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Reading the Book of the World

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Abstract In *Writing the Book of the World*, Ted Sider argues that David Lewis's distinction between those predicates which are 'perfectly natural' and those which are not can be extended so that it applies to words of all semantic types. Just as there are perfectly natural predicates, there may be perfectly natural connectives, operators, singular terms and so on. According to Sider, one of our goals as metaphysicians should be to identify the perfectly natural words. Sider claims that there is a perfectly natural first-order quantifier. I argue that this claim is not justified. Quine has shown that we can dispense with first-order quantifiers, by using a family of 'predicate functors' instead. I argue that we have no reason to think that it is the first-order quantifiers, rather than Quine's predicate functors, which are perfectly natural. The discussion of quantification is used to provide some motivation for a general scepticism about Sider's project. Shamik Dasgupta's 'generalism' and Jason Turner's critique of 'ontological nihilism' are also discussed.

Keywords Metametaphysics · Metaontology · Sider · Fundamentality · Quantification · Predicate functors

1 Introduction

Elitists distinguish the *elite*, upper-class words from lower-class *plebeian* ones. It's been said for example that terms from fundamental physics might be elite, like perhaps 'electron' and 'mass'. Some logical constants might be elite too, like maybe the symbol for conjunction or the identity sign. Perhaps some mathematical words are elite as well. By contrast, secondary quality words like 'red' and 'sour' are

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paradigmatic plebeian terms. The same goes for aesthetic terms like ‘delicious’ and ‘elegant’. Folksy, unscientific terms like ‘dove’ are said to be plebeian too.[1]

The thought here is that the elite words are somehow particularly well-fitted to the world’s intrinsic, fundamental structure, so that using elite vocabulary one can describe, as Bernard Williams put it, the world ‘as it really is… independently of our thought’.[2] When using the plebeian terms, however, we can at best describe the world as it appears to *us*, with our own peculiar sense organs, tastes and history.

Elitism is an old idea,[3] but only recently has it been given a thorough exposition and defence. Its champion is Ted Sider. In his book, *Writing the Book of the World*,[4] Sider discusses the distinction in great detail and uses it to throw new light on some of the most difficult, murky and obscure questions in philosophy. And he announces a bold new philosophical project: metaphysicians, he says, should make it one of their goals to figure out which are the elite words (or, as he puts it, the ‘joint-carving’ or ‘perfectly natural’ words).

But I have my doubts. I’m not convinced that there is a philosophically important distinction between elite and plebeian words. Moreover, even supposing that Sider is right on that point, I think his project is epistemologically problematic: I doubt that we will be able to get far in our attempts to figure out which words are elite. In this paper, I’ll investigate this epistemological issue using an example. Sider claims that there is an elite first-order quantifier; I’ll argue that this claim is not justified.

But first I should explain Sider’s elitism in rather more detail.

2 More on Sider’s elitism

2.1 The distinction between elite and plebeian words, and the goals of inquiry

David Lewis suggested that properties are ordered by ‘naturalness’: some properties are more ‘natural’ than others.[5] The more natural properties are those that ‘carve nature at the joints’; objects that share a natural property resemble each other in one respect—not just to us, but objectively. The property of being an electron is very natural; the property of being a lion is less so; the property of being a dove is still less natural; all of these properties are more natural than the property of being either a dove, or an aqueduct, or a prime number that isn’t seventeen.

Plausibly, one of the goals of science and metaphysics is to identify the natural properties. In zoology, for example, it was an advance when we started categorising

[1] We subdivide the *columbidae* into doves and pigeons, but the division is not in good zoological standing. Roughly, the birds of prettier species are called ‘doves’ while the birds of the uglier species are called ‘pigeons’.

[2] Williams (1978, p. 196) is certainly most naturally read as an elitist, but this is disputed: see Moore (2007).

[3] See Burgess (2005) for a brief history of the idea.

[4] Sider (2011); throughout this paper, all references to Sider’s work are to this book.

[5] Lewis (1983); see also Lewis (1984). Lewis’s work on the topic was a development of the work of David Armstrong; see Armstrong (1978).

whales, dolphins and porpoises with the other mammals rather than with the fish: we discovered a way of categorising the animals that better respects the objective similarities and differences between them. Let's say that a predicate corresponding to a natural property is a 'natural predicate'; then it's plausible to say that good scientific theories are expressed using natural predicates.

