

Abstract Entities

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One of the most puzzling topics for newcomers to metaphysics is the debate over the existence and nature of abstract entities, things like numbers (seven), sets (the set of even numbers), properties (triangularity), and so on. The major questions about abstract entities are whether there are any, if so which ones there are, and if any do exist, what they are like.

My aim here is to provide an accessible overview of the debates about abstract objects. I will try to explain what abstract entities are and to say why they are important, not only in contemporary metaphysics but also in other areas of philosophy. Like many significant philosophical debates, those involving the nature and existence abstract objects are especially interesting, and difficult, because there are strong motivations for the views on each side.

In §1 I discuss what abstract entities are and how they differ from concrete entities and in §2 consider the most compelling kinds of arguments for believing that abstract entities exist. In §3 I consider two examples, focusing on numbers (which will be more familiar to newcomers than other types of abstract objects) and properties (to illustrate a less familiar sort of abstract entity). In §4 I turn to criticisms of arguments for the existence of abstract entities and consider questions about what phenomena need, or are even amenable to, philosophical explanation. In §5 I examine the costs and benefits of philosophical accounts that employ abstract entities and in §6 draw some conclusions.

1 What are Abstract Entities?

Prominent examples of *abstract entities* (also known as *abstract objects*) include numbers, sets, properties and relations, propositions, facts and states-of-affairs, possible worlds, and merely-possible individuals (we'll see what some of these are in a bit). Such entities are typically contrasted with *concrete entities*, things like trees, dogs, tables, the Earth, our Solar System, and Hoboken. I won't discuss all of these examples, but will consider a few of the more accessible ones as case studies to help orient the reader.

Numbers and Sets Thought and talk about numbers are familiar; we spend hundreds of hours learning to do it right. We learn about the natural numbers (like three, four and four billion), about fractions (rational numbers, like $\frac{2}{3}$ and $\frac{5}{9}$), and about irrational numbers (like the square root of 2 and π). And we learned a bit about sets in school, for example the empty set, the set containing just 3 and 4, and the set of even numbers; we even learned to write names of sets using notation like $\{3, 4\}$.

But what *are* numbers and sets? We cannot see them or point to them; they do not seem to have any location, nor do they interact with us or any of our instruments for detection or measurement in any discernible way. This may lead us to wonder whether there really *are* any such things as numbers, and whether, when we say things like ‘there is exactly one prime number between four and six’ we are literally and truly asserting that such a number exists (after all, what could *it* be?). But as we will see in §3.1, there are also strong philosophical arguments that numbers *do* exist. Hence a philosophical problem: do they or don’t they?

Properties and Relations The world is full of resemblances, recurrences, repetitions, similarities. Tom and Ann are the same height. Tom is the same height now as John was a year ago. All electrons have a charge of 1.6022×10^{-19} coulomb. The examples are endless. There are also recurrences in relations and patterns and structures. Bob and Carrol are married, and so are Ted and Alice; the identity relation is symmetrical and so is that of similarity. Resemblance and similarity are also central features of our experience and thought; indeed not just classifications, but all the higher cognitive processes involve general concepts. Philosophers call these attributes of qualities or features of things (like their color and shape and electrical charge) *properties*. Properties as the *ways* things can be; similarly, *relations* are the *ways* things can be related.

Assuming for the moment that there are properties and relations, it appears that many things have them. Physical objects: The table *weighs six pounds*, is *brown*, is a *poor conductor of electricity*, and is *heavier* than the chair. Events: World War I was *bloody* and was *fought* mainly in Europe. People: Wilbur is *six feet tall*, an *accountant*, *irascible*, and *married* to Jane. Numbers: three is *odd*, *prime*, and *greater* than two. All of these ways things can be and ways they can be related are repeatable; two tables can have the same weight, two wars can both be bloody. The two adjacent diamonds in Figure 1 are the same size, orientation, and uniform shade of gray. Champions of properties hold that things like *grayness* (or *being*

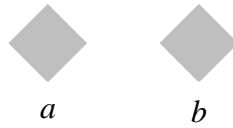


Figure 1: Resemblance and Ways Things Can Be

gray) and *triangularity* (or *being triangular*) are properties and that things like *being adjacent* and *being a quarter of an inch apart* are relations. Since the goal here is just to give on prominent example of a (putative) sort of abstract object, I will think of properties as *universals* (as many, but not all philosophers do). On this construal, there is a single, universal entity, the property of *being gray* that is possessed or exemplified by the two diamonds in our figure. It is wholly present both *a* and *b*, and will be as long as each remains gray.

Philosophers who concur that properties exist may disagree about *which* properties there are and what they are like, but at least many properties (according to numerous philosophers, all) are abstract entities. Perhaps a property like *redness* is located in those things that are red, but where is *justice*, or the property of *being a prime number*, or the relation of *live a century before*? Such properties and relations exist outside space and time and the causal order, so they are rather mysterious. But, as we will see, there are also good reasons for thinking that properties and relations can do serious philosophical work, helping explain otherwise puzzling philosophical phenomena. This is a reason to think that they do exist. Another problem.

Propositions Two people can use different words to say the same thing; indeed, they can even use different languages. When Tom says ‘Snow is white’ and his friend Hans says ‘Schnee ist weiss’ there is an obvious sense in which they say the same thing. So whatever this thing is, it seems to be independent of any particular language. Philosophers call these entities *propositions*. They are abstract objects that exist independently of language and even thought, though many of them are expressed in language. Propositions have been said to be the basic things that are true or false, the basic *truth-bearers*, with the sentences or statements that express them being derivatively true or false.

Tom also believes that snow is white and Hans, who speaks no English, believes that Schnee ist weiss. Again there is an obvious sense in which they believe the same thing (though of course Hans couldn’t express his belief by talking about snow). Some philosophers urge that the best way to explain

this is to conclude that *there is some thing* that Tom and Hans both believe. On this view propositions are said to be the contents or meanings of beliefs, desires, hopes and the like. They are also said to be the *objects of beliefs*. Thus the object of Tom's belief that red is a bright color is the proposition, *that red is a bright color*.

On this view propositions are abstract objects that express the meanings of sentences, serve as the bearers of truth values (truth and falsehood), and are the objects of belief. But like numbers, propositions are somewhat mysterious things. We can't see them, hear them, point to them. They don't seem to *do* anything at all. This gives us reason to doubt their existence, but, there are also reasons to think that they exist. Problems, problems, problems.

1.1 What Abstract Entities Are (Nearly Enough)

Debates about abstract objects play a central role in contemporary metaphysics. There is wide agreement about the paradigm examples of abstract entities, though there is also disagreement about the exact way to characterize what counts as abstractness. Perhaps this shouldn't come as a surprise; if any two things are so dissimilar that their difference is brute and primitive and hard to pin down, abstract entities and concrete entities (*abstracta* and *concreta*) are certainly plausible candidates.

Even so, the philosophically important features of the paradigm examples of abstracta (like those listed above) are pretty clear. They are *atemporal*, *non-spatial* and *acausal*, i.e., they do not exist in time or space (or space-time), they cannot make anything happen, nothing can affect them, and they are incapable of change. They are causally inert, impotent, inefficacious; neither they, their properties or aspects, nor events involving them can make anything happen here in the natural world. We don't see them, feel them, taste them, or see their traces in the world around us. Still, according to a familiar metaphor of some philosophers, they exist "out there," independent of human language and thought.

Taken alone, being atemporal, non-spatial, and acausal are probably not necessary for being abstract in the sense many philosophers have in mind, and others aren't sufficient. Not necessary because many things that seem to be abstract also seem to have a beginning (and ending) in time, among them natural languages like Urdu, forms of government like democracy, melodies like "La Marseillaise," fictional characters like Sherlock Holmes, and dance styles like the Charleston. It may seem tempting to say that such things exist in time but not in space, but where exactly? Moreover, this claim can't be literally true

in a relativistic world (like ours certainly seems to be), where space and time are (framework-dependent) aspects of a single, more basic thing, namely space-time.

And not sufficient because an elementary particle (e.g., an electron) that is not in an eigenstate for a definite spatial location is typically thought to lack any definite position in space. Indeed, if it is in an eigenstate for a specific momentum, it has a zero probability of turning up in any given region of space when measured for position—though it will turn up somewhere. The technicalities don't matter here; the point is just that although such particles may seem odd, they do have causal powers, and so virtually no one would classify them as abstract. Again, according to many religious traditions God exists outside of space and time, but he brought everything else into existence, He is the "first cause," and so many would be reluctant to classify Him as an abstract object.

All this suggests that the division into concrete and abstract may be too restrictive, or that abstractness may come in degrees. I won't consider such possibilities here, however, because the puzzles about abstract entities that most worry philosophers concern those entities that are, if they exist, atemporal, non-spatial, and acausal (how could such things ever affect us?). And we don't need a sharp bright line between abstracta and concreta to examine these.

A philosopher who believes in the existence of a given sort of abstract entity is called a *realist* about that sort of entity, and a philosopher who disbelieves is called an *anti-realist* about it. Abstract entities are not a package deal; it is quite consistent, and not uncommon, for a philosopher to be a realist about some kinds of abstract entities (e.g., numbers) and an anti-realist about others (e.g., properties).

Not-Quite Existence Finally, some champions of abstract entities claim that *there are such things*, but grant them a lower grade of being than the normal, straightforward sort of *existence* enjoyed by Al Gore, Hoboken, and the Eiffel Tower. They often devise rather esoteric labels for this state; for example, numbers, properties, and the like have been said to *have being*, to *subsist*, to exist but not be *actual*, or partake of one or another of the bewildering varieties of not-quite-full existence contrived by philosophers. Such claims are rarely very clear, but frequently they at least mean that a given sort of entity is real in some sense, but doesn't exist in the spatio-temporal-causal order. Which is pretty much just to say it is abstract.

