only by particles of that kind, and second, to posit structure and composition relations holding among objects having those properties. If those properties are instantiated by things standing in that relation, one will have the composite object. Assuming everything is made of fundamental particles, this will always be able to provide a paraphrase of properties shared by composite objects. Should we then think that the PSOntologist can make sense of our talk of properties the way a nihlist can make sense of our talk of tables?

In part, the answer to this question depends on exactly what one wants from a paraphrase. It is not at all clear that being instantiated in a iswaterwise-way is the same thing as there being something in common to all water molecules; one is merely about abstract objects the other is about their relation to a concrete object. If one could quantify over “ways” of instantiating properties, then one could say that (P2) and (P3) actually are talking about an abstract object had in common by all water molecules, namely this “way” of instantiating <is hydrogen> and <is oxygen>; however, this simply reintroduces abundance in the form of ways of instantiating, so one cannot quantify over ways if one wants a perfectly sparse ontology. Thus (P2) and (P3) should be viewed as being irreducibly about both abstract and concrete objects, which seems to make them quite different than our original sentence quantifying over only abstract objects. Still, one can imagine a PSOntologist that will accept any paraphrase so long as it classifies as true the sentences we think are true, and
on that count (P2) and (P3) may be adequate. Rather than delve further into the nature of paraphrase, I want to instead look at whether or not these paraphrases are actually truth-tracking (and falsity tracking) for all the sentences about abstract objects we think should be true or false. The PSOntologist, I will argue, is faced with a dilemma regarding how loose her paraphrases can be: either she will fail to account for the truth of some sentences that should come out true, or she will give a notion of paraphrase that is sufficiently flexible as to reintroduce the reference problem. This dilemma is hardly surprising; if the PSOntologist truly can analyze anything we want to say, then she will have, at least linguistically, reintroduced abundance and all the problems that come with it, but let’s look a bit closer at that.

(PSO) was introduced as a view which posited few enough abstract objects that hopefully some of of descriptions attempting to pick them out are definite. I have offered a paraphrase of sentences which appear to quantify over abundant abstract objects, but I have not offered an account of sentences which appear to refer to abstract objects. How can the PSOntologist account for sentences like “red is my favorite color” or “having an exoskeleton is one of the properties had in common by spiders and insects.” On the one hand, she could say that since there are no properties <is red> or <has an exoskeleton>, these simply fail to refer to anything (it is only on truly rare occasions that we manage to refer to one of the perfectly natural properties). If so, and if (PSO) generally fails to preserve the truth of referential statements, even if it preserves the truth of quantificational sentences, then it is unclear why we should be convinced that the sentences quantifying over these abstract objects are true in the first place. The PSOntologist would be in the awkward position of saying that there is something had in common by spiders and insects, that both spiders and insects have an exoskeleton, but that <having an exoskeleton> is not one of the things they have in common (and more generally no statement we could make about what they had in common would be true). If for every anatomical
predicate P(x) ascribed to both spiders and insects the sentence “<is P(x)> is one of the features had in common by spiders and insects” is false, then what possible reason could we have for thinking the sentence “there are anatomical features shared by spiders and insects” is true? Even if the PSOntologist can analyze the latter sentence in terms of perfectly natural properties, she has left us where we should simply think it is false.

On the other hand, the PSOntologist could attempt to save our referential sentences in addition to our quantificational ones by saying that nominals seeming to refer to non-fundamental abstract objects are actually plurally referring terms. On this view, “the property of being water” would refer to <is hydrogen>, <is oxygen>, <has a part which has>, <has twice as many parts which have _ as _>, and <every part of _ either has _ or _>. It is not at all clear that this is an adequate paraphrase, since merely referring collectively to the properties and relations does not preserve ordering (and so does not say, for instance, whether <is hydrogen> or <is oxygen> is supposed to be had by twice as many parts). It also seems like it will conflate properties which are “built up” out of all the same perfectly natural properties and relations. Given these problems, I am skeptical that the PSOntologist can actually give paraphrases which preserve the truth of our referential sentences.

Suppose that this were possible, that the PSOntologist could provide paraphrases of our referential sentences in terms of sentences which referred plurally to perfectly natural properties and relations. If so, then she will have reintroduced the reference problem. If any sentence has a paraphrase of this kind, including the sentences “the property of being red and round or red and not round is my favorite example to use in philosophy” and “the property of being red is my favorite example to use in philosophy,” then there will be no explanation as to how the words “the property of being red” managed to refer to the cluster of properties and relations that they refer to when the ones referred to by “the property of being red and round or red
and not round” were an equally good candidate. The point is that, while I don’t think the PSOntologist can paraphrase our referential sentences, even if she did she is not helping the situation. A philosophy of language which allows one to paraphrase everything is a two-edged sword, preserving some claims we want to preserve, but also preserving some problems we did not want to preserve.

There are a lot of avenues open to one who wants to endorse a desert-landscape ontology while not facing the natural entailments of this sparsity. The goal of this section has been to show that these avenues do appear to work and definitely appear to face serious objections. While there are definite parallels between (PSO) and compositional nihilism, the fact that (PSO) concerns the realm originally used for paraphrases means that not all the same options are available. In particular, I think the PSOntologist will have to embrace that many sentences we otherwise would accept are actually entailed to be false on her view. Assuming that one had good reasons to reject nominalism, it seems one will have good reasons to reject (PSO).

2.3 Just Right Ontologies

Is there a middle ground in which an ontology of properties is sufficiently sparse to allow for reference and sufficiently abundant as to not incur the problems of nominalism? Additionally, if we can find an ontology that balances these two demands, can it be saved from objections of arbitrariness? I want to start with that second question because I think it more perspicuously defines what is required of a moderate ontology.

There are many objections from arbitrariness facing a moderate ontology (just consider the sorites argument of the previous section), but the one I want to focus on is what answer can a moderate ontologist give as to why there are the properties there in fact are rather than more or fewer? Why, one may ask, does <is red> pick out a property, while <is red and self-identical> does not? This question is instructive
because I believe the answer cannot appeal to contingent facts while still maintaining
that abstract objects are non-causal. If either there is some event that occurred that
precluded there being a property <is red and self-identical>, or if some event could
have occurred and had it occurred <is red and self-identical> would have picked out
a property, then there is a sense in which those events stand in some sort of causal
relation to a property. Since we are supposing a view in which one tries to solve
the reference problem by denying Abundance only (so not denying Non-Causality)
this will not work for present purposes. Thus, it must be the case that the non-
existence of <is red and self-identical> is a necessary fact. This fits in well with a
view which says that the existence of properties in general is explained by the fact
that each one exists necessarily; since <is red> exists necessarily, and since it would
be impossible for there to be a property <is red and self-identical>, we seem to
have a full explanation of why there are the properties that there are (though I will
challenge this in chapter 4).

What explains the impossibility of <is red and self-identical>? It cannot be
explained by the fact that if <is red and self-identical> existed it would be a property,
or non-spatial, or multiply-instantiated, because these are all true of <is red>. Of
course, even Abundance denies the existence of certain “potential” properties like <is
non-self-exemplifying>, but the non-existence of these properties follows from the fact
that their existence would imply a contradiction; what contradiction follows from the
existence of <is red and self-identical>? It is implausible to think that one can always
derive a contradiction merely from the existence of the properties one does not want
to include in one’s moderate ontology; rather, the contradiction would need to follow
from the existence of this property and some other metaphysical first principle. It
thus seems that the moderate ontologist will need to find some metaphysical principle
(like a principle of sufficient reason) which implies the impossibility of these various
other “potential” properties like <is red and self-identical>. 

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I want to suggest that there is only one metaphysical claim that will do the work needed, a claim about property identity which identifies necessarily coextensive properties.

(ID) For any properties P and Q, if necessarily for any x, x instantiates P iff x instantiates Q, then P=Q.

It follows from (ID) that <is triangular> and <is trilateral> are two names for the same property, as are <is red> and <is red and round or red and not round> and <is water> and <is H2O>. This view may seem implausible (or highly plausible) but before discussing this, I want to look at how I think it can provide a response to the reference problem.

Consider the following attempt to establish reference: “let <is red> refer to whatever object which, when substituted for ‘it’, makes the following sentence necessarily true: ‘it is had by only and all red things’.” Since every object which made that sentence necessarily true would be necessarily coextensive, it follows from (ID) that at most one object makes it necessarily true. Thus, given (ID), we seem to have a description of an abstract object which is actually a definite description.

As an aside, I will note that this description requires our predicate “red” to be meaningfully used to talk about objects at other possible worlds. That is, it must be true that “is red” can be true of things at other worlds and that this is not analyzed in terms of the property <is red> being had by things in other worlds, since then the analysis would be circular. This is noteworthy because it is an assumption shared by the truth in/at distinction I will develop in the next chapter and is key in defending a causal solution to the reference problem.

If one thinks that this view has the resources to solve the reference problem (which could certainly be challenged in more ways than the one I just mentioned), the question turns to if it is plausible to identify all necessarily coextensive properties. A knee-jerk objection to this view is that it would prevent properties from playing
the roles we need them to play (especially for intentional contexts like those found in semantics and mental content), since we often need to distinguish <is water> and <is H₂O>. While this is a serious problem, it seems to be the same problem shared by everyone in analyzing sentences like “Hesperus is Phosphorus” or “Clark Kent is Superman.” Presumably any decent view of language will have to have some account of how someone could learn that Clark Kent is Superman and how these different names could play different roles within someone’s mental content; however that analysis works, it seems the same thing could be said of <is water> and <is H₂O>.

While the knee-jerk response may not work, there do seem to be ways in which (ID) would affect how we think about and use properties in various theoretical roles. For instance, (ID) entails that there is at most one necessarily instantiated property and one necessarily uninstantiated property. This means that <is self-identical>, <is such that 2+2=4>, <is round or is not round>, and <is possibly existent> will all pick out the same property; other potential names for this property include <is such that there exist uninstantiated properties> and <is such that it is either God or created by God>. On the other hand, (ID) will also be committed to the identity of <is square and circular>, <is such that 2+2=6>, <is a method for trisecting an angle using only a compass and straightedge>; other potential names for this property include <is a theist with only true beliefs>, <is three-inch thick transparent iron> and <is an object which exists and is not perceived>. Modal analysis has gone out of fashion in philosophy in part because of its inability to account for hyper-intentional differences, and (ID) is precisely the view that says there cannot be properties which are merely hyper-intentionally different.

The other main reason modal analysis has gone out of fashion is its inability to account for differences in order of explanation, and (ID) also inherits some of these problems. For instance, one might have thought there could be a substantial debate
between a reductive physicalist who said that for each mental property there is a physical property that it holds in virtue of, and an idealist who said that for each physical property there is a mental property that it holds in virtue of. However, (ID) entails that there is only one view here, the view in which mental properties and physical properties name the same properties.

A few more strange consequences of (ID) are worth highlighting. First, I assume that while (ID) entails that <is a table> and <is a composite of particles arranged tablewise> are identical, one will not want to identify this property with the relation <are arranged tablewise> (if one did then a whole host of other problems ensues). If so, then the following two properties of possible worlds are identical <is such that, were it actual, <is a table> is instantiated> and <is such that, were it actual, <are arranged tablewise> is instantiated>, which is incredibly strange. Given that <is a table> and <are particles arranged tablewise> are not identical, then properties which substitute one non-identical object for the other should not be identical. It would be perfectly reasonable to say one property entailed the other (as indeed the instantiation of <is a table> entails the instantiation of <are arranged tablewise>), but (ID) requires that the two properties are identical. Second, (ID) entails that each individual has only one “essence” property. Putting this another way, if α is a name for the abstract possible world which represents the concrete world, then <is the first African American U. S. President in α>, <is married to Michelle Obama in α>, and <is born in Kapi’olani Maternity and Gynecological Hospital in 1961 and is called “Barack Obama” in α> all express the same single property. This is certainly weird in that the latter may have been attributed to him immediately after his birth, but this means that <is the first African American U. S. President in α> may have been attributed to him immediately after his birth. Furthermore, this seems to lend itself to a Leibnizian “complete concept” view of properties. Lastly, if one wants to extend (ID) to relations, which is quite natural given the similarity of properties and
relations and the tendency to think of properties as relations with all but one relata filled in, then relations $R_1$ and $R_2$ are identical if all the same thing stand in $R_1$ to each other as stand in $R_2$ to each other. Consider then the relations $<\text{is the parent of}>$ and $<\text{is the child of}>$; either one must say that these are identical relations (which is absurd) or one must quantify over ordered pairs in some way such that (Barack, Melia) instantiating a relation is not the same as (Melia, Barack) instantiating that relation. While this may not seem like a big deal, it is certainly a theoretical cost that the view must posit yet one more category of objects (that of an ordered pair) within one’s ontology. If one denied (ID), then $<\text{is the parent of}>$ and $<\text{is the child of}>$ would simply be distinct relations and we could say that Barack stands in one of the two to Melia and Melia stands in one of the two to Barack. One does not need to posit ordered pairs simply to account for the assymetricality, but one would need to posit ordered pairs in order for the two relations to have different extensions; thus, ordered pairs only need to be posited (at least for this problem) given (ID).