Sider generalises this to other parts of speech. Just as in science and metaphysics we aim to use natural predicates, so we should aim to use natural quantifiers, natural singular terms, natural operators, and so on.[6] In metaphysics, Sider writes, one of the central goals should be to identify the *most* natural or joint-carving terms—the terms that reveal 'reality's fundamental structure'. 'The truly central question of metaphysics,' Sider tells us, 'is that of what is *most* fundamental. So in my terms, we must ask which notions carve *perfectly* at the joints' (p. 5). What Sider calls the 'perfectly natural' terms, I call the 'elite' terms.

2.2 Sider's epistemology

In this section, I will describe Sider's account of how we should go about finding the elite words. It will be helpful to build up to Sider's account, by looking first at some unsatisfactory accounts of the epistemology of the elite (though this is not how Sider himself introduces his position).

Let's start with a simple question. Why is it so often said that terms from fundamental physics (like 'mass', perhaps) are elite, while folksy terms like 'dove' are not? The obvious answer is that 'mass' occurs in a well-confirmed theory, whereas 'dove' doesn't. So here's a first stab at a criterion for identifying the elite terms:

> We are justified in believing that a term is elite if and only if we are justified believing that it occurs in a well-confirmed theory.[7]

This proposal won't work. To see why not, consider the fact that some well-confirmed theories in economics might contain quantifiers that are restricted in some way: restricted to the things that are relevant to economics. The quantifiers in economic theory need not range over stars, for example. It doesn't follow that there is an elite quantifier which doesn't range over stars. The same goes for other disciplines which are limited in scope. Set theorists often use quantifiers that range over only pure sets. Even if set theory is well-confirmed—even if set theory is *maximally* well-confirmed—it doesn't follow that there is an elite quantifier that ranges over only pure sets.

[6] For example, Sider writes (p. 7): 'Realism about *predicate* structure is fairly widely accepted. Many—especially those influenced by David lewis—think that some predicates (like 'green') do a better job than others (like 'grue') at carving nature at the joints. But this realism should be extended, beyond predicates, to expressions of other grammatical categories, including logical expressions.' Sider then goes on to use the existential quantifier as an example.

[7] Throughout this paper, 'justified' means *propositionally* justified, not *doxastically* justified. It might be better to replace 'if and only if' with 'if and only if and to the extent that', but we need not worry about these subtleties.

To avoid this sort of problem, Sider follows Quine in talking not about theories (plural) but about our 'total theory'. We should focus our attention on the best *overall* account of the nature of our world.

So here's a revised suggestion:

> We are justified in believing that a term is elite if and only if we are justified in believing that it occurs in the most epistemically virtuous total theory.

A few words on 'epistemic virtue' are in order. Those of us who aren't sceptics agree that some total theories are (given current evidence) more worthy of belief than others. Those total theories that are more worthy of belief have certain features which make them so. These features are, in my terminology, the 'epistemic virtues'. *Consistency with the evidence* is presumably one of the epistemic virtues; *elegance* might be another. (Since the only sort of virtue discussed in this paper is epistemic virtue, I'll often omit the word 'epistemic' for brevity.) Notice that we evaluate total theories rather differently to theories which are narrow in scope. The theory of continental drift would be *hopeless* if offered as a total theory, though of course it is not a hopeless theory.[8]

But the criterion still isn't right. 'the most virtuous total theory' is a definite description, so it carries an implication or presupposition of uniqueness. Now it might be true that there is some total theory which is more virtuous than all others, but it is by no means obvious that this is so, and we shouldn't make this assumption in giving a criterion for identifying elite words. For all we know, there are several theories which are tied for the title, 'most virtuous total theory'. For example, it might turn out that some of the most virtuous theories are 'substantivalist' in character and so contain the term 'space–time-point', while some other maximally virtuous theories are 'relationist' and contain no such term. Were it to transpire that this is so, Sider's position is that we should adopt an *agnostic* position on the question of whether 'space–time-point' is elite (see p. 221). This suggests:

> We are justified in believing that a term is elite if and only if we are justified in believing that it occurs in *every* maximally virtuous total theory.

One final correction is required. Surely there is no term that occurs in *all* of the most virtuous total theories—one can always avoid the use of a term simply by replacing it with a synonym. But presumably, for example, one can't show that 'spacetime-point' isn't elite by pointing out that one can always use the German term 'Raumzeitpunkt' in its place. It's easy to correct the criterion to avoid this problem.

[8] Notice also that 'the' most virtuous theory need not be 'our' most virtuous theory. Suppose that at some particular time, the most virtuous total theory that has been formulated is known to be seriously defective in some respect. In this case, it might well be that researchers would not be justified in believing that the terms in the theory are elite. I would like to thank an anonymous reviewer at *Philosophical Studies* for this point.