Appealing to notions like subsistence can look like trying to have one's cake and eat it too, thus allowing a philosopher to invoke properties or propositions without having to grant them genuine existence.

We will not pursue such matters here, however, since many of the same problems arise whether the issue about the status of abstracta is framed in terms of the existence or merely the subsistence or being of such things. Whatever mode of being the number two or the property of *having a mass of 2kg* possesses, we still cannot perceive it, pick it out in any way, and it seems to make no difference to anything here in the natural world. Because many of the most debated issues arise for all the proposed modes of being of abstract objects, I will focus on existence.

Why Questions about Abstracta Matter Explicit discussion of abstract entities is a relatively recent philosophical phenomenon. Plato's Forms (his version of universal properties) have many of the features of abstract objects. They exist outside of space and time, but they seem to have some causal efficacy. We can learn about them, perhaps even do something like perceive them, though perhaps only in an earlier life (this is Plato's doctrine of recollection).

Soon after Plato, properties and other candidate abstracta, e.g., merely possible individuals (individual things, e.g., persons, that could have existed but don't), were reconstrued as ideas in the mind of God. This occurred through the influence of Augustine and others, partly under the influence of Plotinus and partly under that of Christianity. Human beings were thought to have access to these ideas because of divine illumination, wherein God somehow transferred his ideas into our minds. In later accounts like Descartes' we had access to such ideas because God placed them in our minds at birth (they are innate). Such views persisted through Medieval philosophy and well into the modern period. In this period philosophers like Locke began to view what we thought of above as properties (e.g., redness, justice) as ideas or concepts in individual human minds.

It was really only in the nineteenth century with work on logic and linguistic meaning by figures like Bernard Bolzano and Gottlob Frege that abstract entities began to come into their own. They emerged with a vengeance around the turn of the twentieth century, with work in logic, the theory of meaning, and the philosophy of mathematics, and, more generally because of a strongly realist reorientation of much of philosophy at this time in the English and German speaking worlds. After a few decades interest in abstract entities subsided, but by the end of the twentieth century, there was perhaps more discussion of a wider array of abstract objects than ever before.

Although explicit discussion of abstract entities has a fairly recent history, they are central to de-

bates over venerable philosophical issues, including the nature of mathematical truth, the meanings of words and sentences, the features of causation, and the nature of cognitive states like belief and desire. These debates also lie at the center of many perennial disputes over realism and anti-realism, particularly standard flavors of nominalism. Discussions about the existence of abstract objects may also illuminate the nature of human beings and our place in the world. If there are no abstract objects, nothing that transcends the spatio-temporal-causal order, then there may well be no transcendent values or standards (e.g., no eternal moral properties) to ground our practices and evaluations. And if there is also no God, it looks like truth and value must instead be somehow rooted here in the natural order; we are more on our own.

2 Why Believe there are Abstract Objects?

We now come to the central questions about abstract objects. Are there any? How can we decide such issues? If at least some kinds of abstract objects exist, can we discover what they are like (this is a problem because it seems to be difficult to make contact with them in order to learn about their nature). In this section I will offer an answer to the first question that also suggests an answer to the second.

A good way to get a handle on the issues involving abstract entities is to begin by focusing on the *point* of introducing them in the first place. The precise point is somewhat different in the case of different sorts of abstracta, but the general motivations are similar. Philosophers who champion one or another type of abstract object almost always do so because they think those objects are needed to solve certain philosophical problems, and their views about the nature of these abstracta are strongly influenced by the problems they think they are needed to solve and the ways in which they solve them. Hence, our discussion here will be organized around the tasks abstracta have been introduced to perform. These tasks are typically explanatory, to explain various features of philosophically interesting phenomena, so to understand such accounts we need to ask about the legitimacy, role, and nature of explanation in metaphysics.

2.1 Philosophical Explanations and Existence

Ontology is the branch of metaphysics that deals with the most general issues about existence. Of course we know a great deal about what sorts of things exist just from daily life: things like trees, cats, cars, other people, the moon. And science tells us more about what sorts of things there are: electrons, molecules of

table salt, genes. But ontology attempts to get at the most general categories or sorts of things there are, e.g., physical objects, persons, numbers, properties, and the like. Some philosophers doubt that the very enterprise of ontology makes sense, but we will begin by assuming that it does.

For many centuries ontology aspired to be a *demonstrative enterprise*, one based on valid arguments. A *valid argument* is one which *must* have a true conclusion *if* all of its premises are true. Such arguments are sometimes called *demonstrative*. A valid argument with all true premises will have a true conclusion (by the definition of validity); such arguments are sometimes called *deductively sound*.

On this traditional conception of ontology, it employs valid arguments to establish conclusions about what the most general and fundamental things in the universe are. It proceeds from obviously secure premises, step by deductively valid step, to obviously secure conclusions. The traditional standards for security were very high, requiring unassailable, necessary, self-evident “first principles.” These were supposed to be claims that couldn’t possibly be false and that no reasonable person could doubt.

The chief problem with this picture is that when we judge classical arguments in ontology by such standards most not only fail—many fail miserably. There is, among other things, no consensus about which candidates for first principles are even true, much less necessarily so, and in many cases demanding valid arguments seems to be asking for too much. By these standards even the best the greatest philosophers could manage comes up far short.

Nowadays many philosophers would gladly settle for premises that are uncontroversially true—or even just fairly plausible. But they still devote a good deal of time distilling arguments for (or against) the existence of one or another sort of abstract object down to a few numbered premises and a conclusion to write on the board, check for validity, then (most often) dismiss then. This approach is often invaluable, but it has limitations. For one thing, few philosophical arguments survive long when judged by the pass-fail standards of deductive validity (how likely is it, after all these centuries of inconclusive results, that Jones has just devised a twelve line demonstration that properties exist?). Indeed, it is quite possible that there are no deductively sound arguments beginning from true premises which do not mention abstracta and end with conclusions that abstracta exist (“no abstracta in, no abstracta out”). However that may be, we often miss things of value if we write arguments off simply because they are not deductively valid. But if traditional and contemporary versions of the demonstrative ideal set the bar too high, how should we think about arguments and disagreements in ontology?

When we turn to the ways philosophers actually evaluate views about abstract objects, we typically find things turning on the pluses and minuses of one view compared to those of its competitors. And a very common feature of the (putative) pluses is that they often mention explanation. For example, we are told that the existence of numbers would explain mathematical truth or that the existence or properties (like *triangularity*) would *explain* why it is that various objects are triangular and that it would also help explain how we recognize newly encountered triangles *as* triangles.

Moreover, even when the word ‘explain’ is absent we frequently hear that some phenomenon holds *in virtue of*, or *because of*, this or that property, that a property is the *ground* or *foundation* or most enlightening *account* of some phenomenon, or that a property is (in part) the *truth maker*, the *fundamentum in re* (as the Medievals would have said) for the phenomenon. For example, it has been urged that the exemplification of a single, common property grounds the fact that our two items in Figure 1 (p. 3) are triangular; it makes it true that each is a triangle. The same property also helps to explain how we recognize that they are triangular and why the world ‘triangle’ applies to them.

Similar claims have been made on behalf of other abstracta. The role of expressions like ‘explain’ is to give reasons, to answer why-questions, which is a central point of explanation. My suggestion is that we should (re)construe arguments for the existence of abstract entities as inferences to the best over-all available ontological explanation (we’ll return to this in §§3-4; see also Swoyer 1982, 1983, 1999a).

I will develop this idea in the course of examining several examples, but first let’s see what morals we can draw from the view that arguments for the existence of abstract objects are ampliative (i.e., deductively invalid but capable of offering good, though not conclusive, support for their conclusions).

First, we should acknowledge at the outset that there will rarely (probably never) be knock-down arguments for (or against) the existence of any type of abstract entity. On this approach, metaphysics (including ontology) is a fallibilistic enterprise, one in which we may need to revise even our currently best-supported views as we acquire new knowledge.

By way of example, twentieth-century physics presents us with a very surprising picture of physical reality, and it may well call for innovations in ontology. To note just one case, quantum field theory, that branch of physics that deals with things at a very small scale (quarks, electrons, etc.), strongly suggests that there are (at the fundamental level) no individual, particular things; there may be no fact about how many “particles” of a given kind there are in a particular region of space-time. If so, the traditional view

that individuals or substances are a fundamental category of reality may be overthrown. Or, to take a rather different example, philosophers may discover new, entirely-unanticipated arguments for, or against, the existence of various philosophical entities, including abstracta.

Metaphysics was once thought of as “first philosophy,” coming first in the sense that it not only described the most fundamental features of reality but provided the basis for the rest of our knowledge about that reality. On the current view there is no first philosophy; nor is there any point in calling metaphysics second- or third- philosophy, because nothing, neither philosophy nor anything else, comes first. Almost any aspect of our knowledge can be affected by any other part, and far from being a mere chapter out of history, metaphysics is a living, ongoing enterprise and should be responsive to intellectual change and novel information.

Second, although each specific argument for the existence of a certain kind of abstract entity may not be fully compelling, if there are a number of independent arguments that a given sort of entity exists, the claim that they do could receive cumulative confirmation by helping to explain a variety of phenomena.

Third, if some type of abstract entity is postulated to play particular explanatory roles, this affords a principled way to learn about its nature. We ask what such an entity would *have* to be like in order to play the roles it is postulated to fill. What, to take a question considered below, would the existence or identity conditions of properties have to be for them to serve as the meanings of predicates like ‘round’ or ‘red’?