As should be now clear, there are significant costs to solving the reference problem by identifying all necessarily coextensive properties (and it is certain that I have not yet discussed all the costs). However, I don’t believe there is any other way to offer a sparse solution to the reference problem, so the cost may be worth paying if it is the only theory in which it is possible for us to refer to abstract objects. I thus think that a full assessment of the view requires comparing it to what, if any, causal solutions there are to the reference problem. For now though, I hope that the options and costs of sparse solutions have been sufficiently explored.
Suppose one had the following view regarding abstract objects:

(4ism) Abstract objects began to exist four billion years ago.

Is there any compelling argument that this view is substantially worse than a more traditional platonist view which holds that many or all abstract objects exist necessarily and eternally? In this chapter, I will argue that no, there is no compelling argument against 4ism. I won’t present any arguments for 4ism, and one could rightly claim that it is an unmotivated position, but this is not the type of argument that will concern me here. The reason that argument will not concern me is that I assume one who wanted to defend a view on which abstracta were contingent or temporary would have a more nuanced and motivated view with many more things to consider, such as the view developed in the next chapter. 4ism is merely a toy ontology which allows me to ask whether or not one who felt compelled to posit abstract objects should also feel compelled to accept that at least some abstract objects are necessary existents. In this chapter I argue that no, there are not easy and devastating objections to views on which abstract objects are contingent or temporary. If one is to claim they exist necessarily, it will have to be on the basis of detailed arguments for a particular philosophical view. The point is that contingent and temporal views of abstracta should not be treated as a non-starter, the way they have been.

¹The disagreement among platonists about whether this is “many” or “all” concerns the “impure” abstract objects like the property <is identical to Socrates> or the singleton set {Socrates}. Every platonist I am aware of accepts that pure abstract objects like <is green> exist necessarily and eternally.
3.1 The Central Argument Against 4ism

Four billion years and one day ago, Mars was red, there were eight planets (or some number of planets), and Jupiter was bigger than Earth, but 4ism seems to imply that none of this was the case because there were no properties, numbers, or relations. If 4ism were true, then two “red” planets would not have had anything in common, because there was no property <is red> which they each had. Likewise, four billion years and one day ago there would have been nothing which Jupiter and Saturn had in common, but then the next day there would have been many things they had in common (the property <is a planet>, for one), and this could be the case even if they underwent no intrinsic change during that day. Can the defender of 4ism (hereafter called a ‘4ist’) really endorse such crazy things as that there were no true propositions and no instances of properties and relations four billion years and one day ago?

Such is the spirit of the central objection against 4ism. We know that the world was a certain way more than four billion years ago, and 4ism seems to deny that it was this way. Of course it is open to the 4ist to point out that she can affirm that Mars was red five billion years ago since the proposition ⟨Mars was red five billion years ago⟩ now exists and she can affirm that it is currently true. The central question is then, is this affirmation (or ones like it involving other abstracta) inconsistent with 4ism? To turn this into an argument against 4ism one needs a way of moving from the truth of the proposition ⟨Mars was red five billion years ago⟩ to there being abstract objects five billion years ago. This inference can be made in a variety of ways, and while many seem initially appealing, I believe they ultimately fail to show the existence of abstract objects five billion years ago. To see this we need to look more closely at how this inference is supposed to go. Specifically, I want to look at arguments for there being propositions and properties more than four billion years ago and parallel arguments for these existing in other possible worlds in which, according to 4ism,
there are no abstract objects at any time.

It is worth flagging two assumptions in what follows. First, I will be assuming actualism and presentism, primarily because they are the more difficult positions to defend. Possibilism and eternalism have strictly more in their ontology and so many analyses would be available to those views which were not available to their counterparts (e.g. two things do not need to be near each other in the four-dimensional block in order to stand in a relation like instantiation); while there are some things that actualism and presentism have an easier time analyzing (e.g. temporary intrinsics), these will not be helpful in defending 4ism. Thus, if I can show that there are no good arguments against 4ism given actualism and presentism, I take it I will have shown there are no good arguments against 4ism.

Second, I will be assuming that presentists analyze truths about the past and future in terms of truths about abstract times, which are constructs much like worlds. If worlds are maximal consistent sets of sentences, then times are maximal consistent sets of past, present, or future tensed sentences; if worlds are complex properties the world could have instantiated, then times are complex properties the world could have instantiated at once. Since times presently exist, they can factor into a presentists analysis of temporal claims the same way that possible worlds can factor into an actualist’s analysis of modal claims. The upshot of this assumption is that there is a very close parallel between analyzing claims about other worlds and claims about past times, which means the view that abstract objects are temporary will face the same problems as the view that abstract objects are contingent.

3.1.1 Propositions

So how do facts about the way the world was and the way the world could be imply that propositions exist at all times and worlds? Consider two arguments, one

\[\text{This analysis comes from Crisp (2007).}\]
temporal and the other modal:

(1t) Five billion years ago Mars was red.

(2t) If five billion years ago Mars was red, then the proposition ⟨Mars is red⟩ was true five billion years ago.

(3t) It was the case five billion years ago that ⟨Mars is red⟩ was true. (1t, 2t)

(4t) It is always the case that if the proposition ⟨Mars is red⟩ is true, then the proposition ⟨Mars is red⟩ exists.

(5t) It was the case that the proposition ⟨Mars is red⟩ existed five billion years ago. (3t, 4t)

For the modal version, suppose W is one of the worlds posited by 4ism in which Mars exists and is red, but in which no propositions exist (one could think of this as a world which started much like ours but abruptly ended five billion years ago). We can then argue:

(1m) There is a possible world W which is such that, were it actual, Mars would be red.

(2m) For any world w, if w is such that were it actual, Mars would be red, then were w actual, the proposition ⟨Mars is red⟩ would be true.

(3m) Were W actual, ⟨Mars is red⟩ would be true. (1m, 2m)

(4m) Necessarily, if ⟨Mars is red⟩ is true, then ⟨Mars is red⟩ exists.

(5m) Were W actual, ⟨Mars is red⟩ would exist. (3m, 4m)

The arguments are obviously quite similar, moving from an undisputed first premise to a proposition being true in a time or world in which 4ism says there are no propositions. Since truth is a property, and only existing things have properties, it follows that there are propositions in these times and worlds, contra 4ism. Of course, I said above that I would assume that the presentist wants to analyze past truths as being truths about abstract past times, so (2t) is really equivalent to:

(2t′) If five billion years ago Mars was red, then when $t_{\text{fivebillionyearsago}}$ was present, the proposition ⟨Mars is red⟩ was true.
from which (5t) still follows with minor adjustments. Once we give this analysis of past truths, the parallel between the arguments becomes even more pronounced. Any solution to one should be a solution to the other.

So then, how can the 4ist respond to these arguments? I am convinced that she should deny (2t’) and (2m). The way she can deny these is by way of the distinction between truth at and truth in worlds and times.

A rough gloss on the distinction is that a proposition is true at a world if and only if that world is as the proposition represents, whereas a proposition is true in a world if that world is such that, were it actual, the proposition would be true. The difference of course is that the latter, but not the former, guarantees that the proposition is around to represent the world. The 4ist wants to affirm (1t) and (1m) but claim that the only thing that can be derived from these premises is that there are propositions true at these worlds and times, not that there are propositions true in them. The description of the distinction above is merely a rough gloss because actually spelling out the technical distinction is exceedingly difficult, so much so that most people resort to mere analogy. Attempts at spelling out this distinction occur in, Adams (1981); Fine (1985); Plantinga (1987); Prior (1969); Speaks (2012); and Turner (2005), with Speaks giving by far the best formulation thus far. The difficulty is with spelling out the “truth at” conditions—how can we say that the world is the way something represents, when that thing is not around to do the representing. I will return shortly to Speaks account of the distinction, but first I want to make a brief case as to why we should think there is such a distinction.

There are two main lines of argument towards the legitimacy of the distinction. First, we can clearly make the distinction for entities other than propositions. Consider a particular copy of a book, say the copy of *Harry Potter and the Deathly Hallows* currently on my bookshelf; I hereby name it HP. While the identity conditions for a book are not entirely clear, it is almost certainly the case that, were
the world as HP represents, HP would not exist. J.K. Rowling does not exist in the world of Harry Potter, and anyone writing in that world would almost certainly write down the events in different ways than she in fact has. In general with books, we have no trouble with understanding and picturing the way the world would be if that book were true, even if the book is not within the world pictured (and it is in fact a noteworthy literary feature when the book would exist within the world pictured). A similar phenomenon occurs with sentence tokens. No one could utter truly the sentence “I cannot speak a world of English.” Nevertheless, the sentence would express something true of many individuals, if they merely did not utter it. So again we need to be able to make a distinction between the representational entity and what is represented.

Second, a distinction between truth in and truth at appears to be the best (and perhaps only) way for an existentialist to make sense of negative existential claims. In a much discussed argument, Timothy Williamson has made a powerful case that all claims of non-existence are false. Existentialism is the claim that a proposition about an individual only exists if that individual exists. From this fact, Williamson argues that if the proposition ⟨Socrates does not exist⟩ exists, Socrates exists, which implies that the proposition could not possibly be true. Since the proposition could not possibly be true, it is not possible for Socrates to not exist, and of course the same would be true for any object. While there may be other options, the standard way people have responded to this is to say that ⟨Socrates does not exist⟩ expresses something possible, even though it could not possibly have the property <is true>, which is the same as endorsing a distinction between truth in and truth at worlds.

This argument of course turns on existentialism about propositions, a position I will discuss more below, but to the extent we have reason to think that existentialism is true and that objects could have failed to exist, we have reason to think there is a
distinction between truth in and truth at worlds.

If we have reasons to think there is an in/at distinction, how should we make sense of it. Here I defer primarily to the account developed by Jeff Speaks. Speaks spells out the notion in terms of “minimalist truth conditions.” Each proposition has a minimalist truth condition, which is a property of possible worlds—a property which can be had by a possible world even if the proposition it is a truth condition of would not exist if that world were actual. For example he offers the following truth condition: “the truth condition for the proposition that Socrates does not exist is the following property of worlds: the property of being such that, were the world actual, Socrates would not exist.” He points out that this property can be had by possible worlds (which of course actually exist) whether or not the proposition ⟨Socrates does not exist⟩ exists in those worlds. Thus, we can say that ⟨Socrates does not exist⟩ is possibly true if and only if some possible world instantiates its minimal truth condition; hence, this proposition is in fact possibly true. Speaks then gives a schema for formulating minimalist truth conditions for any kind of proposition. His schema suggests that the truth conditions for ⟨Mars is red⟩ would be the following property of worlds: <is such that were it actual, Mars would instantiate <is red>>. This of course would require the property <is red> to exist in W, contra 4ism, but the issue of properties will be dealt with below.

Analyzing truth at other times and worlds in this way does not show that (2m) or

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4Speaks (2012)

5(Speaks, 2012, 542)

6It is worth noting that Speaks’ solution is not merely pushing the analysis back a step, the way one would by moving from the truth of sentences to the truth of propositions, because it is not saying that the truth conditions are the bearers of truth. Rather, it is saying that the proposition has the property of being possibly true, and it has this property in virtue of possible worlds instantiating its minimal truth condition.

7Though he admits that the schema is incomplete, and it is not a trivial matter that it could be completed.
(2t’) is false; in fact if we assume the necessary existence of propositions then (2m) and (2t’) are true even given this analysis of truth at worlds and times. What it does show, however, is that the conditional does not follow from an analysis of what it would take for other worlds to be certain ways. If there are worlds or times in which the proposition ⟨Mars is red⟩ does not exist and Mars is still red, then the conditionals are false. The above arguments were attempting to show that the proposition ⟨Mars is red⟩ exists in times and world in which Mars is red, but the crucial premises of those arguments only hold if the proposition exists in those times and worlds, so in fact the arguments have not given us any reason to think that the proposition must exist.