The indispensability criterion:
We are justified in believing that a term is elite just in case we are justified in believing that either it or a synonym occurs in all of the most virtuous total theories.

In calling this *'The indispensability criterion'*, I'm following Sider. Here's the idea. To 'dispense' with an expression is to show that there is a maximally epistemically virtuous theory which doesn't contain the expression or a synonym. So we can rephrase Sider's criterion like this: we are justified in thinking that an expression is elite just in case we are justified in thinking that the expression is indispensable.[9]

Now perhaps not all elitists will accept Sider's criterion. In particular, there's room for debate about how one should respond if it turns out that several theories which use very different vocabularies are all maximally virtuous. I'll return to this question in Sect. 7.2, but for now I'll work with Sider's criterion.

Sider uses the indispensability criterion to argue that there is an elite first-order quantifier:

> As I argued... the way to tell which notions carve at the joints [is:] believe in the fundamental ideology that is indispensable in our best theories. This method yields a clear verdict in the case of quantification. Every serious theory of anything that anyone has ever considered uses quantifiers, from physics to mathematics to the social sciences to folk theories. And... there is no feasible way to avoid their usage. Quantification is as indispensable as it gets. This is defeasible reason to think that we're onto something with our use of quantifiers, that quantificational structure is part of the objective structure of the world.[10]

I'll argue that this is mistaken. In the next four sections, I'll show that all first-order quantifiers are dispensable, which implies (by Sider's own criterion) that Sider is not justified in claiming that there are elite first-order quantifiers.

3 Introducing quinese

These equivalences are well known:

$\ulcorner \neg\forall x \neg \phi \urcorner$ is equivalent to $\ulcorner \exists x \phi \urcorner$.
$\ulcorner \neg\exists x \neg \phi \urcorner$ is equivalent to $\ulcorner \forall x \phi \urcorner$.

[9] Sider explains his account in Sect. 2.3. '[R]egard the ideology of your best theory as carving at the joints,' he writes. He uses the term 'indispensable' in the section: '[R]egard as joint-carving the ideology that is indispensable in your best theory. This [way of putting it] is fine, provided "indispensable" is properly understood, as meaning "cannot be jettisoned without sacrificing theoretical virtue."'

[10] This is from Sect. 9.6.4 of Sider (2011). It should be noted that, according to Sider, the English quantifier 'there exists' is *not* an elite expression. Sider thinks that 'There exists rocks' is true in English, but he denies that the elite first-order quantifiers range over compound things such as rocks. I won't dwell on this issue; I am concerned with the question of whether *any* quantifier is elite.

It might be argued that, in light of these equivalences, it's quite obvious that first-order quantifiers are dispensable. A first-order existential quantifier '$\exists$' is dispensable, because for any variable v, you can always replace $\ulcorner \exists v \urcorner$ with $\ulcorner \neg \forall v \neg \urcorner$. And a first-order universal quantifier '$\forall$' is dispensable, because $\ulcorner \forall v \urcorner$ can always be replaced with $\ulcorner \neg \exists v \neg \urcorner$. This is already sufficient to show, it might be argued, that we are not in a position to identify either '$\forall$' or '$\exists$' as elite.

I am sympathetic with this argument, and I will have more to say about it in Sect. 7.1. But my goal in this paper is more ambitious: I will show that one can dispense with *both* first-order quantifiers *simultaneously*.

Here's the plan. In this section I'll describe a method for excising the first-order quantifiers from a theory, using 'predicate functors' in their place. My argument here was inspired by a paper by John Burgess,[11] but of course I deserve the blame for its faults. In Sect. 4 I'll respond to an objection to the proposal, based on a paper by Jason Turner. In Sects. 5 and 6 I'll argue that we're not in a position to know whether it's the theories which use quantifiers or the theories which use predicate functors that are more epistemically virtuous. In Sect. 7 I'll reject a position according to which both quantifiers and predicate functors are elite.

Sider uses the term 'ontological realism' for the view that there is an elite first-order quantifier. I'll adopt this term, and use the term 'ontological anti-realism' for the view that the first-order quantifiers are plebeian. Assuming that Sider is right about how to identify elite words (see the previous section), to defend her position the ontological anti-realist must find a way of avoiding the first-order quantifiers in her theories.