Explanatory Targets and Target Ranges An explanation requires at least two components. First, *something to be explained*, an *explanation target*. Second, *something to explain it*. In ontology, it is a philosophical theory (though ‘theory’ is often a bit grandiose) like Plato’s theory of forms that does the explaining. We will be concerned with those theories that employ abstract objects in their explanation.

Explanation targets for ontology can come from anywhere. From the everyday world around us (e.g., different objects can be the same color, and a single object can change color over time). From mathematics (e.g., it is necessarily the case that the area of a Euclidean triangle is the length of the base times one-half its height’; there is simply no way that something could be a Euclidean triangle without having its area determined in this way). From natural languages (e.g., the word ‘triangle’ is true of many different individual figures). From science (e.g., objects attract one another because of their gravitational mass but

may repel one another if they are different charges). And many from almost any area of philosophy (e.g., many moral values seem to be objective, but it's a bit mysterious how this can be so).

I will call a more-or-less unified collection of explanation targets a *target domain*. In the next section I briefly discuss several target domains that have led some philosophers to postulate abstract entities. Although I believe that arguments in ontology are usually best construed as ampliative, much of what follows can be adapted fairly straightforwardly to the view that philosophical arguments should aim to be deductively sound.

3 Examples of Work Abstracta Might Do

When we turn to actual debates about abstract objects we find few (arguably no) knock-down, iron-clad, settled-once-and-for-all arguments for or against the existence of most of the abstract objects that interest philosophers. Instead, the evaluation of the arguments involves the art of making trade offs, the weighing of philosophical costs and philosophical benefits. I will urge that although there are widely shared, quite sensible criteria for this, but they fall short of providing rules or a recipe that forces a uniquely correct answer to the question of which, if any, abstract entities exist.

The chief philosophical benefit claimed for most sorts of abstract entities is that they do philosophical work, perform some “ontic labor.” And the chief work they do is to help *explain* otherwise puzzling phenomena, phenomena that would be illuminated if those entities really existed, and so that accounts employing them provide philosophical enlightenment. Benefits, however, rarely come without costs, and we will examine some of the costs of abstracta in §4. In this section we will consider some of their benefits.

There are many candidate abstracta and there is space to discuss only a few. I will begin with one that will be familiar to readers with little background in philosophy, the natural numbers. The *natural numbers* (0, 1, 2, and so on up forever) are just the objects of the arithmetic whose rudiments we have been familiar with since grade school.

3.1 Numbers

Target Range for Philosophy of Mathematics There is no unanimity about precisely which mathematical phenomena are legitimate targets for philosophical explanation, but in the case of number theory

(basic arithmetic), there is widespread agreement about the following.

1. The sentence ' $7 + 5 = 12$ ' is *true*, and its truth is independent of our beliefs and opinions. This is also the case for many other sentences of arithmetic. Fermat's last theorem was true long before Andrew Wiles proved it, and it would still have been true even if no one ever discovered a proof. Similarly, many other sentences of arithmetic, like ' $7 + 5 = 13$ ' are *false*, and are so independently of what we happen to think. This is sometimes put by saying the truth value (either truth or falsity) is independent of our beliefs and opinions.
2. Statements of arithmetic necessarily have the truth values they do; ' $7 + 5 = 12$ ' could not have been false under any circumstances and ' $7 + 5 = 13$ ' could not have been true.
3. Quite apart from questions about language and truth, it is the case that $7 + 5 = 12$ but it is not the case that $7 + 5 = 13$. And the first is necessarily the case and the second is necessarily not.
4. There are infinitely many natural numbers, and necessarily so (there could not have been fewer).
5. The grammatical structure of the sentence '3 is prime' parallels that of 'Sam is tall'. In the later case the subject term, 'Sam' is standardly thought to denote a real object, the person Sam, and the sentence is true because the thing 'Sam' denotes is tall. This suggests that in '3 is prime' the numeral '3' might denote something, and that the sentence is true because the thing it denotes is a prime number.
6. We can employ standard logic in reasoning about arithmetic; the normal, logically valid patterns of inference apply. For example, the step from 'Sam is tall' to 'There is something that is tall' is a valid inference, both intuitively and in standard systems of logic (where it is known as *existential generalization*). So too is the step from '3 is prime' to 'there is something that is prime'.
7. The claim from the previous phenomena, 'there is something that is prime' follows from a true sentence ('3 is prime') and seems, quite independently, to be true. But the claim that *there is* such a thing is just our ordinary, paradigm way of saying that something *exists*, that it is genuine or really there. Perhaps this is not always the case, but it typically is. So we at least seem to be committed to the view that there is something that is a prime number.
8. It is possible to have reliable justified beliefs and, indeed, knowledge in mathematics.
9. Much of our mathematical knowledge is *a priori*. This means that we do not need to learn, and almost never justify, our claims in arithmetic by appeal to experience. Once we know what '1' and '2' and '+' and '=' mean, we just see that $1 + 1 = 2$. Someone who proposed doing an experiment or survey to check whether this claim was true really wouldn't appreciate how mathematics works.

The list isn't complete, and some of the items (e.g., 1) may be more central than others (e.g., 2). Still, the more of these targets a philosophical account can explain the better. As we will see, however, the features that enable a theory to explain some of these phenomena sometimes make it difficult for it to explain others.

Sample Explanations in Mathematics Using Abstracta A wide array of philosophical accounts have been developed to explain these targets. I will discuss one of the simplest approaches that employs abstracta.

Here is the metaphysical story. The natural numbers are objects or entities, though ones of a very special kind. They are abstract, existing outside of space and time and the causal order. There are infinitely many of them (what logicians call a denumerable infinity of them). They do not change. They exist necessarily (they could not have failed to exist), and they necessarily have the properties and stand in the relations that they do (it is necessarily the case that 13 is a Fibonacci number and that $13 > 7$).

This metaphysical picture allows us to explain item (3) in a very straightforward way. It's the case that $7 + 5 = 12$ because that is just how things are with these mind-independent, objective entities, the numbers, in particular with 7, 5, and 12. And there are infinitely many natural numbers item (4), because that is just how many of these entities there are (nothing deep here).

The purely metaphysical picture may also seem to explain (1) and (2), but to account of matters involving truth, we have to say a bit about meaning or semantics. Here, as is often the case with accounts of abstract entities, we need to make one or more additional assumptions, "auxiliary hypotheses," in order to use those entities to explain the targets we want them to explain.

We need some semantic hypotheses like the following. First, numerals are singular terms, ones that can occupy subject positions in sentences, and they denote the appropriate numbers ('0' denotes 0, '1' denotes 1, and so on out forever). Moreover, numerical terms like these would denote the same things in any possible situation (so they are what philosophers call "rigid designators"). Predicates like 'prime number' stand for the property of *being a prime number* and relational predicates like '<' stand for the relation of *being a smaller natural number* (for the moment I won't worry about what these really are). Finally, function expressions like '+' and '×' stand for numerical functions like the addition function (which outputs 5 when you input 2 and 3) and the multiplication function (which outputs 6 when you input 2 and 3). This isn't the entire story, but it is enough for us to see the basic ideas about how the explanations here work.

We then say that a sentence of the form '*n* is *P*', where *n* is a name of a natural number (e.g., the numeral '3') and *P* is a predicate (e.g., 'even') is true just in case *n* refers to a number that has the property that the predicate *P* stands for. Similarly '*nRm*', where *n* and *m* are numerals and *R* a two-place numerical relation, is true just in case the natural numbers denoted by *n* and *m* (taken in that order) stand in the relation that *R* stands for. Finally, '*(n f m) = o*', where *f* is a function term (like '+') and the other lower-case letters are numerals, is true just in case the output ("value") of the function denoted by *f* is the

natural number denoted by o when we input the natural numbers denoted by n and m .

All of this is a bit loose, but since the work of Alfred Tarski in the 1930s we know how to make it completely precise (by giving what logicians call a recursive definition of satisfaction for the sentences of number theory, then defining truth in terms of it). The interested reader can find the details in any good introductory text on symbolic logic, but they aren't needed to appreciate the basic ideas here.

We can now explain why '3 is prime' is true and '4 is prime' is false; '3' stands for an abstract object, the number three, 'prime' stand for the property of *being prime*, and three has that property. By contrast, '4' stands for an abstract object, the number four, that lacks the property. Similar accounts explain why ' $5 < 7$ ' and ' $7 + 5 = 12$ ' are true and ' $7 < 5$ ' and ' $7 + 5 = 13$ ' are false. This explains item (1) on the list. Moreover, since numerical terms necessarily stand for the things that they do, and because the natural numbers necessarily exemplify the properties and stand in the relations that they do, these claims necessarily have the truth values they do item (2).

Simple sentences of arithmetic appear to have a simple subject-predicate structure (item 5; when relation or function terms are involved there is more than one subject term, with '5 and '7' being the two subject terms of ' $5 < 7$ '). We can now explain this because given the machinery invoked in our explanations thus far, this is exactly the structure such sentences do have. And we can apply standard logic in a completely straightforward way to explain why normal logical inferences are valid when we apply them to arithmetical sentences (item 6). For example, existential generalization works because if we take a true sentence like '3 is prime', we know that it is true because '3' stands for *something* (the number three) that is prime. Hence it follows that *there is some thing* (three) that is prime. And on this account this sentence does indeed make a true existence claim, telling us that there really *is* something (once again three) that is prime (item 7)

Items (8) and (9) differ from the preceding seven insofar as they involve notions like justification and knowledge. These are epistemic notions, ones studied in the philosophical field known as the *theory of knowledge* or *epistemology* (from the Greek *episteme*, 'knowledge', and *logos*, 'theory'). This is the area of philosophy that deals with knowledge and related concepts like justification. Although this is a different field from ontology, claims about ontology meet up with questions in epistemology when we ask whether, and if so how, we can know about abstract entities.