3.1.2 Properties

Turning to properties, there are two different types of arguments one might give for properties existing at other times and worlds, one direct and one via the solution to propositions above. Let’s consider the temporal versions of these arguments, and hopefully the modal counterparts will be sufficiently clear so that the reader can reconstruct them if she desires.

The direct argument parallels the argument for any properties. For instance, we can infer from the fact that spiders and insects have some anatomical features in common that there are anatomical features. We can make similar inferences regarding other times and worlds. For instance:

(1d) Five billion years ago, Mars shared some but not all planetary features with Jupiter.

(2d) Therefore, five billion years ago there were planetary features had by Mars but not Jupiter.

(3d) Therefore, five billion years ago there were features.

It is not clear what features could be if not properties, so the conclusion of this
argument appears to be that there were properties 5 billion years ago.

For an indirect argument, we can look at the minimalist truth conditions given above:

(1n) Five billion years ago Mars was red.

(2n) If five billion years ago Mars was red, then the proposition \langle Mars is red \rangle is true at the time \( t_{fivebillionyearsago} \).

(3n) For any time \( t \), \( \langle Mars is red \rangle \) is true at \( t \) if and only if, were \( t \) present, Mars would instantiate \langle is red \rangle.

(4n) Five billion years ago, Mars instantiated \langle is red \rangle. (1, 2, 3)

(5n) It is always the case that if an object \( o \) instantiates a property \( p \), then \( o \) and \( p \) exist.

(6n) The property \langle is red \rangle existed five billion years ago. (4, 5)

In response to both of these arguments, the defender of 4ism needs to be able to say that Mars was red five billion years ago (or had other features five billion years ago) without instantiating \langle is red \rangle (or other properties) five billion years ago. Can she? I think she can, precisely because I think there is an in/at distinction for properties as there is for propositions. Just as propositions can be true in and true at worlds, so properties can be true of things in worlds and true of things at worlds.

Why think there is such a distinction?—because we can define it in a way similar to the way we defined truth in and truth at, and because we have as much or more reason coming from claims about possibilities about properties as we did from the possible truth of negative existential propositions. The possibilities which require an instantiation in/at distinction are both negative existential, as with propositions, and certain comparative claims.

I claim that we have as much reason to accept property existentialism as propositional existentialism. To see this, consider the kinds of arguments that can be given in favor of propositional existentialism. Timothy Williamson gives arguments from what composes a proposition. If a proposition about Socrates has as an essential part
Socrates himself or a mode of presentation of Socrates, then if Socrates did not exist, the proposition would be lacking an essential part, and therefore would not exist.\(^8\) Speaks on the other hand gives an argument from the fact that propositions are the meanings of sentences. He writes:

> If the meaning of a proper name is the object for which it stands then, plainly enough, the meaning of a name cannot exist unless the object for which it stands exists. But it seems plausible that the meaning of a sentence—i.e., the proposition expressed by the sentence (in the relevant context)—cannot exist if the meaning of one of the subsentential expression of which it is composed fails to exist. And these two theses—Millianism, plus the dependence of the existence of the proposition expressed by a sentence on the existence of the meanings of words in the sentence expressing the proposition—together entail Existentialism.\(^9\)

The underlying reasoning for both arguments is the same—propositions about Socrates depend on Socrates. Whether they depends on him because he is an essential part of the propositions (Russelianism), or because he must exist for an essential part of the propositions to exist (Fregeanism), or because of some non-compositional dependence relation, the conclusion is still that propositions about Socrates would not exist if Socrates did not exist.

All the same considerations favor property existentialism, specifically for properties which refer to concrete objects such as <is Socrates> or <is more than 3,000km from Mt. Everest>. It is quite natural to think of the property <is shorter than Socrates> as being essentially composed of Socrates and the relation <is shorter than>. If it is, then it could not exist without one of its essential parts, so it could not exist if Socrates failed to exist (and the same would be true if it was essentially composed of <is shorter than> and a mode of presentation of Socrates). Alternatively, if we assume that a predicate relates to a property the way a sentence relates to a proposition, then we can argue that there could not be a meaning for the predicate

\(^8\) (Williamson, 2002, 244)

\(^9\) (Speaks, 2012, 529)
“being Socrates” if one the terms in the predicate was meaningless; since properties play the role of being the meanings of predicates, the property <is Socrates> would not exist if the predicate was meaningless. Either way, we have just as much reason to think that a property about Socrates depends on Socrates as we do to think a proposition about Socrates does. If Socrates did not exist, then properties about him would not exist.

This much gives us property existentialism, which implies that certain properties would not exist in other worlds or times. In order to motivate a distinction between instantiation in a world (or being true of something in a world) and instantiation at a world (or being true of something at a world), there needs to be examples of a thing having a property at a world or time in which the property does not exist. With propositions we had negative existentials like ⟨Socrates does not exist⟩, which could obviously only be true if they did not exist. The property equivalent of that is <is such that Socrates does not exist>, which could only be true of things if it did not exist. One could imagine us positing this property of Plato when we said “Plato would not have become a philosopher were he in a world where Socrates did not exist.” If something is such that it could have the property <is such that Socrates does not exist>, then there must a distinction between instantiating properties in a world and instantiating them at a world.

With properties, one can also give examples of possibilities we want to espouse which entail an instantiation in/at distinction, but which do not depend on the possible non-existence of anything. Consider this sentence: “had evolution gone differently, every human would be shorter than Obama.” Assuming Obama is essentially human-if-concrete, it is not possible for Obama to exist and every human be shorter than him (assuming there is at least one concrete human, which seems to be an assumption of the sentence). For any possible world, either Obama doesn’t exist, in which case the property <is shorter than Obama> also doesn’t exist, or Obama does exist,
in which case either Obama must lack the property <is shorter than Obama> since he is a concrete human, or every human must lack the property since nothing can be shorter than a non-concrete object; hence, it is not possible for the property <is shorter than Obama> to be had by every human. If it is possible for every human to be shorter than Obama, as our example sentence claims, then it must be possible for <is shorter than Obama> to be true of everything at a world without being true of everything in a world, and hence, we need to distinguish between instantiation in and instantiation at worlds.\(^\text{10}\)

One of the notable features of this example is that it does not depend on it being possible for Obama to fail to exist (unlike the <is such that Socrates does not exist> example). Obama could be a necessarily existent object and we would still have just as much reason to think that there needed to be a distinction between properties

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\(^{10}\)There are two potential objections to this argument which I want to address briefly, both of which are of the form “that is not the correct interpretation of the phrase ‘everything is shorter than Obama’.” According to one, the words “shorter than Obama” express a purely qualitative property, so what the phrase is actually saying is that everyone could have the property <is shorter than 6’1”>. According to the other, while the phrase does express a relation to Obama, it expresses a relation to him at the time and world of utterance, such as <is shorter than Obama in 2008 in \(\alpha\)>. Of course, if we are talking about properties which would exist in another possible world, this property would not exist since the words “Obama in 2008 in \(\alpha\) do not refer to an object in that world; at most they could an elliptical way of expressing what Obama would be like in 2008 in \(\alpha\), but “what Obama would be like in 2008 in \(\alpha\) with respect to his height is the property <is 6’1” tall>. Thus, I actually think there is only one alternative on the table here, the one saying that this is a purely qualitative claim about possible heights.

As for this interpretation, I think it is bad linguistics to interpret “had evolution gone differently, everyone would be shorter than Obama” as “had evolution gone differently, everyone would be shorter than 6’1”.” For one thing it would not be a good general principle to interpret expressions of relations to objects as expressing relations to the properties those objects have. Second, in this particular case, if “shorter than Obama” generally expressed the property <is shorter than 6’1”>, the sentence “when he was a child, Obama was shorter than Obama” would make sense, which it does not. One could respond by saying that in the last sentence, the first occurrence of “Obama” shifted the meaning of the second occurrence away from its typical meaning, and that is why the sentence does not make sense. However, consider the sentence “someone is shorter than Obama.” If one says that this use has the standard meaning of <is shorter than 6’1”>, then it should make sense to substitute Obama in for the someone without changing meaning, which it does not. Thus, in the phrase “someone is shorter than Obama,” the “shorter than Obama” expresses a relation to him rather than a property. But then by the same reasoning, since “every human is shorter than Obama” could similarly allow Obama to be one of the things picked out by the phrase “every human,” this particular phrase will also have to express a relation to Obama. Thus, I stand by my interpretation in terms of it expressing a relation to Obama and saying that it could be instantiated by things at worlds where Obama does not exist.
being had in or at worlds. This is significant because in the case of propositions which could not be true in any worlds, namely negative existential propositions, Timothy Williamson has defended that we should merely deny that any of these propositions are true, and instead we should accept that everything exists necessarily.\(^{[11]}\) While this may help in the case of negative existential propositions, it would not explain how we can affirm the possibility of every human being shorter than Obama. Thus, necessitism can only address one of the two arguments, while the in/at distinction can address both, which would seem to be a case for preferring the in/at distinction as the better solution, even in the propositional case.

Since we have good reason to think that there is an in/at distinction for properties as well as propositions, all that remains is to spell out the distinction precisely. Just as Speaks gave us truth conditions for propositions which were properties of worlds, I suggest that there are also instantiation conditions for properties which are relations had by world-object pairs. Here working with our toy example, the instantiation conditions for an object o in world W of <is shorter than Obama> is the following relation had by the ordered pair (W, o) (where it\(x\) picks out the first member of the ordered pair, and it\(y\) picks out the second): <is such that, were it\(x\) actual, it\(y\) would be shorter than Obama>. Likewise, <is such that Socrates does not exist> is had by an object o if and only if the the ordered pair (W, o) instantiates <is such that, were it\(x\) actual, it\(y\) would be such that Socrates does not exist. The property <is red> is true of Mars at time t if and only if the ordered pair (t, Mars) instantiates <is such that, when it\(x\) is present, it\(y\) is red>. Thus, just as there are truth conditions for propositions, there are instantiation conditions for properties, and these conditions can be used the analyze claims of properties being had at times and worlds in which 4ism says there are no properties. With this analysis, the above arguments dissolve. For the first argument, the 4ist only need acknowledge that (1d)

\(^{[11]}\)Williamson (2002)
is true using instantiation at times, but (2d) will only follow from (1d) if (1d) uses instantiation in times. For the second argument, (3n) is only plausible if read in terms of instantiation at, but we only get the existence of properties in (5n) if we read it in terms of instantiation in.

3.1.3 The General Formula

I have offered truth conditions and instantiation conditions for a few particular examples, but if this solution is to be accepted, it needs to be shown that every proposition has truth conditions and that every property has instantiation conditions. One way to show this is to give a general formula or algorithm for formulating these conditions for arbitrary properties and propositions. Before trying to give such a formula, I want to note that I can’t rightly claim to have given the instantiation conditions for the above properties. Here are some plausible alternatives for the instantiation conditions of (W, o) having \(<\text{is shorter than Obama}\>): \(<\text{is such that were it}_x\text{ actual, it}_y\text{ would not be as tall as Obama}\>\), \(<\text{is such that were it}_x\text{ actual, it}_y\text{’s height in inches would be smaller than Obama’s height in inches}\>\), \(<\text{is such that were it}_x\text{ actual, it}_y\text{ would be able to stand up fully in places where Obama would not be able to}\>\). Likewise, here are some plausible alternative instantiation conditions for (t, Mars) having \(<\text{is red}\>): \(<\text{is such that when it}_x\text{ is present, it}_y\text{ is such that it would appear red to humans}\>\), \(<\text{is such that when it}_x\text{ is present, it}_y\text{ reflects light in the red spectrum}\>\), \(<\text{is such that when it}_x\text{ is present, it}_y\text{ está rojo}\>\). Of course, it is also the case that propositions have many different truth conditions.\(^{13}\) There is a

\(^{12}\)The “plausible” here is because these are in fact only alternative instantiation conditions if they predicates used in fact express the same property. It would take some work in semantics to defend that they do, but for now I can simply say that it is plausible that they all express the same property.