There'll be no problem in simple cases. Suppose for example that I say, 'There exists a rabbit.' The ontological anti-realist may say simply 'Rabbit!', meaning by this that the property of rabbithood is realized. Similarly, where I would say, 'There exists a brown rabbit', she can say 'Brown-and-also-rabbit!' And where I would say 'There exists something that is not a rabbit', she can say 'Non-rabbit!'

The strategy here is simple enough. She makes an assertion by uttering a predicate, and when she does so she means that the corresponding property is realized. Since she has only a limited lexicon, she needs to compound predicates much of the time. This is easy enough in simple cases, as we have seen, but she should prefer a systematic way of compounding predicates, and she would like to be sure that the resulting language is expressively rich enough. (How, for example, can she deal with 'there exists a rabbit, and something else which is brown'?).

Fortunately for her, Quine has already carried out this task, in his paper 'Variables Explained Away'.[12] He added to familiar, first-order predicate logic a family of 'predicate functors', which are used to compound simple predicates. I will now explain how Quine defined his predicate functors, before returning to my discussion of the ontological anti-realist.[13]

[11] Burgess (2005).

[12] Quine (1960).

[13] Rather than presenting Quine's original system, from Quine (1960), I'll incorporate some of Quine's later modifications, from Quine (1971, 1981). I do this partly to make my discussion easier to compare

The simplest of Quine's predicate functors is '$\sim$'; which 'negates' a predicate—so for example '$\sim Dog$' is a predicate satisfied by all and only the non-dogs. More generally[14]:

For any n-place predicate F, $\sim F$ is an n-place predicate such that the open formula $[\sim Fx_1 \ldots x_n]$ is equivalent to $[\neg Fx_1 \ldots x_n]$.

'&' 'conjoins' predicates, like so:

For any n-place predicates F and G, $(F \,\&\, G)$ is an n-place predicate such that the open formula $[(F \,\&\, G)x_1 \ldots x_n]$ is equivalent to $[Fx_1 \ldots x_n \wedge Gx_1 \ldots x_n]$.

For example, ($Brown \,\&\, Rabbit$) is satisfied by all and only the brown rabbits. 'Δ' is the 'derelativisation' predicate, defined like so:

For any n-place predicate F, ΔF is an $(n-1)$-place predicate such that the open formula $[\Delta Fx_1 \ldots x_{n-1}]$ is equivalent to $[\exists x_n Fx_1 \ldots x_n]$.

For example, if '*Eats*' is a two-place predicate satisfied by x and y just in case x eats y, '$\Delta Eats$' is a one-place predicate satisfied by the eaters and nothing else.

You might think that it would be useful to have a 'conversion' functor ('ϕ', say) which 'switches the argument places' of a binary predicate. So for example, x and y would satisfy '$\phi ParentOf$' just in case x is the child of y. As it turns out, to deal with predicates of adicity greater than two, it's better to have two different functors that behave like this, defined as follows:

For any n-place predicate F, ϕF is an n-place predicate such that the open formula $[\phi Fx_1 \ldots x_n]$ is equivalent to $[Fx_1 \ldots x_{n-2}x_n x_{n-1}]$.

For any n-place predicate F, ΦF is an n-place predicate such that the open formula $[\Phi Fx_1 \ldots x_n]$ is equivalent to $[Fx_n x_1 \ldots x_{n-1}]$.

The last two predicate functors allow us to tinker with the adicity of our compound predicates. The 'padding' operator adds an argument-place to its predicate:

For any n-place predicate F, $\uparrow F$ is an $(n+1)$-place predicate such that the open formula $[\uparrow Fyx_1 \ldots x_n]$ is equivalent to $[Fx_1 \ldots x_n]$.

For example, x and y satisfy '$\uparrow Dog$' just in case y is a dog.

The 'reflection' operator, on the other hand, removes an argument place:

For any n-place predicate F, $\downarrow F$ is an $(n-1)$-place predicate such that the open formula $[\downarrow Fx_1 \ldots x_{n-1}]$ is equivalent to $[Fx_1 \ldots x_{n-1}x_{n-1}]$.

For example, x satisfies '$\downarrow Kills$' just in case x commits suicide.

Footnote 13 continued
with that in Turner (2010), and partly so as to make the longer formulas more manageable. For proof-systems, see Bacon (1985) and Kuhn (1983).

[14] I'm omitting corner-quotes and adding brackets in an *ad hoc* way, to make these definitions easier to read.

This completes the list of functors.