Justification in arithmetic (and in mathematics generally) often proceeds by way of calculations

and, at more advanced levels, proofs. These are based on, indeed are little more than chains of, logically valid patterns of inference (like existential generalization). Our previous machinery justifies the application of logic in arithmetic, and so explains some features of mathematical justification. If we are already justified in believing that ‘3 is odd’, we are then also justified in believing ‘there is something that is odd’. This is so because existential generalization is a mini-valid argument pattern, so if the first sentence is true, the second must be true as well.

But our reasoning must begin somewhere. How do we justify those of our arithmetical beliefs that we don’t prove? How do we justify our belief (assuming we take it as basic) that $1 + 0 = 1$? Alas, accounts like the one so far that seem well-equipped to explain phenomena (1)-(7) founder when we come to (8) and (9). (the classic discussion of this difficulty is Benacerraf, 1973).

The basic problem is that since numbers are abstract, they lie completely outside the spatio-temporal order. We seem unable to achieve any sort of contact with them. We can’t see numbers, touch them, point to them, measure them. Nor do they cause things we can see or touch or point to or measure. So how do we ever learn anything about numbers? Since all of us know that one is an odd number, we do, somehow, know something about them. On the present account, this knowledge is *about* an abstract object, namely the number one, though of course a person may not think of it as being an abstract objects, perhaps never having heard of such things. But how? The problem is serious enough that we will defer it in order to treat it in some detail in §5.2

A theme running through many of these explanations is that the realm of mathematics is completely objective, unaffected by what we happen to think or how our languages chanced to develop. And mind- and language-independent objects outside the natural world, namely the numbers, are what ground this objectivity. Various philosophers have argued against this picture under banners like “objectivity without objects,” but it nicely illustrates one way abstracta can be invoked in philosophical explanations.

There are competing explanatory accounts of our nine phenomena involving that employ abstracta other than numbers (especially sets, but also properties, categories, and structures). They have many of the same costs and benefits as our simple account using numbers, however, and I will not discuss them here. Finally, we should note that strategies like the one sketched above can be applied in many other parts of mathematics by postulating additional abstract objects, e.g., irrational numbers, complex numbers and other sorts of mathematical entities (like points, lines, functions, groups, vector spaces).

Lessons the Explanations Teach us about these Abstracta We know a good deal about numbers before we ever study philosophy, so the present philosophical explanations aren't likely to provide a much novel information about their nature (other than telling us that they are abstract). But in the case of less familiar abstracta (like properties or propositions), the explanations might well shed light on the nature of the entity in question. I will say something about what this involves here in the case of numbers to illustrate the *sort* of thing that is involved in inquires about the nature of *any* sort of abstract entity.

There are at least four things philosophers often want to know about a given sort of entity; its existence conditions, its identity conditions, its modal status, and its epistemic status.

Existence Conditions In the case of *natural* numbers there many not seem to be much philosophical interest in their existence conditions, since we already knew which numbers there are (0, 1, 2, 3, ...; anything you can get by starting with 0 and adding 1 as many times as you like). But with less familiar notions, like that of a complex numbers (e.g., $i\sqrt{2}$), we typically want to know its existence conditions. Under what conditions *is* something a complex number? Which (putative) items of that sort exist? The aim is to provide necessary and sufficient conditions for something being a complex number. To take another example, in set theory very elaborate conditions are laid down for telling us which sets exist.

This model is sometimes carried over from mathematics to philosophy, where philosophers ask for the existence conditions for various sorts of non-mathematical abstracta like properties and propositions. It is a matter of debate whether asking for necessary and sufficient conditions of this sort unreasonably assimilates philosophy to mathematics, but obviously the more proponents of properties can say about which properties there are the better. For example, can there be properties that are not exemplified? Again, assuming that *being round* and *being square* are properties, are there also properties like *being round or square* or *being round and square*?

Identity Conditions If x and y are abstract objects, can we provide necessary and sufficient conditions for them being one and the same object (in the way that 2 and the positive square root of 4 are the same, but 2 and the negative square root of 4 are not)? In the case of numbers we can typically answer specific questions of this sort by calculation or proof, but can we give general identity conditions that apply to all natural numbers in a fell swoop? If x and y have exactly the same numerical properties and stand in exactly the same numerical relations, it then turns out that they must be identical, the self-same number. But we might like conditions that throw more light on what it is to be a natural number.

A related example should clarify the general idea. If x and y are sets, then x and y are identical just in case they contain exactly the same members. This claim is called the *principle of extensionality*, and sets are said to be extensional entities; indeed, this is often thought to be an important part of the definition of what it is to be a set. By contrast, properties do not obey the related principle of being identical just in case they are exemplified by exactly the same things. To adapt a well-known example from Quine, suppose there are two properties: *being a chordate* (having a heart) and *being a renate* (having kidneys). These are numerically distinct properties, even though it is possible that exactly the same things, precisely the same organisms, exemplify each. This raises the difficult question of what the identity conditions of properties are, but we are getting ahead of ourselves.

Identity conditions are important in mathematics, and as with existence conditions it is possible to worry that requiring identity conditions for a given sort of abstract object as a precondition to granting its existence (or even to discussing whether it exists or not) is an unreasonable demand. After all, philosophers have thus far not been very successful at spelling out precise identity conditions for physical objects or for persons—but we all know perfectly well that such things exist. Of course an account of a given sort of abstract object should tell us as much as possible about that object, so we would like to know as much as possible about when x and y are identical, even if this falls short of full necessary and sufficient conditions for identity.

Modal Status Do the abstract entities invoked in our explanations exist necessarily (they simply couldn't have failed to have existed) or merely contingently (they might not have existed)? Second, we may ask which features of, and relations among, these entities (e.g., *being an even number*) belong to them necessarily (in any circumstances in which they could exist) and which features only belong to them contingently (they could have existed without having them).

Our hope is that if the answers to questions about the nature of a given sort of abstract entity aren't obvious before developing explanations employing that entity, the explanations themselves will help us answer these questions. In the present case, we hope to see what the modal status of a postulated abstract entity *needs to be* in order to explain some of the targets it is. In the explanation sketches of the nine phenomena on page 12, the answer is that the numbers necessarily exist *and* that they necessarily have the properties and stand in the relations that they do. We must conclude this in order to explain items (2), (3), and (4) on page 12.

Epistemic Status The most basic epistemological question about an abstract entity we have reason to believe exists is *how* we can know about it. We can't reasonably expect a detailed scientific answer to such questions at this stage in history, but we need to be given a general idea. By way of analogy, there is much that we don't currently understand about visual perception. But we have enough of a general idea how visual perception works to see that it is a *normal, natural, causal process* involving the reflection of light off objects to the backs of our retinas, there stimulating nerves and setting off various electro-chemical reactions that in turn trigger process in the visual cortex and other parts of the brain. Admittedly we don't understand the conscious aspects of the visual experience itself, but at least they occur in time, surely in space (the brain—besides, you can't really separate time and space), and involve some sorts of natural, neural causal processes. It would be good to have at least a little detail of this general sort in order to shed light on the way we know about abstract objects.

In the process of answering these questions we may get an answer to the further epistemic question of whether our knowledge about a given sort of entity (here arithmetical knowledge about the natural numbers) is *a priori* or not. We began by assuming it was, as is traditional, though the account we examined didn't yield a very satisfying explanation of how this could be so (there are other accounts that do, but they have trouble explaining earlier items on the list). But in the case of at least some other abstract entities, for example properties, there is some debate as to whether our knowledge about them is *a priori*, i.e., attainable independently of experience (save for enough experience to acquire the concept of them) or *a posteriori* (based on experience). In those cases we might hope that our explanations of our knowledge about entities that did the jobs properties were invoked to do had to be *a priori* if properties were to do those jobs.

Numerical Properties In this subsection I have taken numerical properties and relations (like *being prime* and *less than*) to be fairly unproblematic in order to keep things simple. There are various, deeper accounts one could give of these. On one, these are really just sets; for example, the arithmetical property of *being prime* is just the set of prime numbers. Other accounts treat them as genuine properties. We now turn to these in more detail.

3.2 Properties

In order to convey the scope of the phenomena abstracta have been invoked to explain I will briefly consider two quite different reasons why philosophers have claimed properties exist (additional reasons are discussed in Swoyer, 1999b).

Meanings Language is one venerable source of data for ontologists, and theoretical accounts of language and meaning often rely upon abstract entities. The fundamental idea is to posit abstract entities of various sorts (e.g., properties, propositions) to serve as the meanings (“semantic values”) of linguistic expressions. A major goal of a semantic theory is to explain the semantical properties of, and relations among, linguistic expressions. These include the conditions under which various sort of sentences are true (as above with ‘Sam is tall’) and logical relations among various sentences like synonymy, inconsistency, and principles of validity (e.g., existential instantiation).

A great many different aspects of meaning have been thought to require abstracta for their explanation, but we will focus on what is perhaps the simplest example, *general terms* or *predicates*. General terms are a very mixed bag, but for our purposes we may ignore their differences.

Many general terms, e.g., ‘honest’, ‘supercilious’, ‘sadder-but-wiser’, can be true of a variety of things, they apply to the things they do partly because of their meanings, and in some cases where two predicates in fact apply to exactly the same things, they could have applied to different things. Furthermore, we can use pronouns, which often seem to be paradigm referring expressions, that are linked back to them: ‘Bush is stubborn, and *that* (stubborn) can be a bad quality in a president’. And from ‘Bush is stubborn’ we can infer that ‘*There is something* that Bush is’.