\(^{13}\)Using our example earlier, truth conditions for \(\langle\text{Socrates does not exist}\rangle\) at a world W plausibly include \(<\text{is such that were it actual, no one would be Socrates}\>\), \(<\text{is such that were it actual, Socrates would not be self-identical}\>\), \(<\text{is such that were it actual, the number of people identical to Socrates would be 0}\>\), \(<\text{is such that were it actual, Sócrates no existería}\>\).
noteworthy feature of the different instantiation conditions and truth conditions that illuminates the nature of these conditions. Namely, every predicate which expresses the same property can be used to express instantiation conditions for that property; likewise, every sentence which expresses the same proposition can be used to express the truth conditions of that proposition. Specifically we have the following two rules holding:

(TC) For any sentence $S$ and proposition $P$, if $S$ expresses $P$ ($P = \langle S \rangle$), then a truth condition for $P$ at a world $W$ (time $t$) is $<\text{is such that were it actual (present)}, S >$.

(IC) For any predicate $p$ and property $P(x)$, if $p$ expresses $P(x)$ ($P(x) = <\text{is } p>$), then an instantiation condition for $P(x)$ at $(W, o) ((t, o))$ is $<\text{is such that were it } x \text{ actual (present), it } y \text{ would be } p>$

Any sentence can give us truth conditions for the proposition expressed by that sentence, and any predicate can give us instantiation conditions for the property expressed by that predicate. This gives us a systematic way to provide truth conditions and instantiation conditions for any any proposition and predicate we can express. Since a proposition is true at a world if and only if that world instantiates its truth conditions, we can (by definition) evaluate any proposition we express for truth at other worlds (and likewise for properties). One can then give a standard analysis of modal and temporal truths in terms of worlds and times instantiating those truth conditions— a proposition $P$ is possibly (necessarily) true if and only if some (all) possible world(s) instantiates the truth conditions for $P$ (and mutatis mutandis for temporal claims).

Likewise, one can give analysis of modal and temporal property

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14I am open to things other than sentences expressing propositions; hence, I am not claiming that the only truth conditions for $P$ are given in terms of $S$. I am merely claiming that any sentence which expresses $P$ can also be used to express the truth conditions for $P$. It is difficult to formulate general rules for other means of expressing propositions; however, it is in the spirit of the position I espouse here to assume that anything which can express a proposition can also be used to express the truth conditions for that proposition.

15Important for this analysis is that all truth conditions for a proposition are necessarily coex-
claims in terms of worlds and times instantiating instantiation conditions for those objects—P(x) is possibly (necessarily) true of o iff for some (all) possible world(s) W, (W, o) instantiates some instantiation conditions for P(x) (and mutatis mutandis for temporal property claims).

Still, one might worry that I have not offered truth conditions or instantiation conditions for propositions and properties we cannot currently express. I respond that, first, there is no reason to think that these conditions depend on predicates for their existence any more than the property <is red> depends on the predicate “red” for its existence. All that (TC) is providing is a way to systematically pick out truth condition properties for a for propositions which we can also pick out. This does not entail that there are not truth conditions for propositions which we cannot pick out, nor that there are not instantiation conditions for properties we cannot pick out (and presumably these conditions would be consistent with the modal analysis given above, otherwise they would not be truth conditions or instantiation conditions). Second, if there are truth conditions or instantiation conditions which depend on contingent or temporal things, such as <being such that, were it actual, Socrates would not exist> depending on Socrates, they will depend on the same things as the propositions and properties for which they are truth conditions and instantiation conditions. If <being such that, were it actual, Socrates would not exist> failed to exist because Socrates failed to exist, then the proposition ⟨Socrates does not exist⟩ would also fail to exist and so would not need truth conditions.

I want to briefly sum up what I take to be my argument thus far in response to the main objection to 4ism. First, we should distinguish between abstract objects being true or instantiated in a world and abstract objects being true or instantiated

tensive. This follows analytically from (TC). Consider two truth conditions <is such that were it actual, S_1> which is a truth condition for P_1 and <is such that were it actual S_2> which is a truth condition for P_2. If there were some world W that instantiated one truth condition but not the other, then P_1 and P_2 are possibly non-coextensive, from which it follows that P_1 ≠ P_2. Thus, if two truth conditions are not necessarily coextensive, they are truth conditions of different propositions.
at a world. We can define this distinction in terms of properties had by worlds and times which are had if and only if something is true at or instantiated at that world or time. Accepting this distinction for properties and propositions seems to be a natural extension of the same distinction for things like sentences and books. Furthermore, it is the only way to make sense of several claims we want to accept (such as claims of contingent existence and claims of comparison between present objects and ways the world could be). But, if we accept an in/at distinction, then there is no good argument from ordinary claims about other times and worlds to the existence of properties and propositions in those times and worlds. Arguments of this kind either equivocate between truth in and truth at, or rest on an assumption that abstract objects exist necessarily, or rest on a false assumption such as that a proposition true at W must be such that were W actual, that proposition would exist. However they fail, ordinary claims have not proven inconsistent with 4ism. I thus take the primary argument against 4ism to fail, which should leave us more open to views according to which abstract objects are contingent or temporary.

3.2 How Should We Think About Possible Worlds?

I have offered an analysis of truth at and instantiation at in terms of the properties that abstract worlds and times have, but I have not yet offered a theory of what exactly possible worlds and times are, nor have I offered an account of in virtue of what these worlds have properties like <being such that, were it actual, Socrates would not exist>. I do not think that providing such a theory is essential to showing why the central argument against 4ism fails; there are many theories which could endorse an in/at distinction, and any such theory will be sufficient to defend 4ism. Nonetheless I want to offer one such theory here. My reason for offering such a theory is not to say that the 4ist should necessarily endorse this theory—the total evaluation of the different costs and benefits of theories of possible worlds is beyond
the scope of this chapter. Instead, my reason for offering this theory is that views which analyze modal truth in terms of truth at worlds have typically been thought to face serious objections when it comes to modal logic and iterated modal operators, and I want to show that there is a view which does not face those objections. Briefly one objection I would like to address uses iterated operators to raise a problem such as “if there were no possible worlds 5 billion years ago, then it was not possible for worlds to come into existence, so 4ism is in fact impossible.” A second objection I want to address claims modal logic is affected by views of this kind saying “at other possible worlds, different possible worlds would exist and possible worlds which actually exist would not exist, so possibility is neither symmetric nor transitive.” Hopefully addressing these objections will further show why I do not think the 4ist faces the serious problems people think she faces.

The theory I want to propose as avoiding these and other objections is the following:

A *world* is a set of propositions which for each proposition either contains that proposition or its denial.

A *possible world* is a world which is such that it could be the case that every proposition in the set is true.

Given this analysis, we can then further give the following necessary and sufficient condition for truth at worlds:

A proposition P is true at a world W if and only if P∈W.

This is obviously modally non-reductive—a world is possible if and only if all the propositions in it *could* be true. However, no one other than David Lewis has seriously thought that possible worlds could be used to eliminate modality from our ideology, and if one is not eliminating modality, then at most one can use possible worlds to shift where the primitive modality is, which I take to be minimally helpful. Instead of trying to shift modality to worlds, the possible worlds in the theory I’m proposing
merely provide a non-reductive analysis of modal statements. Non-reductive analysis can be incredibly helpful in our understanding the world and seems to be the only way we can understand fundamental parts of the world. Consider claims like that an object is simple if and only if it has no proper parts, that a predicate is perfectly natural if and only if the world could not be fully described without using that predicate, and that a set is infinite if and only if it can be put in 1-1 correspondence with a proper subset of itself. I think these are all accurate characterizations of important concepts, but in none of these examples does the analysandum hold in virtue of the analysans (if anything it is the other way around). A set is infinite in virtue of the elements in the set, specifically in virtue of how many elements there are in the set. A predicate’s being perfectly natural is a primitive fact that does not hold in virtue of anything. An object being simple is about its intrinsic nature and is not dependent on other non-existent proper parts. Nonetheless, these explanations are often given and considered to be helpful. On the view proposed above, possible worlds play this same non-reductive, explanatory role.

Even if one accepts that worlds can be useful without being modally reductive, one might still raise particular objections to this theory of worlds. For instance, it might be thought that these worlds are “incomplete” in some important sense that will prevent them from truly being an analysis of modality. After all, if existentialism is right, propositions depend on individuals, so since there could be different individuals, there could be different propositions (and hence different worlds), which seems absurd. I don’t think this view faces any serious absurdities, but lest one think that I am defending the claim that these possible worlds are sufficiently “complete” to avoid this objection, I want to show that even a far more sparse view of worlds can avoid this objection. Considering these worlds will be more illustrative of what I take the incompleteness objection to be and why I don’t think it is a problem. Thus, suppose for the sake of argument that there are no propositions and that one is endorsing a
similar modal analysis to the one above but in terms of sentences:

A \textit{world*} is a set of sentences which for each sentence either contains that sentence or its denial.

A \textit{possible world*} is a world* which is such that it could be the case that every sentence in that set is true.

We can again further provide the bi-conditional:

A sentence S is true at a world* W if and only if S \in W.

If the propositional view faces problems in virtue of its incompleteness, then surely this view will since it will posit strictly fewer worlds than the propositional view (that is, there are are fewer worlds* than worlds). However, if one grants that there are not propositions beyond what we have sentences for, then I think this view faces no serious objections (and in fact solves the original objections I set out to solve).

Let’s start with a toy language and see how this view assigns modal status. Suppose our language contains only one sentence, “there is a golden mountain.” Since there is only one sentence, there will be two worlds*, one which affirms and one which denies this sentence (in general, if a language contains n sentences, then the number of worlds will be $2^n$). Both of these worlds* could have all their sentences true, so both are possible worlds* (from which it will follow that “there is a golden mountain” is true at some but not all possible worlds*, making it possible but contingent). If our example language gains a second sentence, “there is no gold,” there will then be four worlds*. Three of these worlds* will be possible worlds* while one will be impossible, and both sentences will have the modal status of possible and contingent.

We can then add a third sentence “1+2=3.” This will give us eight worlds*, and our third sentence will be true at exactly half of those worlds*, but it will be true at all three possible worlds*, giving it the modal status “necessary.” It shouldn’t be hard to see that this method will assign the correct modal status to ordinary sentences, but what about modal sentences?
Suppose our toy language adds a fourth sentence, “possibly there is a golden mountain.” This entails there are sixteen worlds*; which ones are possible depends on the nature of modality. For any given world* W, either W contains “possibly there is a golden mountain” or its negation, and containing one or the other does not happen in virtue of anything. If W contains “possibly there is a golden mountain,” that is simply for combinatorial reasons, not because there is (or would be) some other possible world* at which there is a golden mountain. The nature of modality and how claims relate to other worlds* will only come into play in counting certain worlds* as possible worlds*; e.g., if all the worlds* that counted as possible worlds* contained both “there is a golden mountain” and “it is not possibly the case that there is a golden mountain,” then it follows that possibility is irreflexive. If S5 is correct, then it will actually turn out that three of the sixteen worlds* are possible, the ones which are the union of the previous possible worlds* and the sentence “possibly there is a golden mountain.” Rules of modal logic can be seen as stating what kinds of combinations are possible. If one endorses “◇S→◇◇S”, then one is saying that if S is true at one possible world* (contained in one possible world* set), then ◇S is true at every possible world* (contained in every possible world* set). Thus one can endorse whichever modal logic one likes; the formal mechanism of possible worlds* is consistent with any of them.

So, given these formal advantages, why not accept this view of worlds? Lewis offers a classic objection; he says that the language used to define these worlds* “must have limited descriptive resources; and then it cannot distinguish all the possibilities it should.”

Every day we gain new sentences which can represent possibilities we could not represent before (such as representing possibilities for people which did not exist before). Our language is also likely not maximal with respect to representing perfectly natural properties. Given that, there will be huge amounts of modal space

16(Lewis 1986 157)
for which there will be no possible worlds*. Consider philosophers at a possible world* very much like ours but which lacked Obama. If that world* were actual, it would not be possible for Obama to be President, or to be something other than President, or to even be, since all sentences about Obama would not exist were that world actual (and hence the worlds* representing these possibilities would also not exist). If worlds* would fail to represent possibilities were that world* actual, why should we think they are any different here?

The philosophers at this world* lacking Obama, call it W’, are incredibly helpful for thinking through what exactly are and are not the shortcomings of this view of possible worlds. In particular, I claim the following sentences are all within the set W’: “Obama does not exist”; “the sentence ‘Obama exists’ does not exist”; “sets containing the sentence ‘Obama exists’ do not exist”; “philosophers do not list ‘Obama exists’ as one of the things that is possible”; “possibly Obama exists”. Nothing is inconsistent about this set because “possibly Obama exists” being true at a world* does not require the sentence to be such that it would exist if that world* were actual. To evaluate “possibly Obama exists” in terms of what possible worlds* would exist if W’ were actual is precisely to evaluate it in terms of truth in a world*, rather than truth at a world*, but why, if we evaluate standard modal claims in terms of truth at worlds*, should we evaluate modal claims about modal sentences in terms of truth in worlds*?