An interesting feature of Quine's functors is that they enable one to construct *nought*-place predicates. I've already said that the derelativisation of the two-place predicate '*Eats*' is a one-place predicate '*ΔEats*' which means *eats something*. Taking this one step further, '*ΔΔEats*' is a nought-place predicate which means *something eats something*.

With a bit of practice, it's straightforward to take sentences of first-order predicate logic and turn them into nought-place predicates, built out of atomic predicates and Quine's predicate functors.

Here's an example:

$$\exists x \exists y[(Rabbit(x) \wedge Brown(y)) \wedge \neg x = y]$$
$$\exists x \exists y[(\uparrow Rabbit(y, x) \wedge \uparrow Brown(x, y)) \wedge \neg{=}(x, y)]$$
$$\exists x \exists y[(\phi \uparrow Rabbit(x, y) \wedge \uparrow Brown(x, y)) \wedge \sim{=}(x, y)]$$
$$\exists x \exists y((\phi \uparrow Rabbit \,\&\, \uparrow Brown) \,\&\, \sim{=})(x, y)$$
$$\Delta\Delta[(\phi \uparrow Rabbit \,\&\, \uparrow Brown) \,\&\, \sim{=}]$$

The crucial result is that *any* name-free sentence of LFOPL (the language of first-order predicate logic) is equivalent to some complex predicate, built up using only simple predicates and Quine's predicate functors.[15]

Quine introduced his predicate functors because he wanted to show that variables are in principle dispensable: we don't need to use them. In principle, we can avoid using variables by speaking 'Quinese'—the language whose sentences are just nought-place predicates constructed from atomic predicates using Quine's predicate functors.

But back to the ontological anti-realist. It looks as though Quinese is just what the ontological anti-realist wanted: apparently, by speaking Quinese she can avoid using proper names and the first-order quantifiers, and Quine has shown that the resulting language is sufficiently expressively rich.

But there's a complication. Here again are Quine's definitions of the predicate functors:

$[\sim Fx_1 \ldots x_n]$ is equivalent to $[\neg Fx_1 \ldots x_n]$.
$[(F \,\&\, G)x_1 \ldots x_n]$ is equivalent to $[Fx_1 \ldots x_n \wedge Gx_1 \ldots x_n]$.
$[\Delta Fx_1 \ldots x_{n-1}]$ is equivalent to $[\exists x_n Fx_1 \ldots x_n]$.
$[\phi Fx_1 \ldots x_n]$ is equivalent to $[Fx_1 \ldots x_{n-2} x_n x_{n-1}]$.
$[\Phi Fx_1 \ldots x_n]$ is equivalent to $[Fx_n x_1 \ldots x_{n-1}]$.

[15] Perhaps I should explain this result slightly more carefully. It's easy to see (based on the definitions of the predicate functors given above) how to extend the familiar definition of truth-at-a-model for standard first-order predicate logic to a definition of truth-at-a-model for the language that results from extending first-order predicate logic by adding Quine's predicate functors. Quine proved that for every name-free sentence S of first-order predicate logic, there is a nought-place predicate P composed of just simple predicates and the predicate functors, such that S and P are true at precisely the same models.

It's worth noting too that we can extend Quine's system so as to dispense with proper names—we need only add an appropriate sentence functor for each name. For example, 'Rabbit(Peter)' will become 'PeterRabbit', which is to be understood as meaning something like *the property* rabbit *is realised Peterly*. More generally, if F is an n-place predicate, '*PeterF*' is an $(n-1)$-place predicate such that $[PeterFx_1 \ldots x_{n-1}]$ is equivalent to $[Fx_1 \ldots x_{n-1} Peter]$.

$[\uparrow Fyx_1 \ldots x_n]$ is equivalent to $[Fx_1 \ldots x_n]$.
$[\downarrow Fx_1 \ldots x_n]$ is equivalent to $[Fx_1 \ldots x_n x_n]$.

Quine stipulated that the formulae in the left-hand column of this list are equivalent to the corresponding formulae on the right. The ontological anti-realist will want to resist this claim. She wants to say that Quinese sentences are elite, while sentences containing quantifiers are not: so in at least one respect the two sorts of sentence are not 'equivalent'. The anti-realist will regard the Quinese predicate functors as *primitive terms*, and the list above as a set of instructions for producing *inferior substitutes* for Quinese sentences, in the plebeian language LFOPL. Having reinterpreted Quinese in this way, the ontological anti-realist can use the new language without reneging on her commitment to avoid the plebeian expressions of the ontological realists.