Related issues arise for the workings of abstract singular terms, terms that fit into subject position like ‘honesty’, ‘triangularity’ and ‘the causal relation’. Indeed, as subjects of sentences these have seemed to some philosophers to be even better candidates to denote or stand for abstract things like *honesty* than their associated general terms (‘honest’). Similar considerations have led some philosophers to postulate propositions to serve as the meanings of “that-clauses,” like the clause ‘that snow is white’ in the sentence ‘Bush believes that snow is white’. But many of the issues in these two cases are similar to those involving general terms, and so I will focus on the latter here.

Properties have been invoked to explain a variety of targets involving the meanings of general

terms; the sentences two paragraphs back suggest several. First, what sorts of meanings do general terms have? They clearly seem to have some sort of meaning; ‘cat’ and ‘dog’ have meanings, and they are different. Furthermore, these meanings have something to do with the world itself, outside language. There is something about a creature that makes it correct to call it a ‘cat’, we recognize new cases where the word correctly applies, and people can pretty much agree on its application. It’s not all just arbitrary.

Nor can the meanings of general terms just be the set or group of things they apply to. In some cases two general terms that happen to have the same extensions, i.e., to be true of exactly the same things, *could* have had different extensions. Suppose, contrary to fact, that all and only chordates are renates, so that ‘chordate’ and ‘renate’ are true of exactly the same things (they have the same *extension*, as philosophers would say). Still, there could have been a chordate that wasn’t a reneate. Conversely, some general terms that in fact do have different extensions, like ‘chordate’ and ‘renate’ in fact do, could have had the same one. So the meaning of such predicates cannot just be their extensions (nor the sets containing just the things in their extensions), since these could be the same even when the meanings are different.

Properties avoid this problem, since distinct properties can have the same extension (exactly the same objects exemplify each), though of course they needn’t. Hence properties have often been recruited to serve as the meanings of general terms. The meanings of ‘honest’, ‘supercilious’, and ‘sadder-but-wiser’ are the properties of *honesty*, *superciliousness*, and *being sadder-but-wiser*.

On such accounts the property *honesty* figures in the explanation of why the sentence ‘Tom is honest’ is true; ‘Tom’ denotes a person who exemplifies that property. This idea has been developed by a number of philosophers, perhaps beginning with Plato who tells us that ‘we are in the habit of postulating one unique Form [his version of properties] for each plurality of objects to which we apply a common name’ (*Republic*, 596A; see also *Phaedo* 78e, *Timaeus*, 52a, *Parmenides*, 133d).

In the sentence ‘Bush is stubborn, and *that* (stubborn) can be a bad quality in a president’, the word ‘that’ seems to refer to something. But what? If ‘stubborn’ stands for the property of *being stubborn*, we could explain this by saying that the ‘that’ refers back to that property.

Some of our sentences about numbers involved the logical pattern of existential generalization. It can apply here too: from ‘Bush is stubborn’ we can infer ‘*There is something* that Bush is’. If ‘stubborn’ stands for a property, *stubbornness*, then we can explain why this is valid. The second sentence says that there is something that he is, and the first sentence guarantees that there is, *stubborn*. It takes some

argument to get from this to his having the property *stubbornness*, but this is the crucial first step. This also explains why the sentence ‘*There is something that Bush is*’, which seems to say that he has some property, is true. It is true because it makes the simple, literal claim that he does.

Many details must be worked out for such explanations to carry conviction. This is the essential first step, however, and the one where abstract entities (properties) enter the picture. Moreover, the basic idea is not just a promissory note; various philosophers have done impressive work in developing the details in various directions (e.g., Bealer, 1982; Zalta, 1988).

This picture of properties suggests several things about their nature, though as presented here it is too sketchy to pin things down completely. First, the *existence conditions* for properties that serve as the meanings of general terms require a property corresponding to each general term of each natural language (save for those which would lead to paradox, a nicety that needn’t detain us here). Furthermore, since new general terms (e.g., ‘DVD player’) come into languages all the time, there must be enough properties to provide semantic values for them. Finally, since there are meaningful general terms that lack extensions (e.g., ‘witch’, ‘phlogiston’), some properties must exist unexemplified.

The *identity conditions* of properties suited to serve as meanings are a matter of controversy and involve subtleties we needn’t pursue here. We can at least say, though, that if *x* and *y* are properties, they are identical only if they are exemplified by exactly the same things and *would have been* exemplified by exactly the same things no matter what the circumstances.

What about *modal status*? The use of properties in many parts of semantics does not obviously require that properties exist necessarily, but if all of the properties we might need to supply semantic values for any possible human language exist, then it is not unnatural to suppose that they exist necessarily. And when we turn to portions of English that explicitly involve sentences like ‘Socrates is necessarily a human being’, we may well find reasons to require that at least some properties exist necessarily.

Finally, what about the *epistemic status* of the properties employed in the semantic explanations sketched above? As we have noted, our semantic account will require properties that are not exemplified by anything, and whatever the status of exemplified properties, unexemplified properties are definitely abstract objects. If such properties are completely isolated from the natural world, they will raise much the same epistemic problems that numbers do. Furthermore, the more facts about language we can know *a priori* (perhaps, e.g., ‘vixens are female foxes’), the more likely it is that we will need some sort of *a*

priori access to properties.

None of these inferences to the existence of properties based on these mini-explanations is conclusive. Objections can be raised to each, but this is true for all arguments for (or against) the existence of abstract objects. Taken alone, each explanation of the nine arithmetical phenomena discussed above may provide fairly weak support for the existence of numbers, but taken together they may provide fairly strong cumulative support. Similarly, the explanations involving general terms help provide a single, unified story that is more persuasive than any of the explanations taken alone. And the more they are embedded in a detailed theory of properties and meanings, the more support they receive.

Many additional arguments for the existence of abstract objects (e.g., possible worlds) also turn on issues involving semantics, but I hope our brief discussion is enough to convey something of flavor of the sorts of targets and considerations involved in explaining features about meaning.

Causation and Causal Powers I now turn, quite briefly, to a rather different sort of explanation target, causation, just to indicate the wide scope of phenomena properties have been invoked to explain and to highlight an important problem in metaphysics, the *linkage problem*.

Properties have been invoked to help explain various features of causation and of natural laws. We'll consider the former. It is not a single, undifferentiated amorphous blob of an object (or a blob of an event) that makes things happen. It is an object (or event) *with properties*, and *how* it affects things depends on *what* those properties are. The liquid in the glass caused the litmus paper to turn blue because the liquid is an alkaline (and not because the liquid also happens to be blue). The Earth exerts a gravitational force on the moon because of their respective masses (and not because of their respective charges).

Such talk is difficult to take literally unless there really are properties, so the existence of properties is often held to explain this very general features of causation (it isn't intended to add up to a full account or analysis of causation, of course). The basic idea here is that a *property* like gravitational mass confers *causal powers* on its instances, e.g., a power to exert a force on an object of a given mass a given distance away in conformity with Newton's Law of Universal Gravitation.

The account is much too sketchy to tell us much about the nature of properties, but does it suggest anything? A natural, though not inevitable, conclusion to draw about the nature of properties is that they exist only if they confer causal powers on their instances. And perhaps the most natural conclusion to

draw here is that properties are identical just in case they confer exactly the same causal powers on their instances. Such properties needn't exist necessarily, and we may be able to learn about them empirically by observing their instances, or the effects of things that exemplify them on things we can observe (without or without special instruments, like microscopies and telescopes).

The Linkage Problem We have seen enough to wonder whether the same properties that would provide meanings for general terms could also be the properties that help to explain causation. Similarly, it might be wondered whether the propositions that serve as truth bearers are the same as the propositions suited to serve as objects of belief. Clearly an argument is needed that the propositions that play the first role are *the very same propositions* that play the second. These are examples of a problem that arises frequently in metaphysics; I will call it the *linkage problem*.

In the philosophy of religion we find various traditional arguments for the existence of God, e.g., the *first cause argument* (there had to be a first cause of everything else, and it is God), the *design argument* (the world is very intricate and highly organized, which couldn't happen by chance, so something designed it, and that is God), and the *ontological argument* (an intricate argument intended to show that there is a single, all-powerful, all-knowing, all-good god). The linkage problem is to show that it is (or at least could be) the same god that is justified by each argument, i.e., to support the claim that

$$\begin{aligned} \text{god of the cosmological argument} &= \text{god of the teleological argument} \\ &= \text{the god of the ontological argument} \end{aligned}$$

Likewise, we would need to show that

$$\begin{aligned} \text{properties used in semantic explanations} &= \text{properties used to explain causal powers} \\ &= \text{any properties used to explain targets in other domains} \end{aligned}$$

If we are fortunate, we might devise a series of ontological explanations that employ the same entity. This increases information, because different explanations may tell us different things about what that entity is like. It also increases confirmation, because the sequence of explanation may provide cumulative support for the claim that the entity they all invoke actually exists.

Unfortunately, different jobs may require entities with different existence or identity conditions, different modal status, or the like. For example, the identity conditions of properties suited to serve as semantic values of predicates may differ from the identity condition of properties suited to illuminate

causation. So we can never simply assume that we are dealing with just one entity. We must always *argue* that we are. Perhaps no one sort of thing *could* perform *all* the different explanatory jobs a particular sort of entity has been invoked to do.