Given this, it is true at W’ that it is possible for Obama to exist, but it is also true that were that world* actual, they would not represent the possibility of Obama existing, and, crucially, there would be no possibility that they were failing to represent. Since there would be no propositions or possible worlds representing the possibility of Obama existing, there simply is no way to object that there would be some possibility that philosophers in W’ failed to represent. Frustratingly, if W’ were actual, it would be possible for Obama to exist, but there would be no possibility
(in the quantificational sense) of Obama existing. Obama’s possible existence is only true at W’ world because we can represent it, but there would be no world* representing this possibility if W’ were actual. If we are in a similar situation, then our worlds* in fact represent every possibility there is. We can recognize that in some undefined sense, there could be more possibilities than there are in that some world sets contain the sentence “there are possibly true sentences distinct from any actual sentence”, but those sentences do not exist and so do not represent a problem for our modal analysis (e.g., there is no sentence which is possibly possible but which is not possible).

If there are propositions that are not represented by any sentences, then we can object that this view does not represent all of the possibilities there are, namely the ones involving propositions for which there is no sentence. Thus, if we think there are such propositions, we should return to the propositional version of the view. Since there are vastly more propositions than sentences, this should take some of the sting out of this undefined sense in which our worlds are incomplete, but it will still be the case (given existentialism) that there could have been more propositions and that these propositions could have been true. My point here is that there are no such propositions, so there is no counterexample to the current analysis. Returning to the original objections, it is true at \( t_{5\text{billion years ago}} \) that it is possible for abstract objects to come into existence, and this is the case not in virtue of the possible worlds that existed when that time was actual. It is also true that there could be other possible worlds, if different propositions existed, but we cannot analyze modality in terms of “them” since there are no such propositions. Something is possible if it is true at a possible world; the mere fact that there could be other possible worlds or no possible worlds should not affect our use of possible worlds in analyzing actual propositions.
3.3 Where This Leaves Us

On the one hand, this chapter may seem quite underwhelming—all I have attempted to do is show that an intuitive distinction between truth in worlds and truth at worlds can be defended to allow for the coherent denial of the existence of various things, particularly of abstract objects. But in another sense it is quite substantial—in clearing up that various ridiculous things are not implied by a position like 4ism, the door is open to much more creativity in ontology. If denying that abstracta are necessary and eternal does not require us to give up Moorean beliefs about the past, classic modal logic, or the roles typically played by abstract objects in a relational ontology, then it seems we don’t have compelling reasons to endorse that they are necessary or eternal. At minimum, if one wants to endorse that abstracta are necessary and eternal, then one needs to provide an argument for that claim and not just assume that this is entailed by the fact that we can make true claims about other times and worlds.
4.1 Causal Theories of Properties

Thus far I believe I have shown that there is a reference problem for platonism, that there are problems for attempts to solve it through sparsity, and that it is not obviously absurd to think of abstract objects as temporal or contingent. What remains is to discuss causal solutions to the reference problem. One way to go about this would be to try to exhaust all of logical space to find exactly what causal views were possible solutions and then to try to evaluate the views in every respect, but I am skeptical of the merits of this approach. It seems far more reasonable for me to offer my preferred solution at this point, and if someone else wants to defend another position in logical space, I can leave it to them to develop their solution and evaluate it in comparison to mine. I thus propose to spend this chapter developing my preferred ontology of abstract objects, which will include showing how it provides a causal solution to the reference problem. It nonetheless behooves me at the outset to try to give a partial mapping of possible causal solutions and to say something about why I am not drawn in the various other directions one could be drawn. While I will not attempt to offer fully developed, knockdown arguments, I want to at least offer some initial considerations for why views of the type I defend are preferable to other possible causal views of abstract objects. Specifically, I think there are reasons to prefer an ontology of abstract objects which is not fully abundant and in which abstract objects can be caused but do not cause things in the world.
While I do not believe there is yet a fully adequate causal theory of reference, I will assume that the best theories explain the fact that a word $W$ refers to an object $O$ in terms of $O$ partially causing various tokening events of that word. For instance, one can explain the fact that “Socrates” refers to the person Socrates by the fact that he caused various perceptual experiences in his parents which in turn caused them to utter the name “Socrates.” Given this kind of account, our word “red” will refer to $\langle \text{is red} \rangle$ if and only if $\langle \text{is red} \rangle$ is partially causally responsible for various tokenings of “red” and related words such as “reddish” (though certainly there is much more to be spelled out here).

In light of this I do not see a good way to solve the reference problem while accepting an abundant ontology. Presumably, an adequate causal solution to the reference problem will give some sort of general principle regarding the circumstances in which we stand in causal relation to abstract objects, such as “when I see an object I perceive all the properties it has.” Combining any principle like this with Abundance will have absurd consequences. For instance, with the above principle, if the cup is red, then I will not only perceive $\langle \text{is red} \rangle$ but also $\langle \text{is red and such that } 2+2=4 \rangle$, $\langle \text{is red and round or red and not round} \rangle$, and infinitely many others. Even if this perceptual experience is partially causally responsible for my uttering “red”, there is no reason to think that $\langle \text{is red} \rangle$ is more causally responsible for this than any of the other properties. If one could give an account of why $\langle \text{is red} \rangle$ was the most causally salient property, such as its having the most oomph, then one could give a causal solution along these lines, but it is not at all clear how such an account would go. One might suggest that $\langle \text{is red} \rangle$ was the most “reference magnetic” in virtue of its relative naturalness, but beyond giving a name in scare quotes I do not know how to spell out such a view. This view would have to posit real causal powers to abstract objects in proportion to their naturalness. Perhaps there is a force that works like gravity, so that just as larger objects exert more gravitational force, more natural
abstracta exert more causal oomph (and hence have more propensity to be referred to). One could certainly speculate a long time about ways to fill this out, I guess I just find the project confusing and unmotivated. However, if one does not posit this special causal power, then it seems the only other ways to give "is red" special status is to make it the only property that caused my tokening of “red”—denying Abundance.

I also think there are good reasons to deny that abstract objects are causally active in the world. The main reason is simply that, since we can already give causal explanations for most things, any causal contributions made by abstract objects would be over-determining things which already had causes. If I see a red cup, there is a causal explanation of my perception in terms of the light reflected off the cup, my eye, and my brain; what is there left to be caused by the property "is red"?

One answer that could be given is that there is some other type of causation, such as formal causation, which was not taken care of by the light reflecting off the cup; I do not have a notion of formal causation, so this answer doesn’t hold much appeal for me. A different answer would be to find unexplained parts of my experience and attribute "is red" as the cause of them. The thing I have in mind here would be to say that while the light caused my brain state, the property caused my mental experience of redness. While I appreciate that this at least opens up something for "is red" to do in the causal order, it is incredibly difficult to give an account of how and why properties cause the mental experiences we have on just the occasions that physical causes cause our brains to have the corresponding experience. At minimum this seems to require dualism, but it also seems to require some sort of explanation of correspondence that does not lend itself to easy explanations. This mystery may not bother everyone, but it is, at minimum, something quite serious to be explained.

In addition to the over-determination problem, views in which humans are causal agents and properties are merely causal patients are uniquely well-situated to allow
for an appropriate level of sparseness. Among other things, I claimed in the second chapter that sparse solutions face a dilemma between being so sparse as to be impoverished or so abundant as to not allow for reference. If a causal view is going to help us escape this dilemma it is going to be by allowing me to stand in causal relations to very many properties (thereby not being impoverished) but doing so in a way that allows me to distinguish the various properties. A view in which I causally act on the properties will allow me to control when I interact with them, and thereby allow for unique causal relations. Thus, I think there is good reason to look for a sparse causal theory of abstract objects in which causal relations exist when and only when a conscious will is involved. While none of this amounts to conclusive argument, I hope I have somewhat motivated my attempt to develop such a view in the remainder of the chapter.

4.2 Artifactualism

Dan Korman defines creationism as “the thesis there are abstract artifacts, that is, objects that have no spatial location and that are deliberately brought into existence as a result of creative acts.” One can be creationist about any particular kind of abstract objects, with the famous examples being works of art (Levinson (1980)), fictional characters (Thomasson (1999)), social institutions (Searle (2007)), concepts and thoughts (Sainsbury and Tye (2012)), and software (Irmak (2012)). We can think of each of these positions as particular creationist theses and distinguish them from universal creationism—the view that all abstract objects are artifacts. I believe universal creationism is both the best solution to the reference problem and a highly plausible view within ontology.

Since one could develop a universal creationist view in various ways, I will (for
lack of a better term) refer to my preferred ontology as artifactualism. My theory of the existence and nature of these abstract artifacts will draw substantially from the theory of concepts put forth in by Sainsbury and Tye in *Seven Puzzles of Thought*. Artifactualism starts from two theses, each of which I take to be highly plausible. First, all abstract objects are representational—there is a way the world or some part of the world must be in order to be as the abstractum represents. When the world is as a proposition represents, we call that proposition “true,” and when an object is as a property represents, we call that property “instantiated.” This representational nature is the essential nature of abstract objects. Second, all mental activities have representational content. While this is slightly more controversial than the first thesis, since it rules out the existence of bare qualia and things of that sort, I still find it overwhelmingly plausible. Perceiving, believing, hoping, fearing, desiring, and the like all have as their object something which represents the world as being as certain way. If I imagine an octopus playing the drums, then there is a content to my imagining; you could have a dream with that same content. Content need not be believed or accepted; in order for something to be content, it merely needs to be the case that the world can be or fail to be as it represents. From these two theses, it only makes sense to conclude that abstract objects are the contents of our mental activities.

Many mental activities appear to create content. The act of writing a song, coining a word, or designing a hideous monster for your movie all seem to be acts of mental creation. The artifactualist takes this appearance at face value and says that we do in fact create abstract objects. The creator of an abstract object is able to refer to it since they stand in causal relation to it. Of course, most of my mental activities will have as their content not my own creations but rather abstract objects that were created very long ago and which I am merely able to refer to by reference transfer (e.g., the color <is yellow> was created long before I was around, but I am able to
refer to it through intending to refer to the object my parents expressed with the word “yellow”; they of course referred in a similar way, and this chain traces back to the original creators of the property). On the rare occasion that I represent something that is truly new, then and only then do I create a new abstract object. My ability to create abstract objects is thus identical to my ability to form new representational content about the world.

A story that is sometimes used to illustrate views of this kind is Richard Dawkins’ creation of the term “meme.” Given an artifactualist interpretation, what happened was that Dawkins, through an act of will, created a mental representation that was partially constituted by the property <is a meme>, a property that was brought into existence by this very act of representing. Upon its coming into existence, it was the case that many things instantiated <is a meme>, since many things were as the property represented. Dawkins found the property sufficiently useful in thinking about certain phenomena in the world that he gave it a name, “meme.” Upon telling others this name, they came to be able to refer to the property and to use the property to pick out things which are memes. Thus, people in Dawkins linguistic community grew to be able to speak about and use the property <is a meme>.

Nothing in artifactualism says that one must share abstract objects with one’s linguistic community. I could easily dream up a fictional creature which I never name and never discuss with anyone, and thus no one other than me would be able to have thoughts about this creature; still, my thought about it has representational content (i.e. there is visually a way the world would have to be for this creature to be in it) so my thought has an abstract object as its content.

While not entailed by the view, I think there are very good reasons for an arti-

\[\text{\textsuperscript{2}}\text{I am borrowing this example from Korman (2014).}\]

\[\text{\textsuperscript{3}}\text{This account closely resembles Sainsbury and Tye’s account of a conceptual community (see especially p. 43).}\]
factualist to say that an abstract object can change its meaning over time (as I will argue for below in section 4.4.2). Sainsbury and Tye give the example of how “meat” was at one point used for anything edible, and has subsequently shifted to only referring to edible flesh. An artifactualist should interpret this as a case where human language use caused an abstract object to change its representational content. This view is only possible if one thinks that abstract objects do not have their representational content essentially, but there is no reason an artifactualist would need to think that they do. Given this, I claim that by allowing us to refer to the property <is a meme>, Dawkins gave up unique control over what it represents. It is now the case that the linguistic community determines what is a meme, and this may well change the property away from its original meaning. For instance, it may become the case that only pictures with a clever phrase on them count as memes (while commercial jingles, for instance, do not). My point here is merely that the creator of an abstract object has no special claim to it; it exists for everyone to use and refer to.