Here's the schedule for the next four sections. In Sect. 4, I'll deal with Jason Turner's claim that Quinese contains a first-order existential quantifier after all. In Sect. 5, I'll look at some epistemic virtues and argue that they don't give us grounds for preferring Quinese theories to LFOPL ones, or *vice versa*. In Sect. 6 I'll look at an ingenious argument, adapted from the work of Shamik Dasgupta, for the conclusion that it is the predicate functors of Quinese, rather than the quantifiers and variables of LFOPL, that are elite. In Sect. 7, I'll discuss the suggestion that *both* the predicate functors of Quinese, *and* the quantifiers and variables of LFOPL are elite.

4 Turner's argument

In his paper 'Ontological Nihilism',[16] Jason Turner argues that the derelativisation functor, '$\varDelta$', is a first-order existential quantifier. He agrees of course that it's a rather unfamiliar sort of quantifier, because it doesn't bind variables, but he thinks that it's a quantifier even so.

He has an argument for this conclusion, which I'll discuss in a moment. But even in the absence of such an argument, it's easy to see what he's getting at. Compare these two sentences:

$\exists x \exists y Eats(x, y)$
$\varDelta\varDelta Eats$

The '$\varDelta$' in the latter sentence seems to be doing very much the same job as the '$\exists$' in the former. The '$\exists$' binds variables, while '$\varDelta$' doesn't, but otherwise they look to be functioning rather similarly. So there's something intuitive about Turner's idea that '$\varDelta$' *just is* an existential quantifier.

Turner's claim threatens my argument. My position is that we can dispense with first-order quantifiers by using predicate functors instead. But if Turner is right, one of the predicate functors just is a first-order existential quantifier. So let's take a look at Turner's argument.

[16] Turner (2010).

4.1 Turner's argument

The argument is complicated, so I'll break it up into three steps.

Step One: Variable-Binding and 'Quantification Proper'

Turner thinks that '$\exists$' does two jobs at once. As he puts it, the '$\exists$' symbol 'manages variable-binding, and it says something about how many values of its bound variable satisfy the postfixed formula'. He thinks it clarifies things to separate the two jobs, to separate 'variable binding' from 'quantification proper'.

He goes on:

This is what lambda-abstraction languages do. They have a predicate-forming operator, 'λ' that combines with a variable and an open expression to make a predicate: where 'ϕ' is an open expression, '$\lambda x \phi$' means 'is an x such that ϕ'. They also have expressions '$\exists_p$' and '$\forall_p$' that mean 'there is something that' and 'everything is such that' respectively.

For example, where in LFOPL we would write:[17]

$$\exists x Rabbit(x)$$

Using Turner's notation we would write:

$$\exists_p \lambda x Rabbit(x)$$

By having one lambda within the scope of another, we can use this notation to create compound polyadic predicates. For example, here is a predicate which means *brother of*:

$$\lambda x \lambda y (Sibling(x, y) \wedge Male(x))$$

Turner calls '$\exists_p$' a 'quantifier proper' (as opposed to '$\exists$', which is a quantifier-and-variable-binder-rolled-into-one). Assuming that the term 'quantifier proper' is appropriate, the ontological anti-realist will say that '$\exists_p$' is plebeian.

It will be helpful to have a new name for the new notation. I stipulate that 'the Lambda Language' is a modified version of LFOPL in which lambdas and '$\exists_p$' are used in place of '$\exists$'. For simplicity I will ignore universal quantifiers in what follows, and I'll assume that neither '$\forall_p$' nor '$\forall$' is included in the Lambda Language.

Step Two: Lambda-Terms and Predicate Functors
As I said, the following is a predicate meaning *brother of*:

$$\lambda x \lambda y (Sibling(x, y) \wedge Male(x))$$

So is this:

[17] I'll assume that '$\exists_p$' can also be prefixed to simple predicates, and that the resulting formula are interpreted in the obvious way. For example, '$\exists_p F$' is equivalent to '$\exists x Fx$'.

$(Sibling \ \& \ \phi{\uparrow}Male)$

So these two predicates seem to mean the same thing. One uses lambdas and variables, the other uses predicate functors; the effect is the same. Quine's achievement is to have shown that predicate functors can do the same job as variables and lambdas. That's how Turner sees it, anyway. More generally, Turner thinks that if you take a Quinese predicate and excise the predicate functors '$\uparrow$', '$\downarrow$', 'Φ', 'ϕ', '&', and '$\sim$' by using lambdas and variables instead, the result is a formula synonymous with the one you started with.