Finally, we can rarely explain much with simple claims, like the bald assertions that numbers exist or that properties exist. These claims are typically part of a longer story, a philosophical theory, that tells us something about what the relevant abstract entity is like. The theory also needs to explain how the entity is related to other things, including other abstract entities (since theories often invoke more than just one sort of abstract entity, e.g., accounts in semantics often employ both properties and propositions). The account also needs to tell us how its abstracta are related to the phenomena around us that led us to postulate them in the first place.

Thus a full account of properties should tell us something about which sorts of things have properties (e.g., can properties themselves exemplify properties), and should at least provide the resources for dealing with questions like whether properties include colors, shapes, and masses. How are properties related to those things that have them, i.e., what does exemplification amount to? Answers to such questions help us *apply* the theory of the abstract entity, bridging the gap between the abstract realm and the typically concrete phenomena we want to account for. And an especially important part of an account of abstracta is to tell us at least enough to see that their connection to our cognitive faculties is not problematic (ideally, it should tell us something positive about how this connections works).

3.3 Evaluating Explanations in Ontology

There are various desirable features of ontological explanations, features that, other things being equal, make an explanation more compelling.

Desiderata Here are several of the more important desiderata for philosophical explanations.

1. Do more with less This injunction can take various forms. The fewer unexplained (primitive) entities the better. If two primitive abstract entities will explain the targets in a domain, don't use six to do so. The motivation here is general and somewhat vague, but it is important and has a venerable history. The great Medieval philosopher, William of Ockham (c. 1287-1347), counseled philosophers "not to multiply entities beyond necessity."

This precept has become known as *Ockham's razor*, a tool for shaving off unneeded ontological postulations. But as everyone who writes on the matter soon observes, Ockham's exhortation was to avoid multiplying entities *beyond necessity*. So the relevant question is always whether a given sort of abstract entity *is* necessary, which typically means: is it required in order to explain any philosophical targets? The answers to such questions are often controversial, so although we can agree that if a short simple theory works as well as a long and complicated one, the former is better, in practice the wielding of Ockham's razor is often a matter of contention,

2. Breadth and depth of coverage are important The more of the nine arithmetical phenomena (p. 12; and, indeed, the more additional phenomena) a philosophical theory can explain the better. Similarly, it counts in favor of a theory of meaning based on properties if it can explain the semantic behavior of different constructions of English (e.g., 'Sam is tall' and 'Sam is taller than Jill', as we have seen how it might do, as well as 'Sam is the tallest person in town' and 'Sam believes that Jill is tall', which we have not examined).

3. Explain why rival accounts work as well as they do It is useful if an explanation illuminates why competing accounts work (in those places where they do work) and fail (where they fail).

4. Explain which things need explaining It is also good if an account can illuminate what should, and what should not, be on the list of targets it is used to explain. And if it explains a traditional target away (showing that it doesn't really exist), it needs to provide arguments for doing so.

5. Solve the linkage problem

6. Don't solve one problem only to create one just as bad It is important to explain a target (e.g., in semantics) without creating new problems elsewhere (e.g., in epistemology).

This list is not exhaustive, but it illustrates some of the commonly accepted and central desiderata for explanations in ontology. Unfortunately, these desiderata can be in tension. For example, we can sometimes get by with fewer primitives by sacrificing breadth of coverage. Hence, the six goals do not add up to rules or recipes that always tell us which of several competing philosophical explanations is best, and this remains the case even if we add further plausible desiderata. But it is important that they often *can* tell us that certain explanations are not very good.

Constraints There are also constraints on ontologically satisfactory explanations. Some are nearly universal (e.g., consistency, though even that has been challenged lately). Others vary with time or schools of thought, and some reflect quite idiosyncratic philosophical scruples or ideals. When immersed in a given culture or intellectual tradition, constraints may seem even stronger, less negotiable, than desiderata, though from a distance some appear more ephemeral. Constraints and desiderata fade into one another, but the importance of the former is often underestimated so I will note a few examples.

Religious Constraints In various periods there have been religious constraints on metaphysical explanations. In Medieval disputations about properties issues involving faith, reason, and the nature of God were never far from view. Indeed, these matters often provided explanatory targets for metaphysicians; for example, it was often held that an account of properties should be able to explain the Trinity, the Eucharist, and the (putatively) unchanging nature of God. At the very least—and this was absolutely nonnegotiable—it must not conflict with accepted theological doctrine (on pain of heresy—it was a risky time to do ontology.) Such constraints are much less important today, though they still matter for some theistic philosophers.

Empiricist Constraints Philosophical orientations also provide constraints. For example, many philosophers have argued that knowledge must be grounded in experience. We cannot simply reason out what the world is like from the armchair; we have to go and check. Such philosophers, often called *empiricists*, may require that only entities experienced in perception be allowed to figure in ontological explanations. Bertrand Russell's Principle of Acquaintance, his injunction to only admit items into our ontology if we are directly acquainted with them, is an example. Empiricist constraints have a strong tendency to exclude abstracta, and, indeed, a great portion of metaphysics in general.

Localization constraints This illustrates how constraints can be based in a philosophical outlook that can (and in this case does) turn up in different philosophical schools or traditions. Thus, some philosophers maintain that any entity invoked to explain a target must exist *where the target does*. Aristotle, for example, upbraids Plato for separating the Forms from their instances, suggesting that this renders them incapable of explaining phenomena here in the natural order (*Metaphysics*, 1079b11-1080a10). It may be difficult to make the intuitions behind this idea precise and convincing, but the sentiment seems to be that my dog's standing in some obscure relation to some obscure entity (like the abstract property of *being yellow*) outside the spatio-temporal causal order cannot explain anything about my dog here and now.

Obviously this constraint would tell against abstracta.

Scientific Constraints The scientific revolution begun in the seventeenth century emphasized primary qualities (e.g., extension, number and, with Newton, force and mass) and downplayed secondary qualities (e.g., color, taste, smell). For some philosophers this meant that a satisfactory metaphysical picture of nature should include the former as properties of physical objects, but not the latter (though they had to be explained, or explained away, in some way).

Naturalistic Constraints Today naturalistic worldviews are popular, and these are often thought to allow only physical entities, or at most only entities that exist in space-time. Such accounts can be reductionistic (e.g., only the basic individuals and properties of physics exist), but they needn't be. This general picture makes it difficult to employ abstracta, though some philosophers have argued that at least some abstract objects are compatible with a properly-understood naturalism. But the importance of naturalistic constraint at least means that such philosophers must worry about giving such an account.

The list of constraints on metaphysical explanations is more incomplete, and more nebulous, than the earlier list of desiderata. But in a concrete historical setting constraints can seem very real, sometimes inevitable, even if at a latter time they seem arbitrary, even quaint. This needn't make metaphysics "subjective" in any debilitating sense (so that whatever a particular culture happens to think about it is "true for them"). But it is a useful reminder that metaphysics, like any other intellectual enterprise, is a human endeavor that takes place in, and is highly colored by, a time, culture, and tradition.

Difficulties with Competitors The best available ontological explanation must meet some minimal threshold of goodness to justify belief in its conclusion. Moreover, the notion of the best *available* explanation is *comparative*; a theory doesn't get many points for explaining something if a rival theory explains it much better. Hence, arguments for the existence of a particular sort of abstract entity often need to be bolstered by criticisms of opposing theses. For example, the view that properties are needed to play the role of semantic values of predicates is stronger when accompanied by arguments that other sorts of entities, e.g., *sets* (of the things in the extension or the predicate) cannot play the role nearly as well. Finally, being the best explanation doesn't mean being perfect. Virtually all philosophical accounts have open problems, and trying to solve them is part of the day-to-day work of philosophers.

4 Quandaries and Doubts

I have spoken as though inference to the best ontological explanation were relatively unproblematic, but there are various places where objections to it, and especially to its use in philosophy, can be raised. I will consider the more serious ones here.

4.1 Doubts about Philosophical Explanation

The deepest objection to the use of inference to the best explanation in philosophy is that philosophy can never provide explanations, period—a view Wittgenstein held throughout much of his career. Others object that even if some areas of philosophy can provide explanations, the highly dubious field of ontology isn't one of them. Still others hold that it is illegitimate to use “philosophical entities,” especially abstract entities, in explanations of any sort, and that the explanatory value of such explanations is illusory.

Some very able philosophers have endorsed such views, including many logical empiricists, ordinary-language philosophers and, today, philosophers who are sometimes called quietists. The objections differ, but they have similar implications for our topic: explanations that rely on abstracta simply offer up mysterious entities in pseudo-explanations to solve pseudo-problems in a pseudo-discipline. These dismissive claims are not always defended, and when they are, they often depend on shaky assumptions (e.g., the logical positivists' verificationist theory of meaning). Perhaps in the end one person's explanation is another person's pseudo-explanation, but some things can be said on behalf of each side in these debates.

Objection: Philosophical Explanations are Vacuous By way of example, some philosophers have maintained that properties are mysterious entities with no trace of explanatory power. At best, talk about properties awkwardly redescribes the things their proponents mistakenly thought needed explanation. For example, the philosopher Antony Quinton assures us that purported explanations invoking properties are “only cumbrous restatements of the facts they were introduced to explain. ‘This is an instance of redness’ says no more than that this is red” (1973, p. 295; cf. Pears, 1951, p. 226; Sellars, 1963, p. 229, fn. 2). And then there is the great American philosopher W. V. O. Quine, who states:

That the houses and roses and sunsets are all of them red may be taken as ultimate and irreducible, and it may be held that McX [Quine's hapless champion of properties] is no better off, *in point of real explanatory power*, for all the *occult entities* which he posits under such

names as 'redness' [1980, p. 11; emphases added; Quine hedges his claim a bit, but this is clearly where his heart lies].

Similar indictments have been handed down against every abstract entity in the book.