If an artifactualist does not identify abstract artifacts by their representational content, then they must be identified in some other way. Here I suggest that the artifactualist follow the thesis of originalism proposed by Sainsbury and Tye for concepts, which says that concepts are identified by their origins. Adapting it to the present theory one gets,

\[ \text{Originalism} \text{ ~For any abstract objects } x_1 \text{ and } x_2, x_1 = x_2 \text{ iff necessarily, for any time range } t, \text{ the } y(s) \text{ brought about the existence of } x_1 \text{ in } t \text{ iff the } y(s) \text{ brought about the existence of } x_2 \text{ in } t. \]

Originalism provides the artifactualist with a way to say when abstract objects are the same or distinct (at least so long as we are comparing within the actual world). It further allows her to escape many classic puzzles of thought and belief, as Sains-

\[ ^4 \text{[Sainsbury and Tye, 2012, 46]} \]
bury and Tye argue. For instance, since the names “Hesperus” and “Phosphorus” were created at different times by different mental activities, it follows that they are distinct abstracta (as long as nominals are abstract objects, which I believe they are). It follows from this that the proposition \( \langle \text{Hesperus is Hesperus} \rangle \) is not the same proposition as \( \langle \text{Hesperus is Phosphorus} \rangle \) (and therefore one can be believed without the other being believed). In solving this puzzle, originalism does not fall into the problems of descriptivism, since the referent of a nominal still traces causally back to the original baptism (affirming Millianism). While I think the ability to solve various puzzles is a reason to like originalism, I ultimately think the artifactualist should accept it because it simply follows from the nature of abstract objects as created artifacts—artifacts are identified by their origins. Deriving originalism from a more general metaphysical thesis seems to make it a less \textit{ad hoc} solution to these various puzzles, which seems to count in favor of artifactualism.

4.2.1 Property Identity

Given that there is a property \(<\text{is blue}>\), could that property have been different than it is? Does the same \(<\text{is blue}>\) property come into existence in every world that creates properties for blue things, or only in some? How do we identify properties across possible worlds? These are incredibly interesting questions to which I unfortunately do not have particularly interesting answers. The same property\(<\text{is blue}>\) does not exist in every world where there is a blueness property, but luckily I have already argued that modal statements should be analyzed in terms of properties in the actual world, so this does not affect modal truths. After that I cannot say much more than others can say about identity of objects across worlds.

For instance, I feel confident saying that this table, the table I am currently looking at, could have been against the opposite wall and could be moved there in the future. Likewise, the property \(<\text{is blue}>\) could have meant something slightly different and
could be brought to mean something different in the future (through human linguistic use). The table could have been made slightly sooner or later than it was made, or could have been made in a different way (such as the parts being assembled in a different order). Likewise, the property \(<\text{is blue}\>) could have been made earlier or later than it was in fact made, and could have been made by a different person. I am not sure that this table could have been made of different parts and I am not sure \(<\text{is blue}\>) could have been made by different intentions. When I want to discuss how this table would have been in other worlds (or any object for that matter) I do so by stipulation—“suppose this table had been against the opposite wall...”—and similar things can be done with properties—“suppose \(<\text{is blue}\>) had been created by aliens and then taught to humans...”. None of these answer the difficult questions regarding identity across possible worlds; it is merely my contention that artifactualism is not in any worse position than any theory which allows for trans-world identity.

4.3 Why Universal Creation?

Many people have defended that certain abstract objects are created (works of art, fictional creatures, computer programs, etc.), but to my knowledge no one has said that all abstract objects are created. Sainsbury and Tye, for instance, say that concepts are created abstract objects, but that many of these created concepts express classic platonistic properties. For instance, if we adopt their convention of using all caps to refer to concepts (in their sense of the term), we can say that “is wet” expresses ISWET which refers to \(<\text{is wet}\>) , and likewise “two” expresses TWO

\footnote{In the creationist ontologies mentioned earlier, for instance, consider that Levinson (1980) distinguishes pure sound/instrument structures from structures “as-indicated-by-X-at-t” (see p. 20), Searle (2007) distinguishes institutional facts which depend on people from brute facts which do not but which still seem to include facts about abstract objects, and Irmak (2012) distinguishes software from algorithms which are “platonistic mathematical entities.”}
which refers to 2\textsuperscript{6}. If I am right in saying that no creationist has endorsed universal creationism, it would be reasonable to suspect that there are substantial costs to universal creationism that have steered people away. I personally suspect it is more due to lack of full consideration of the view, but I do think there are some substantial knee-jerk arguments that are worth addressing. I attempted to address the modal and temporal arguments in the last chapter where I argued that we can still make sense of our speaking about things at times and at worlds in which the properties and propositions would not exist. I here want to address two more arguments that seem like obvious objections to artifactualism (or any universal creationist view).

4.3.1 Different Languages

First, a standard argument for propositions is that we often say that two sentences in different languages expressed the same thing—if that is true, then we need a proposition to be “the thing” they both expressed. Properties likewise can play this role of validating sameness-claims when we say that “is red” and “ist rot” express the same thing. Given artifactualism, it seems like properties and propositions cannot play the role of being the thing expressed in two different languages.

This is not guaranteed by a mere creation hypothesis, as noted by the fact that Sainsbury and Tye’s position still allows for a proposition to be expressed in multiple languages (even though the proposition is not the primary abstract object expressed by those sentences, it it still expressed in some secondary sense). It is open to a universal creationist to follow this multi-tier approach. If we suppose “airplane” and “Flugzeug” have different etymological histories, and we assume that “airplane” was the first term coined for airplanes, a creationist could say that the creation of the term “airplane” created two properties: <is an airplane> and <is an airplane>\textsubscript{2}. The Germans could then coin the term “Flugzeug” creating the property <ist ein

\textsuperscript{6}(Sainsbury and Tye 2012, 40 & 63)
Flugzeug> which would also express the underlying property <is an airplane>₂. While obviously more details could be worked out for this view, I do not believe it is one that an artifactualist should endorse. It seems oddly ad hoc for the first property of a kind to create the underlying property which all later properties of that kind express. Worse than that though is that this would seem to give up the artifactualist’ solution to the reference problem. How, one can ask, does <ist ein Flugzeug> manage to express <is an airplane>₂? Given that we are supposing them to be etymologically independent, it could not happen through reference transfer, and the creation of <ist ein Flugzeug> has nothing to do with the creation of <is an airplane>₂, so it does not seem to happen causally. While not quite as bad as the original reference problem, it seems to be a serious cost of the view that it requires this magical relation to obtain between most created properties and some property previously created in a completely different part of the world.

I thus think the artifactualist should concede, there are no abstract object which play the role of being expressed by distinct isolated languages. The question is

7I included here that the languages are totally isolated from each other because I want to make sure that each language is still referring to the original abstract object created in that language, which is not guaranteed by the mere fact that distinct objects were created. There are at least two ways in which a term in one language can shift to expressing an abstract object created in a different language, even if the the term was not originally intended to refer to this object. First, many languages appropriate words or concepts from other languages, in which case different sounding words may express one and the same underlying thing. For instance, the English word “London” and the French word “Londres” refer to the same city. The typical way this occurs is with the intention to refer to or express whatever the previous person did; if I tell you the name of my daughter is Sophia, your tokening of the word “Sophia” is the result of a causal chain that leads back to Sophia herself. However, one can imagine a scenario in which a French person comes to London and baptizes it “Londres.” Initially her word “Londres” will express the name she created and refer to the city, and she will not be deferential if someone tells her “no, this isn’t actually Londres but is Sutton.” She may, however, eventually come to intend her term “Londres” to refer to whatever the locals refer to as “London,” at which point she would be deferential and open to correction on the use of the term. We can refer to this as a trumping situation and I mean to avoid it by positing that the languages are totally isolated. Second, one can imagine scenarios in which conversations resulted in the fusion of multiple abstract objects producing a new abstract object to which both parties refer. The scenario described in Sainsbury and Tye (2012) is that of a new comet being seen by people. Each person may form their own name for the comet, but it may be that conversations the next morning create a new common name. This situation is also excluded by the languages being totally isolated.
then, does this undermine some obviously true claim about the relations between various words and sentences in different languages? I claim it does not. The thought at the start of this section was that something had to play this role to validate sameness-claims regarding language, but I claim we can treat sameness-claims regarding language the same way we treat claims of sameness regarding two distinct but arbitrarily similar artifacts. If we take two distinct but fairly similar chairs, we can make all sorts of sameness-claims about them, for instance that they are both chairs, that they serve the same purposes, that they both instantiate <is a chair>, that they can be sat in by all the same people, and many more. Likewise, we can say of <is red> and <ist rot> that they are redness properties, that they serve the same purpose, that they both instantiate <is a redness property>, that they are instantiated by all the same objects, and much more. I take it that “the translation of ‘roses are red’ into German is ‘Rosen sind rot’” is a true sentence partially made true by the fact that <is red> and <ist rot> are had by the same objects and are expressed for the same purposes within the language. I take it that “both ‘is red’ and ‘ist rot’ express that something is red” is true in virtue of <is red> and <ist rot> both being redness properties. Occasionally this will require paraphrase, such as in analyzing “the same thing is expressed by ‘is red’ and ‘ist rot’”, which I take to be true in virtue of its true paraphrase “the properties expressed by ‘is red’ and ‘ist rot’ are of the same meaning kind, have the same extension, and are useful for similar purposes.” If one is unwilling to endorse the paraphrase, then so be it, but I do believe the artifactualist can affirm all our ordinary beliefs about the relations between words across languages.

For all that, it is still not the case that <is red> and <ist rot> are numerically one, nor will it be the case that “is red” and “ist rot” express the same property even if uttered by the same individual (unless of course there is sufficient conceptual and linguistic interaction so that one culture defers to the other and intends to express the
property expressed by the other). Nor will it be the case that the properties become
one at some higher level of generalization. The property <is a shade of red> is had
by both <is red> and <ist rot>, but so is <ist eine Rottöne>, and these are just as
distinct as <is red> and <ist rot>. Propositions which contain these properties will
likewise be distinct. My claim here is only that these distinct objects can be put to
almost exactly the same uses and for that reason are typically treated as identical
in some sense. The artifactualist denies the underlying identity, but she need not
thereby deny any of the ordinary claims about sameness of use.

One argument that this is an inadequate account is that truly bilingual people
(those who think and dream in both languages) could say that they know that they
are expressing the same thing when they say “roses are red” and “Rosen sind rot”,
and since knowledge implies truth, it cannot be that they are in fact expressing
distinct things. Here though it is fully open to the artifactualist to say (along with all
those who think content is partially externally determined) that we are not infallible
with respect to our own thoughts. Externalists have long maintained that we can
be wrong with respect to what concepts we exercise, and they have tried to show
this with various examples of someone switching environments without realizing. If
someone grows up on Earth and then is moved to Twin Earth where water is made
up of XYZ, then her thought that she would express as “I liked water sports as a kid
and I still like water sports” either (unbeknown to her) expresses two different things
with the two different occurrences of “water,” or expresses something false which she
is in no position to know is false, namely the claim that she enjoyed water (referring
to XYZ) sports as a kid. Either way, there will be something about the concept
that she does not recognize, so she cannot be said to be infallible with respect to
the content of her own thoughts. While the situation faced by the bilingual person
is different in that it does not involve any weird skeptical scenarios (like switching
planets without realizing it), the mere possibility of being imperfect with respect
to the content of our thoughts raises the question, should we really think that this person can mentally tell the difference between \(<\text{is red}\>) and \(<\text{ist rot}\>) expressing the same property and them expressing two different properties which are not only coextensive but also used in incredibly similar linguistic situations (as opposed to \(<\text{is red}\>\) and \(<\text{is red and self-identical}\>\), which would merely be coextensive)? It is true that the bilingual person may not care which word she uses to express a thought, but this is no different than not caring whether someone brings in the right chair or the left chair when bringing in an extra chair for one’s guest; either chair will serve the needed purpose, just as “\text{ist rot}” and “\text{is red}” can serve the needed purpose of picking out all the red objects, but this does not entail the chairs identical, nor does it entail the properties identical.