So for example, these are the same in meaning:

$\lambda x \lambda y(Rabbit(x) \ \wedge \ Brown(y)) \wedge \neg x = y)$
$(\phi{\uparrow}Rabbit \ \& \ {\uparrow}Brown) \ \& \ \sim =$

Turner introduces another language: I'll call it 'Lambda-Quinese'. Lambda-Quinese does contain 'Δ', but it doesn't contain the functors '$\uparrow$', '$\downarrow$', 'Φ', 'ϕ', '&', and '$\sim$': in Lambda-Quinese, the work of these latter functors is done by lambdas and variables.

Step Three: Comparing Lambda-Quinese and the Lambda Language

We've now created a modification of LFOPL, the 'Lambda Language', and a modified version of Quinese, 'Lambda-Quinese'. When you compare sentences from the two languages, they look very similar. To return to my example, consider the sentence:

$\exists x \exists y(Rabbit(x) \wedge Brown(y) \wedge \neg x = y)$

This translates into the Lambda Language like so:

$\exists_p \exists_p \lambda x \lambda y(Rabbit(x) \wedge Brown(y) \wedge \neg x = y)$

In Quinese, the corresponding sentence is:

$\Delta\Delta[(\phi{\uparrow}Rabbit \ \& \ {\uparrow}Brown) \ \& \ \sim =]$

In Lambda-Quinese, this becomes:

$\Delta\Delta\lambda x \lambda y(Rabbit(x) \wedge Brown(y) \wedge \neg x = y)$

Now if you look at the Lambda-Quinese sentence and compare it to the sentence from the Lambda Language, they're almost the same. The only difference is that in Lambda-Quinese, 'Δ' replaces '$\exists_p$'. This works generally: given any sentence (i.e. any nought-place predicate) of the Lambda Language, the corresponding sentence of Lambda-Quinese is obtained by replacing each '$\exists_p$' with 'Δ'.

For Turner, this is enough to show that 'Δ' and '$\exists_p$' mean the same thing, by the following general principle.

Turner's translation principle:
Suppose L_1 and L_2 are languages that are exactly alike except that, where L_1 has an expression α, L_2 has a different expression, β. If ϕ is a sentence in L_1

that uses α, we write it as 'ϕ_α', and 'ϕ_β' will be the expression of L_2 that is just like 'ϕ_α' except that β is replaced everywhere for α... If every term (other than α and β) is interpreted the same way in L_1 as it is in L_2, and if the speakers of L_1 utter ϕ_α in all and only the circumstances in which speakers of L_2 utter ϕ_β, then α and β have the same interpretation also.[18]

In our case, L_1 is the Lambda Language, and L_2 is Lambda-Quinese. We can assume that the two languages contain the very same stock of simple predicates. We've constructed them so that they have the same connectives and variables, and 'λ' means the same thing in both cases (see *Step Two*). Applying Turner's translation principle with α as '$\exists_p$', and β as 'Δ', we conclude that 'Δ' and '$\exists_p$' are synonymous—which is Turner's desired conclusion. As we saw in *Step One*, '$\exists_p$' is a 'quantifier proper'. Hence, so is 'Δ'.[19]

4.2 My response to Turner's argument

I suggest that the ontological anti-realist begin by conceding (for the sake of argument at any rate) that 'Δ' is a first-order existential quantifier. I will suggest a new, improved version of Quinese ('New Quinese', I'll call it) in which 'Δ' is replaced with a different symbol '$\subseteq$'. I'll ensure firstly that it is not a first-order existential or universal quantifier, and secondly that New Quinese is not expressively impoverished.

As before, I'll introduce the functor by showing how to produce counterparts for sentences containing the functor in LFOPL:

The counterpart of $[(F \subseteq G)x_1\ldots x_n]$ is $[\forall y(Fx_1\ldots x_n y \rightarrow Gx_1\ldots x_n y)]$.

For example, '$Dog \subseteq Mammal$' means that all dogs are mammals.[20]

New Quinese is the language that consists of predicates composed using only the functors '$\uparrow$', '$\downarrow$', 'Φ', 'ϕ', '&', '$\sim$', and the new functor '$\subseteq$'. Two abbreviations are useful: I'll write 'V' for '$\downarrow=$' ('the universal predicate') and 'Λ' for '$\sim V$' ('the empty predicate').

In practice, the two Quineses don't differ much. Suppose F and G are one-place predicates. Where in New Quinese one says '$(F \subseteq G)$', in Old Quinese one says

[18] Turner spends some time in his paper clarifying and defending this principle—I'm omitting details from his discussion that don't affect my argument. See Sect. 4.1.2 of Turner (2010).