Nowadays, points like Quinton's are sometimes made in the context of a *deflationary* account of truth (or a deflationary account of some other notion). There are various ways of developing such accounts, but the core idea is that the claim that a sentence is true says no more (and no less) than the sentence itself: " 'Socrates is wise' is true" is just another way of saying that Socrates is wise. Again, '7 + 5 = 12' is true just because $7 + 5 = 12$. That is all there is to it. What you see is what you get. There is no deeper fact or theory that is needed to—or that can—explain why the sentence is true, and it is a sort of philosophical illusion, perhaps one in need of a cure, to suppose that there is.

Some of the targets noted above involve truth or related semantic notions. Realists often advert to abstracta to explain them, but the deflationist counters with a simpler story. The sentences of arithmetic, for instance, do have truth values, and no gimmicky paraphrases (according to which our sentences really mean something very different from what we naturally take them to mean) are needed to show this. There *simply isn't* any deep, profound philosophical explanation of the truth (of the true ones), and we need to be cured of hankering for one. In a similar spirit some argue, with Quinton, that the sentence 'Socrates exemplifies the property of being wise' is a perfectly respectable sentence, but it is just a redundant and rather obscure way of saying that Socrates is wise. That's all there is to it.

Reply Quinton's contention that the claim that something exemplifies redness is just a cumbersome restatement of the claim that it's red would be correct if that were all the realist had to say about the matter. But if the realist also has a *theory* of properties, especially one with a rich formal component then, properties might very well pay their way by doing interesting and important explanatory work. For example, a good semantic theory based on properties (not a trivial thing to devise) would show us *why* 'Socrates is wise and wisdom is a virtue' entails 'Socrates has at least one virtue'. And such theories *have* been developed in detail by various philosophers (e.g., Bealer, 1982; Zalta, 1988). There are also problems with deflationary theories that must be overcome before we should accept their proponents' claims that a robust philosophical account of truth, or of properties, is a pipe dream. Swyer, 1999b contains further discussion of these difficult matters.

Philosophy isn't Science Inference to the best explanation plays a central role in daily life and, according to many philosophers, in science. The butler must have been an accomplice; that is the best way to explain the footprints in the snow and the shattered glass in the pantry window. If molecules exist, that would explain why grains of pollen bounce around on the surface of water; the constant motion of the molecules jostles the grains. But is such inference legitimate? It's a form of ampliative inference, so there can be no question of showing that when such arguments have true premises they must have true conclusions (they needn't) or, as Hume taught us, that such inferences will work as well tomorrow as they did yesterday. Still, many maintain, without inferences to the best explanation science, and much of ordinary life, would be impossible.

Philosophy, however, isn't science. Although there are disagreements about the nature of scientific explanation, we often know a good scientific explanation when we see one. Newton *did* explain a lot about the orbit of the moon around the earth. Indeed, we use our judgments about such exemplary cases to test our philosophical accounts of scientific explanation. Moreover, many scientific explanations employ well-confirmed scientific theories.

But when we turn to ontology, we can hear the critic say, the situation is very different. We do not have well confirmed philosophical theories in anything like the way we have well confirmed theories in the sciences. Moreover, the critic continues, we have no idea what a philosophical explanation would be like, or how to evaluate competing explanations. It looks like just anything goes.

Reply Does being a philosopher mean never having to say you are wrong? Not by a long shot. You only have to spend a few hours (or a few years) trying to develop a satisfactory account the semantical and logical behavior of belief sentences (like 'Sue believes Tom is in Detroit') to see how difficult finding a plausible account can be. Explanatory desiderata, explanatory constraints, and the complexity of many explanation targets often restrict explanations so much that, far from every account being right, *all* our accounts are *wrong* in one place or another. There is, for example, still no completely satisfactory account of the semantic behavior of belief ascriptions.

It would be wrong to pretend that explanations in metaphysics are as deep or nuanced or successful as most explanations in chemistry or physics or physiology. Furthermore, inferences to the best explanation in science and in daily life often involve locating causal mechanisms (as with our pollen's motion). But the philosophical explanations sketched above don't do that. There are a number of explanatory virtues in

addition to pinpointing causal mechanisms, however, including unification, integration, and redescribing phenomena in a theoretically enlightening way. Seeing a common pattern at work behind seemingly disparate phenomena certainly yields one sort of understanding. By describing the moon, the earth, and projectiles on the surface of the earth as bodies with inertial and gravitational mass, Newton was able to provide a unified account of their motions.

Something similar can occur in philosophy. For example, as H. F. Cherniss (1936) argues, Plato deployed his theory of Forms (his version of properties) to solve difficult problems in ethics (explaining how ethical principles could be objective), epistemology (explaining the difference between knowledge and belief), and metaphysics (explaining how change is possible). We might add that the Forms helped Plato explain the semantic workings of general terms (cf. *Republic*, 596A; *Phaedo* 78e; *Timaeus*, 52a; *Parmenides*, 133d). This isn't to say that all of Plato's explanations were successful. Far from it. But the general pattern of explanation by integration was certainly at work in his account.

Similarly, if numbers exist and arithmetical expressions stand for numbers and their properties, we can explain how sentences of arithmetic can have truth values, why they have the truth values they do, why these don't depend on our beliefs, why they bear logical relations (like that involving existential generalization) to each other, and why we can use logic to reason about them.

What else can be said on behalf of philosophical explanation? Many of the greatest philosophers in history (including some contemporaries) devoted their lives to providing explanations for philosophically puzzling phenomena. They may have been wrong, but it seems unlikely that so many acute thinkers from such different historical periods were all in the grip of some simple confusion that could be dispatched in a chapter or two. We need sustained arguments that they were wrong, and these are few and far between.

We should also note that acknowledging that something is a legitimate explanatory target in philosophy doesn't assure the victory of realism about one or another sort of abstract entity. Some antirealist theory might provide a better account of a target than any theory invoking abstract objects can.

Some of the explanation targets mentioned above, e.g., the (putative) necessity of mathematical truths, may be of little interest outside metaphysics. But others, e.g., those involving mathematical truth itself or the nature of causation, arise in other areas of philosophy. So if there is a problem about metaphysical explanation, it afflicts a wide swath of philosophy. Still, in the end different views about philosophical explanation may depend on very different conceptions about the nature of philosophy. And while some

conceptions are clearly unprepossessing, I can see little reason to suppose that a single conception can be demonstrated, to the satisfaction of most, to be best.

4.2 Doubts about the Targets

1. Who Picks the Targets? Lists of philosophical targets change over the years, and there is no denying that they are to some extent a matter of philosophical fashion. Moreover, there is always the all-too-human tendency to tailor one's list of targets in light of what one has the resources to explain. Still, some of the items on many lists, e.g., mathematical truth, are things many of the great philosophers struggled to explain. Many of them also arise quite naturally in areas of philosophy outside metaphysics, and even outside philosophy entirely.

2. Denial: There is No Such Target Virtually every item on any philosopher's list of explanation targets has been dismissed as a fiction by some other philosopher. Very able philosophers have denied that there is such a thing as mathematical truth, or at least that we need to assume there is in order to explain why mathematics is so useful (Goodman and Quine, 1947; Field, 1980). Others have denied that there is any such thing as causation (e.g., Russell, 1913; Wittgenstein 1922/1961, 5.136–5.1361; Norton 2003). Some doubt there are laws of nature (e.g., van Fraassen, 1989; Giere, 1999, esp. ch 5; Quine, 1986, p. 398), a phenomenon properties are often invoked to explain, though we haven't discussed how here (see Swoyer, 1999b§4.3 for an overview). Others are skeptical about linguistic meaning, ranging all the way up to Quine's whole-sale semantic eliminativism (there are no meanings, e.g., Quine, 1960). Still others doubt the existence of beliefs and desires (this is characteristic of eliminative materialism; Stich (1983) is one of the milder versions). One must evaluate these rejections one by one, but it is important to be clear that most of these targets are thought to be legitimate by most philosophers working in the relevant areas.

5 Pluses and Minuses

Almost everything has its price, and metaphysics, like life, often presents us with diverse, not fully compatible, goals that require us to make tradeoffs, weigh costs against benefits, make difficult decisions. In this section we consider the chief benefits, and costs, of abstract entities.

5.1 Benefits

The primary philosophical attraction of abstract entities is that they seem to offer so much *explanatory power*. For example, when we encounter words or phrases that *look* like denoting singular terms (e.g., ‘courage’ or ‘3’) we can explain this very neatly by arguing that they *are* singular terms and that they *do* denote; they refer to the appropriate sort of abstract entity (a property, in the first case, a number, in the second). The realist can often avoid denying the existence of relatively obvious phenomena (like the existence mathematical truth, as some anti-realists about numbers and sets do), needn’t urge that we have been badly in error about entire realms of discourse (like mathematics), and can avoid resorting to tortured paraphrases to evade ontological commitment. Indeed the more luxuriant lines of abstracta (e.g., Russell 1903; Zalta 1988; Bealer 1982) contain so much metaphysical machinery that it is almost a foregone conclusion that they can explain any phenomenon that comes their way. All this sounds a little too good to be true. Is it?

5.2 Costs

1. Entity specific objections Quine and others have objected to entities with “obscure” identity conditions, an injunction they take to exclude most abstracta other than sets. Other philosophers have objected to universal properties on the grounds that they could be wholly present in different places at the same time which, they assert, is absurd. These aren’t objections to abstract objects as such, however, and each needs to be argued out entity by entity, and so we won’t pursue them here.