Beyond that argument, it is unclear to me why one should be dissatisfied with the artifactualist’ claim that different languages use distinct but similarly useful properties to represent the world? Some people seem to have a deep-seated intuition that the possibility of translation requires expression of the same abstract object, but I guess I just do not share this intuition. Other than that intuition, I fail to see how artifactualism fails to have the abstract objects needed to analyze the claim that “the same” things can be expressed in different languages.

4.3.2 Mathematical Claims

One might naturally think that artifactualism would entail constructivism with respect to mathematical objects. After all, in constructivist mathematics, proving that an object exists involves mental activities which literally bring the object into existence. Given that constructivist views are mathematically revisionary, I would consider it a serious cost for artifactualism if this entailment in fact held, but happily it does not. I do not want to (and do not need to) take a stand on whether a constructivist view in fact gives us the correct mathematical picture of the world; I
think it is a huge advantage of artifactualism that it does not need to be committed to
one mathematical system as privileged or as “the true” system. I would like to show,
however, that there is no reason to think one could not hold classic mathematical
views given artifactualism.

Constructivism is typically derived either from claims about abstract objects being
finite or from their being fully dependent on human mental activities. For instance,
one could argue that since nothing can be actually infinite, the natural numbers
cannot all exist, therefore they must be finite and extendible by human mental ac-
tivities. Alternatively, one could argue that because they depend on our thoughts,
there cannot be mathematical objects “out there” which we claim exist but which
have not been constructed by human thought. While one could certainly combine
constructivism with a creationist picture, nothing about being created entails that
abstract objects are either finite or mind-dependent. If an argument of this kind
is to succeed, it is going to have to proceed from the particular method of creation
posited by artifactualism. In particular, I said that our ability to create abstract
objects is identical to our ability to form new mental representations. At some point,
someone(s) saw four objects and represented them as being four in number, and this
is how &lt;are four&gt; was created. Given this creation story it follows that there have
only been finitely many creative acts in the past (assuming the past is finite and
there are no infinite minds); it then might seem to follow that there are only finitely
many abstract objects (and so finitely many numbers). What in fact follows from
there having been finitely many creative acts is that either there are finitely many
abstract objects or that at least one creative act created infinitely many abstract
objects. While there are certainly significant obstacles, I believe there is potential
for either view to be mathematically non-revisionary, and so the artifactualist need
not be mathematically revisionary.

If one wants to preserve classical math while only positing finitely many abstract
objects, the most promising route is to affirm structuralism. Structuralism in math is the view that mathematical statements are not ultimately about the objects it has classically been thought to be about (e.g. \(\frac{3}{10}, 2, \pi\)), but are instead about the structure those objects exemplify. A structure is a certain kind of complex relation (typically with infinite arity, meaning it could only be instantiated by infinitely many objects). Mathematical structures are defined by their axioms. Structuralists claim that the objects instantiating the relation are irrelevant; the claim “2+3=5” will be true of the Peano arithmetic structure whether the roles of “2” and “3” are played by numbers, properties, coffee cups, stars, or anything else—the relata are simply irrelevant to the truth of the mathematical claims. Given this, the truth of mathematical claims does not depend on there being infinitely many abstract objects, but merely on our being able to create a few infinite-place structures. While this is strange, if the Peano arithmetic structure is a relation, I don’t know why I couldn’t have a mental representation of that relation, even though I could not represent infinitely many things instantiating that relation. There is perhaps a problem here, but it would take quite a bit of psychology and philosophy of mind to prove there was a problem.

As I see it, the problem for this view is not in there being a mathematical structure which grounds the truth of various mathematical claims, but in using this structure to conclude anything about the world. The applied mathematics one would like to have for this view is that there are infinitely many number relations (e.g. <are three>, <are four hundred ninety seven>) which we express with various words (e.g. “three”, “four hundred ninety seven”) and that these relations instantiate the Peano arithmetic structure. Since our number relations instantiate this structure, we know that anything derived about this structure will be true with respect to our number relations. For instance, since the apples instantiate <are two> and the oranges instantiate <are three>, and these properties play the 2-role and 3-role respectively in the Peano arithmetic structure, we can derive that the combination of the apples and
oranges will instantiate <are five> (since <are five> plays the 5-role, combination plays the +-role, etc.). While this would be a nice clean picture of applied math, it is unfortunately unavailable to the artifactualist who believes there are only finitely many number relations. I thus think the artifactualist structuralist can make sense of pure mathematical statements, but owes us a story about how those statements can be used in applied math. She owes us a story as to why things proven about this structure can be known about the number relations we have created, and I’m just not sure how this story will go. The artifactualist is not entirely without things to say; perhaps she can say take an instrumentalist view and say that Peano arithmetic is “close enough” to be useful, or perhaps she can say that in other possible worlds where there are infinitely many objects these claims hold, so they hold in this world. None of these options seem particularly promising to me, so I will not pursue them more here, but it is worth noting that there are things the artifactualist can say to defend classical mathematics while being finitist.

On the other hand, the artifactualist could claim that while the number of creative acts in the past is finite, the number of created objects is not. One might think that in mentally representing the Peano arithmetic structure I mentally fill in the remaining numbers so that there are in fact infinitely many number relations which together instantiate the structure. Since we have a systematic way to refer to the parts of the Peano arithmetic structure (through a numeral system), simply gaining the ability to refer to this structure will give us the way to refer to any natural number we want (specifically, we can refer to the structure because we stand in causal relation to it, and then we can refer to any number by giving a definite description of a part of that structure, such as the definite description “564565168511564”). This could again run into objections that we cannot in fact make this mental representation, but again proving this would require quite a bit of psychology and philosophy of mind. Absent that objection, I do not think there is any reason an artifactualist needs to
be mathematically revisionary. Whether or not she wants to be mathematically revisionary will thus need to come from some reason other than artifactualism.

4.4 Other Benefits of Artifactualism

4.4.1 Knowledge of Abstract Objects

One of the biggest objections facing realists about abstract objects is that it seems to be incredibly mysterious how we have knowledge of these objects. There are many different ways to formalize the objection (particularly important are Benacerraf (1973) and Field (1989)), but it suffices for present purposes to leave it as the intuitive need to explain our ability to have generally true beliefs about something with which we have no causal contact. As best I can tell, the state of the debate is essentially that anti-platonists have not been able to conclusively show that platonists are in violation of an epistemic or explanatory principle that everyone should share, but the platonists have also not been able to provide a deeply satisfying account of this seemingly mysterious ability that we have.

Artifactualists, on the other hand, can offer a theory of our knowledge of abstract objects available to any competent language user. The natural numbers were created as a structure satisfying the Peano axioms, so anything that follows from the Peano axioms is true of them. We know the nature of the created object by its having been defined into existence, and the rest is just derivations. When new mathematical objects are “discovered” there does not need to be an investigation into whether or not there really are the objects described—the objects are created, and the only question is if they are useful for anything. This may seem like a bit of an underwhelming solution, but it seems to fit with actual mathematical practice (and our knowledge of other abstract objects can obviously be accomplished in similar ways). The fact

8In fact, there may well be other ways to fill in a picture of a single mental act creating infinitely many abstract objects other than the structuralist picture given here.
that artifactualism can solve both the reference problem and the knowledge problem counts very heavily towards the theoretical utility of artifactualism.

4.4.2 Words Changing Meaning

There is a problem for abstract ontologies that does not get discussed much, and that is the problem of words changing meanings. It is a common feature of language that words change meanings over time. Different examples can be given to prove this, such as “Madagascar” or “meat,” but I think it is much more common than those examples would make it seem, particularly for vague terms like “blue” or “tall.” Assuming that there are many shades of color for which it would be vague whether or not the term “blue” applies, it seems quite easy to think that linguistic communities shift from including those shades, to it being vague whether or not they include those shades, to not including those shades, and vice versa. I see no reason to think the exact range of definite and vague applications of the term “blue” is the same now as it was 50 years ago, and if it is not, then the word has changed meaning (even if ever so slightly and only at the borders). Given that words change meanings, there are two ways to model this at the abstract level. Let \( AO_1, \ldots, AO_n \) denote abstract objects of whatever category plays the role of being expressed in language and being the object of intentional states. For most views, \( AO_1, \ldots, AO_n \) will denote propositions, but I do not want to assume that here for reasons that will become obvious below. Suppose that a word \( W \) shifts meaning from time \( t_1 \) to time \( t_2 \) and that \( S \) is a sentence which uses \( W \). We thus have the following two ways to model a word changing meanings:

\[ \text{Shift} \] At \( t_1 \) \( S \) expresses \( AO_1 \) while at \( t_2 \) \( S \) expresses \( AO_2 \)

\[ \text{Change} \] \( S \) expresses \( AO_1 \). The way the world must be for it to be as \( AO_1 \) represents at \( t_1 \) is different than the way the world must be for it to be as \( AO_1 \) represents at \( t_2 \); \( AO_1 \) has changed its \textit{representational}
I claim, there are compelling reasons to prefer *Change* to *Shift*. I further claim that *Change* is much easier to maintain on an artifactualist picture than on a more traditional platonist picture.

First then, I think claiming that sentences and words shift which abstract object they express has absurd consequences for our ability to think and communicate. Take as an example the word “meter” which has been precisified over the past few hundred years. Suppose it is October 21, 1983 and that the term “meter” has just been changed ever so slightly. Suppose I am picking my parents up from the airport and my dad asks my mom how long it will take to get to my house. My mom then responds “David told me yesterday that his house is approximately eight kilometers from the airport;” what she said was false. While it is the case that my house is approximately 8 kilometers from the airport, and it is the case that yesterday I expressed a true proposition with the words “my house is approximately 8 kilometers from the airport,” still, my mom attributed to me a proposition I never expressed. Suppose later on in the day I tell my parents “I had the option to get a cheaper place, but I didn’t want to live within two kilometers of the airport because of noise;” what I said was false. While it is the case that when choosing a place to live, I would have asserted the sentence “I do not want to live within two kilometers of the airport,” the proposition I would now assert by saying “I did not want to live within two kilometers of the airport” is an entirely distinct proposition which I never considered before October 21, 1983.

These examples are strange. It is strange that a tiny change in the definition of a word would cause so much of what we believe and assert to be replaced with different objects. The term “meter” may seem like a strange example since its definition is officially stipulated, but it seems plausible to me that it is often the case that many vague terms will have minor changes in their exact meaning. Given how many of our
beliefs involve vague terms, this will mean that our beliefs are overhauled regularly. While it may not often be the case that words change meaning in a day, the same problems recur if a word changes meaning over the course of several years (except slightly less frequently). In particular, given *Shift*, it will be nearly impossible to represent what people in the distant past represented, which would seem to falsify the liberal arts claim that we are “wrapped up in questions that have been asked for centuries.” If one endorses *Change* rather than *Shift*, one can say that in these cases people were talking about the same thing, even though that thing has changed a bit (the same way we can both be talking about Obama even if he has gone from sitting to standing in the time we are talking). This seems to me to be a good reason to prefer *Change*.

*Change* implies some things about the objects which we think about and express. First, something must be able to causally influence them to explain the change. Second, they cannot have their representational character essentially. Third, it would seem to follow from the second point that they cannot be picked out by their representational character, since it would be utterly bizarre to pick out an unobservable entity by its accidental qualities. These three things are all inconsistent with platonist propositions (but are perfectly compatible with artifactualist propositions). Of course, the platonist need not insist that propositions are the objects of thought and the things expressed by our sentences (hence why I refrained from calling them propositions above). After all, Sainsbury and Tye posit “thoughts” to be the objects of our thought and the things expressed by our sentences, while still maintaining that there are platonist propositions expressed by these thoughts. A similar multi-tier approach is open to certain types of Fregeans who could say that the object we believe is a mode of presentation of an eternal proposition and that these modes of presentations of propositions undergo change. I think a reference problem will recur at the gap between the middle tier and the eternal propositions, but I will not pursue
that more here. Here I merely want to say that adding levels is a cost of a theory, and one benefit of artifactualism is that it avoids this cost.

4.4.3 Referring to New Abstracta

In the first chapter I focused on the problem of how persons could have ever gone from not referring to abstract objects to referring to them; however, there is also a problem of how we refer to all the various new abstracta to which we refer every year (such as <is a meme> or <is an iPhone app>). We can call the former the global reference problem and the latter the local reference problem. The significance of the local reference problem is that our need for causal interaction to explain reference to abstracta is not just one obscure occasion in the distant past, but is a common occurrence to this day. Thus, even if one thought that I overlooked an obscure way that one could establish reference to a few particular abstract objects, the local reference problem entails that we still have a general need for a causal theory of abstract objects.