Ockamist impulses and ontological economy No one likes ontological bloat, and Ockham’s plea for ontological economy is accepted by most philosophers as important. Other things being equal, a good explanation of a philosophical target that doesn’t rely on abstracta is preferable to good explanation that does. But other things are rarely equal. Abstract objects often add enough explanatory power that theories invoking them can give broader and deeper and smoother explanations of a target than theories that do not. For example, it is very difficult (though a number of philosophers believe not impossible) to give an account of mathematical truth that does not employ abstracta of any sort. So while ontological economy is important, other things are rarely equal so it is rarely decisive in debates about abstracta.

Anti-realism: there are alternatives There is always anti-realism, so perhaps we shouldn’t feel driven to abstracta as the only game in town. There are many forms alternatives to realism take nowa-

days, as new positions (e.g., fictionalism, projectivism, error theories) spill over from the philosophy of mathematics, the philosophy of science, and meta-ethics into philosophy generally. Furthermore, with the demise of behaviorism, philosophy's linguistic turn beginning to show its age, and the rise of cognitive science, various flavors of conceptualism are once again on the menu (e.g., Swoyer, 2005). Still, none of these alternatives provides a strong reason for avoiding the need for a given sort of abstract object to explain a legitimate philosophical target unless the anti-realist explanation (or dismissal) of it is spelled out in a reasonably detailed and compelling way. So again we can't say much that is general; we must consider each approach case by case.

Epistemic access Epistemology is the Achilles' heel of realism about abstracta. We are biological organisms thoroughly embedded in the natural, spatio-temporal, causal order. Abstract entities, by contrast, are atemporal, non-spatial, and causally inert, so they cannot affect our senses, our brains, or our instruments for measuring and detecting.

A few philosophers have postulated a cognitive faculty of intuition that provides some sort of non-causal access to numbers or other abstracta. The nature of this access has never been explained, however, and many of us find nothing like it in our own perception and thought. Scientists have no inkling where it is located in the brain, and it has yet to turn up in any empirical studies. Empirical investigation of thought that (might) seem to be about abstracta is becoming more common (e.g., Boroditsky and Ramscar, 2002), and it may eventually illuminate the issues here. At present, however, it doesn't get at the most basic problems that have worried philosophers about our cognitive access to abstracta.

Perhaps knowledge about abstracta doesn't require contact with them? The only remotely plausible story about this would seem to be that such knowledge is innate. This may well be true of our rudimentary knowledge of arithmetic, but it doesn't scale up well to knowledge about tensor algebra or the semantic values of words for describing the nuances of Medieval chivalry.

The epistemic problems here do not stem from any (almost certainly hopeless) causal theory of knowledge, but simply from the fact that our acquisition and justification of beliefs about things lying outside the spatio-temporal causal order is more than a little mysterious. Indeed, even if abstracta did exist, it is difficult to see how they could make any difference to our cognitive processes. Things would seem just the same whether they existed or not, or if they existed up until tomorrow, then suddenly vanished.

Reference and non-uniqueness Nowadays a major reason for postulating abstracta is to use them

as semantic values in semantic accounts of natural languages. Unfortunately, the epistemic problems abstracta generate make it difficult to use them for this purpose. We can't make epistemic contact with abstracta, so it is difficult to see how we could get our words to latch onto them. We can't single numbers out, by pointing or in any other obvious way, and say 'that is 0', 'that is 37', and so on. We might try to pick 0 out by saying that '0 is the first of the natural numbers', but this doesn't really help unless we have pinned down the reference or extension of 'natural number' and (less obviously) that of 'first' (as it applies to the sequence of natural numbers). So we are back with the original problem. We can't make identifying reference in language because we can't make identifying reference in thought.

In some cases, particularly in mathematics, we *can* specify the structure of a given realm of abstract entities. For example, we can pin down the structure of the natural numbers with some sophisticated logic (with what is known as a second-order version of Peano's Postulates). But if there is one group of things with this structure, there are many, and there is little reason to suppose that any one of them gives the unique metaphysical truth about What Numbers Really Are (cf. Benacerraf, 1965). Because we lack epistemic contact with numbers, we can only describe the structure of the realm of numbers, and such descriptions underdetermine the denotations of our numerical vocabulary. So, ironically, the apparent success of our earlier explanations for the semantic features of numbers seems undermined by the problems with epistemic phenomena.

6 Conclusion

So . . . *are* there abstract entities? And if so, which ones? The answers depend on the answers to three prior questions. Is inference to the best available overall ontological explanation ever legitimate? If so, when? And when it is, how do we adjudicate among competing explanations? My answers are more tentative than I would like, but this is a conclusion, so I will end by drawing some.

Is the Game Optional? If someone won't play the metaphysical game, there are no knock-down, non-question-begging arguments to show he is wrong. We can cite reasons for, and against, the possibility of inference to the best ontological explanation, but none of them come close to being conclusive. Indeed, if I am right, differences of beliefs in ontology very often stem from differences of beliefs about the legitimacy and nature of inference to the best explanation in ontology.

One can, of course, say: well, *if* you are going to play the game of ontology, you have to agree that at least some of these things need accounting for. But this risks trivializing the project. Most people become interested in ontology because it promises to tell them something about what the world is really like, not because it is just an absorbing and challenging game.

Evaluating Competing Explanations The gist of the discussion thus far is that evaluation of rival explanations in ontology is a global affair that requires sound philosophical judgment rather than a reliance on hard and fast rules (the problem is that there *are* no such rules, though there are rough but generally accepted guidelines, so that not just anything goes). The process is global or holistic, in the sense that it depends on the weighing of many different considerations at the same time. And although the decisions that must be made in evaluating competing programs are usually made in light of shared philosophical values, there doesn't seem to be any uniquely correct way to trade such values off against each other. For example, other things being equal more explanatory power, breadth of coverage, and simplicity are better than less (who would disagree—and what else *could* we go on?). But then when are things *ever* equal? And when they are not, is it better to have a richly detailed explanation of a narrower range of phenomena or a less detailed explanation of a wider range?

Disagreements about simplicity Arguments over simplicity play a prominent role in debates in ontology, sometimes crowding out consideration of other important explanatory virtues. The verdict of simplicity is rarely unequivocal, however, and judgments about it differ from one philosopher to another. Still, some philosophical disputes actually come down in print to questions about whether two basic, undefined, primitive objects and one basic, undefined, primitive relation are simpler than one primitive object and two primitive relations. Such considerations are much too fragile to support conclusions about the “ultimate nature of reality,” as if *What There Really Is* could come down to whether an account employs two primitive notions, rather than three.

6.1 The Fundamental Ontological Tradeoff

There is an even more fundamental trade-off that we face at every turn in philosophy, from ethics to philosophy of science to philosophy of mathematics to metaphysics. I will call it the *fundamental ontological tradeoff*. The fundamental ontological tradeoff is the tradeoff between *explanatory power*, on the one

hand, and *epistemic credibility*, on the other; between a rich, lavish ontology that promises a great deal of explanatory punch, and a more modest ontology that promises more epistemological security and believability. How a philosopher strikes a balance in this tradeoff goes along way to determining whether or not she will believe there are abstract entities.

The more machinery (especially abstract machinery) we postulate, the more we might hope to explain—but the harder it is to believe in the existence of all that machinery. Russell makes this sort of point in his famous theft-over-honest-toil passage: “The method of ‘postulating’ what we want has many advantages; they are the same as the advantages of theft over honest toil. Let us leave them to others and proceed with our honest toil” (Russell, 1919, p. 71). But without at least a little postulation, it is very difficult to even get started.

6.2 The Upshot

Once ontological explanation is allowed and (rough and ready) ground rules are set, there can be winners and losers and perhaps a spectrum of views in between. But it is important to see that not everyone who plays the game gets to win. For example, although Goodman’s and Quine’s (1947) celebrated attempt to provide an account of mathematics that avoided all abstracta remains impressive, it simply cannot account for enough features of mathematics to be judged a success—even by Quine. But once we eliminate the more unpromising explanations, we may well be left with more than one contender.

In short, if ontological explanations are legitimate, it is unlikely that there will be uniquely correct explanations, and so unlikely that we will arrive at a single picture about which abstracta (if any) there are. Perhaps we can make slow progress to this goal, with a series of explanations zeroing in more and more on the existence and nature of various abstracta. But as we saw when discussing the linkage problem, such a series may instead lead to a fragmentation of entities, with a corresponding fragmentation of our views about them.

If Epistemology isn’t a problem, abstracta win If inferences to the best ontological explanation are legitimate, and if the epistemic problems about cognitive access to abstract entities can be overcome, then the case for at least some abstract entities is very strong. This is so because we can explain much more with them than without them. But the epistemological problems are severe.

A parting thought Still, would it really be so bad if the best we could do was to rule out some

accounts in ontology and learn to live with more than one survivor? Perhaps developing a tolerance for more than one (which need not mean every) ontological framework is the best we can do. If we can do this without falling into some dreadful sort of relativism. Maybe that's good enough.¹

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¹Many discussions of abstract objects are rather technical, but in the interests of accessibility I will steer clear of such complexities and avoid logical notation (the interested reader can find many of the more technical matters discussed in some of the works cited here). Because the existence of various sorts of abstract objects, and indeed abstract objects in general, is a matter of contention, prudence suggests constant qualifications like "putative" examples of abstract entities and talk that "seems" to be about them. But this becomes tiresome and I will mostly leave such hedges tacit. I am grateful to David Armstrong, Hugh Benson, Monte Cook, Brian Ellis, Ray Elugardo, Jim Hawthorne, Herbert Hochberg, Chris Menzel, Adam Morton, Sara Sawyer, Ted Sider, Shari Villani, and Ed Zalta for helpful discussions on the topics discussed here.

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