I will present two examples in arguing that there is a local reference problem. The target view that these are meant to challenge is a view according to which we somehow established reference to abstract objects in the distant past, and now we can simply refer to new abstract objects by definite description. While being able to refer to some abstract objects is helpful in giving definite descriptions (such as “the successor of 1”), there are still many objects which we seem to not be able to pick out by definite description, even when those descriptions refer to other abstracta.

My first example is that of imaginary numbers. I claim that the best account of how we came to refer to and use imaginary numbers is that we created them to serve a certain purpose (roughly the purpose of having factors in equations which do not affect the measurable result until they are squared). The alternative account would be that we discovered these objects which were already there to discover, but
given that account, we will have to have a definite description of imaginary numbers using only numbers we had discovered prior (such as real numbers). At first glance this seems easy—“let $i$ and $-i$ refer to the only two things which when multiplied by themselves equal $-1$.” However, this description does not single out a unique object. For instance, a quaternion is a number which is written in terms of three different numbers $i$, $j$, and $k$ (so typically symbolized $a+bi+cj+dk$). While $i\neq j\neq k$, it is the case that $i^2=j^2=k^2=-1$ (and likewise for their inverses). Thus, each of $i$ and $-i$, $j$ and $-j$, and $k$ and $-k$ are equal candidates for the description “the only two things which when multiplied by themselves equal $-1$,” which means it is not a definite description.

If we cannot give a definite description of imaginary numbers, then non-causal views will not be able to solve the local reference problem. It is open to this kind of view to endorse structuralism, saying that referring to a particular one of $i$, $j$, and $k$ is not important, since the only mathematically important thing is the complex number structure. However, I do not believe this helps the situation, as our ability to refer to the complex number structure seems just as much in need of explanation as our ability to refer to complex numbers. One might think we can refer to this structure as an extension of the real number structure which includes two roles for the square root of $-1$; however, should we think of this extension as the extension which includes the roles for the square root of $-1$, or as an extension which includes some such roles? Quaternions are not the only hypercomplex numbers; hypercomplex numbers can be extended ad infinitum to octonions, sedinions, and so on. There are thus very, very many mathematical roles which are such that, when squared, equal $-1$; unless we can say more about this role we were using to transform the real number structure into the complex number structure, I think we have to admit that there is not a unique complex number structure. Of course, one can go structuralist over complex number structures as well (and so on up the line), but this is to concede that one has not
solved the local reference problem. There may be ways to preserve true claims we make using imaginary numbers, but it is a cost of the view that we are unable to refer to imaginary numbers.

For a second example of the local reference problem, consider the fact that new words get introduced every year, many of which appear to express properties such as <is Googling the answer> or <is a social networking site>. How then do we gain the ability to refer to these properties? I will take as a starting point that the first chapter was right and that we cannot give a nominalistically acceptable definite description of these properties. The question I want to ask here is, does our ability to refer to many other properties enable us to refer to these newly coined ones using descriptions that one could not have used when first establishing reference to abstracta. While I am aware of three particular ways that being able to refer to abstract objects would enable us to establish reference to objects we otherwise could not refer to, none of these are sufficient to explain how we refer to all these new properties each year. Briefly, one way that the reference problem could be solved by using other abstracta is if the “new” property we wanted to refer to was merely shorthand for some combination of previous properties; an example of this could be if we gained the ability to refer to the property of <has due process> because this is simply another name for a conjunctive property of various judicial laws and rulings being followed. A second way would be if the new property is an instantiated determinate of a determinable to which we can refer; we could perhaps refer to a new color property as “the precise color property had by that petal on that flower.” A third way would be if we could single out a property by a unique relation to something else we can refer to; examples of this would be “the successor of 1” and “the complimentary color of <is red>.” If this list is exhaustive of the difference between our ability to refer to new properties and the ability of our pre-historic ancestors, then there seem to be many new properties that we should not have been able to refer to. The first two ways are incredibly limited,
and there do not generally appear to be unique relations to new abstract objects.

Consider a term like “smartphone” and the corresponding property \(<\text{is a smartphone}>\). While we can give some characteristics which are typically associated with something being a smartphone, such as access to the internet and acting as a GPS, it is implausible that \(<\text{is a smartphone}>\) is really just plurally referring to several of these properties. I had a flip phone in 2003 that had access to the internet but would not be considered a smartphone; the original iPhone lacked a GPS but was definitely still a smartphone. New words are introduced precisely to be able to say things we couldn’t say before; while we can say enough to indicate what the property \(<\text{is a smartphone}>\) is and what has it, it is not reductive. Nor does \(<\text{is a smartphone}>\) seem to stand in any specifiable unique relation to some other property we can refer to. Perhaps there is now a property \(<\text{is a device}>\) which is a determinable with two determinates: \(<\text{is a smartphone}>\) and \(<\text{is a tablet}>\), but this is certainly not how we came to refer to \(<\text{is a smartphone}>\)—the order of explanation seems to be the opposite. As far as I can tell, nothing we were able to refer to before gave us a unique definite description of \(<\text{is a smartphone}>\); thus, in order to solve the local reference problem, one would need a causal theory of properties, and artifactualism meets this need.

4.4.4 Why Properties Exist

One of the main things that draws me towards artifactualism is that it explains why abstract objects exist in the first place. The peculiar thing about this advantage is that it is unlikely to be recognized as an advantage by non-artifactualists. Platonists, for instance, say that (at least many) abstract objects exist necessarily. If we want to know why the property \(<\text{is red}>\) exists, the platonist believes she has an adequate answer in that it is necessarily the case that \(<\text{is red}>\) exists. What more could one ask for in explaining the existence of something than that its existence is
necessary?

I find this answer unsatisfying in a certain way, and I find the artifactualist’s causal answer far more satisfying, but it is difficult to articulate exactly why. What seems to me to be problematic in the answer is that metaphysical axioms and principles are not the right type of things to appeal to in order to explain the existence of something. The problem I am gesturing at can be illustrated by considering the universalist position in the composition debate. Consider a universalist view according to which there are, among other things, turkeys, trout, and objects composed of the front half of a trout and the back half of a turkey (trout-turkeys). Suppose we ask, what explains the existence of these various things? Suppose the universalist says that the turkey is explained by the various activities of its parents which resulted in its existence, and likewise for the trout, but that each trout turkey owes its existence to the fact that “for any x, y, if x is not a part of y and y is not a part of x, then there is an object z composed of x and y” is a metaphysical truth.\footnote{It is true that, given universalism, the particles composing the turkey always composed an object. Still, I take it that any plausible universalism will still want to make some room for the activities of the parent turkeys being causally responsible for the existence of the new turkey; denying that seems like a very serious cost for the view.} It seems obvious to me that in such a scenario the existence of the trout-turkey is bizarre in a way that the existence of the trout and the turkey are not; the principle of composition just cannot be the ultimate explanation of the existence of something. Now, it is open to the universalist to say that in fact, supposing the turkey to have been born second, the actions of the turkey’s parents actually caused the trout-turkey to come into existence. While we primarily think of these actions as bringing a turkey into existence, it in fact brought into existence every object composed of that turkey and some other thing; these accidental byproducts of bringing a turkey into existence are merely described in statements of universal composition. That is, I think, what the universalist should say—there is a physical cause of every composite object, and the
composition principle is merely describing all that is brought into existence when something new is brought into existence.

If we take this lesson and turn to platonism, we are faced with a situation where there is a principle that one might take to be explaining the existence of things—“necessarily, anything that can be said of things exists,” or “necessarily, all of logical space is populated with centered possible worlds,” or some other such principle. Saying that this principle explains the existence of these abstract things is an inadequate explanation of their existence. If one instead wants to say that the principle merely describes what is going on, then there is no further explanation to appeal to (as there was in the case of the trout-turkey being explained by the turkey’s parents). We are thus left with no explanation whatsoever. I suspect that the platonist will embrace this and say that her claim that abstract objects exist necessarily was not meant to be an explanation of their existence, but instead was meant as repudiation of the need for explanation. Perhaps this reaches the point where intuitions just bluntly differ, but it seems like a serious cost of platonism that there are all these objects which lack an explanation. In the same way that it would be a cost for universal composition if composite objects popped into existence unexplained as soon as their parts came into existence, it is a cost for platonism that abstract objects popped into existence from eternity past with no prompting whatsoever. I realize nothing said in this section will convince a platonist that her position is problematic, but perhaps it can persuade some people who have not yet decided if abstract objects need an explanation for their existence.

4.5 A Remaining Objection: Causation

Artifactualism is committed to there being a causal connection between our mental activities and the realm of abstract objects; this is quite unlike the billiard-ball-style causation where things push and pull each other, so it seems like the artifac-
alist owes us an account of how this causal connection works. Unfortunately, I do not have anything particularly insightful to say with regard to this problem. I said before that our ability to create abstract objects is identical to our ability to perform a mental activity (thinking, believing, desiring, etc.) with new content (content which cannot be causally traced back to some origin outside our own minds). Because I do not have a good story about how a body manages to represent anything, I likewise lack a story as to how we manage to represent new things. The best I can say in defense of artifactualism is, first, that everyone shares this problem (the mind-body problem), and second, that actuality implies possibility. We know that we are creatures that are able to do certain things. One of the things it appears we are able to do is to create new representational content. Given that we create new content, it must be possible for us to create new content, even though we cannot give a good account of how the brain does this. If we in fact have this ability, then I think artifactualism is an incredibly attractive ontology.

Given this response, however, I suspect the platonist may claim that her position is in no better or worse position than artifactualism, that they stand in dialectical parity. After all, since actuality implies possibility, the fact that we pick out and express various abstract objects implies it is possible for us to do so. Since artifactualism requires a mysterious ability to create new mental content, and platonism requires a mysterious ability to pick out objects in the platonic heaven, both views are on a par with respect to mystery. Really, all the artifactualist has done is show a different way to arrive at the same conclusion—our mental abilities are strange, but somehow we manage to express and refer to various abstract objects.

I want to say two things in response to this parity claim. First, I think that, on balance, even if the two views were equal with respect to our access to abstract objects, artifactualism has several other advantages highlighted in this chapter (such as having an explanation of why abstract objects exist and having ready solutions

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to some of the paradoxes of language). I thus think that artifactualism would be the better theory even if this particular parity held. Second, my argument against platonism in the first chapter was not that reference was mysterious, but that we know particular things about reference and that these things entail platonism could not allow for reference. In particular, I claimed that the ability to establish reference to an object required the ability to single out that object either through causal connection or definite description. Since platonism denies causal connections between us and abstracta, and since there are no definite descriptions of abstract objects (given abundance), it follows that platonism entails we cannot establish reference to abstract objects. No such similar principle has been offered regarding our ability to create new mental content, and absent such a principle, the comparison is between a mysterious ability to create content and an impossible ability to refer without singling out.

Is there a plausible metaphysical principle which entails that our alleged ability to create mental content is impossible, just as establishing reference to an object without being able to single it out is impossible? Some candidate principles include: necessarily, if o is a created object, then something transferred energy to o; necessarily, if o is a created object, then o is subject to the laws of physics; necessarily, if o is a created object, then it has both a material and an efficient cause. Plausibly all these principles are violated by artifactualism. Our ability to create abstract objects involves the ability to create without transferring energy (as far as I know, but perhaps philosophers of mind will tell us otherwise), to create something not subject to physical laws, and to be an efficient cause of something without there being material that one is shaping. While there is some pull towards these principles, I don’t see any of them as obvious. They will all be seen as implausible by Humean and counterfactual theories of causation, among others (at most they could only be contingently true). Those who think omissions are causally efficacious will deny at least the first and third principles (and quite plausibly deny the second, depending on
what the thing caused by the omission is like). Anyone who thought there were some
created abstract objects (such as works of fiction and works of art) will want to deny
all three as well. Of course, merely having deniers does not make a principle bad,
but it might imply that the principle is at least not obviously true. At minimum,
I think those who are already inclined to believe in some created abstract objects
should deny these principles, and thus should find artifactualism to be superior to
platonism. Those who are inclined to deny artifactualism because of a principle
along these lines owes us a defense of the principle. If there were such a defense, I
would take it that the problem of reference was something like the free will debate,
where each position faces unanswerable objections. Absent a defense of one of these
principles, I maintain that the mystery of artifactualist creation is far better than
the impossibility of platonist reference.