[19] I've actually modified the argument in one small respect. Turner's version of the argument involves an extra symbol: 'δ'. I've changed the argument to remove the need for this extra symbol. I find the plethora of new symbols involved in the argument already rather confusing. The discussion is not affected in any important way by this change. Sceptical readers should compare my presentation of the argument with Sect. 6.3.1 of Turner (2010).

[20] Quine himself introduced a rather similar functor (though for very different reasons) in his Quine (1981).

'$\sim \Delta(F \& \sim G)$'.[21] Conversely, where in Old Quinese one says 'ΔF', in New Quinese one says '$\sim(F \subseteq \Lambda)$'.[22]

It's clear that '$\subseteq$' behaves quite unlike '$\exists$', '$\exists_p$', '$\forall$' and '$\forall_p$', and so even if Turner is right that Quinese contains a first-order existential quantifier, it seems that New Quinese does not.

5 A survey of some epistemic virtues

I'm going to argue that, as far as we can tell, LFOPL theories are not more epistemically virtuous than the corresponding New Quinese theories. The first-order quantifiers seem to be dispensable. I also think that, as far as we can tell, New Quinese theories are not more epistemically virtuous than the corresponding LFOPL theories. So the predicate functors seem also to be dispensable. In this section, I'll survey some (putative) epistemic virtues and argue that they don't allow us to choose between LFOPL theories and the corresponding New Quinese theories. In Sect. 6 I'll discuss an argument, adapted from Shamik Dasgupta, for the conclusion that Quinese theories are more epistemically virtuous than LFOPL ones.

Here are the virtues I'll discuss:

(1) Consistency with the empirical data.
(2) Predictive power.
(3) Simplicity.
(4) Other aesthetic virtues: elegance, beauty and so on.
(5) Ontological parsimony.

I'll start by looking at (1) and (2).

I take it that, when deriving empirical predictions from LFOPL or New Quinese theories, we are entitled to assume the following principles:

$[\sim Fx_1 \ldots x_n]$ iff $[\neg Fx_1 \ldots x_n]$.
$[(F \& G)x_1 \ldots x_n]$ iff $[Fx_1 \ldots x_n \wedge Gx_1 \ldots x_n]$.
$[(F \subseteq G)x_1 \ldots x_n]$ iff $[\forall y(Fx_1 \ldots x_n y \rightarrow Gx_1 \ldots x_n y)]$.
$[\phi Fx_1 \ldots x_n]$ iff $[Fx_1 \ldots x_{n-2}x_n x_{n-1}]$.
$[\Phi Fx_1 \ldots x_n]$ iff $[Fx_n x_1 \ldots x_{n-1}]$.
$[\uparrow Fyx_1 \ldots x_n]$ iff $[Fx_1 \ldots x_n]$.
$[\downarrow Fx_1 \ldots x_n]$ iff $[Fx_1 \ldots x_n x_n]$.

Given these assumptions, the empirical consequences of an LFOPL theory are *exactly the same as* the empirical consequences of the corresponding New Quinese theory. Hence, the two theories don't differ in their predictive power or consistency with the data.

[21] This generalises immediately to the case in which F and G have arity greater than one, and to complex predicates.

[22] The general case is a bit more difficult here. Suppose F is an n-place predicate. Then 'ΔF' is equivalent to $\ulcorner \sim(F \subseteq \uparrow^{n-1}\Lambda)\urcorner$, where the superscript numeral represents repeated application in the obvious way. The generalisation to the case of complex predicates is trivial.

Now let's look at (3): can we show that LFOPL theories are simpler than their New Quinese counterparts, or *vice versa*? To investigate this issue, I've compared various first-order mathematical theories with their New Quinese counterparts. I won't look at these theories in detail; instead, I'll just summarise my conclusions.

Sentences in LFOPL which use few variables, and contain no predicates of high adicity 'translate' very smoothly into New Quinese. For example, consider these two formalizations of the claim that R is symmetric:

$$\forall x \forall y (Rxy \rightarrow Ryx)$$
$$V \subseteq (R \subseteq \phi R)$$

However, sentences in LFOPL with a large number of variables, or predicates of high adicity, have rather ungainly Quinese counterparts. For example, consider this sentence, taken from Tarski's axiomatization of geometry[23]:

$$\forall u \forall v \forall x \forall y \forall z ((Bxuv \wedge Byuz \wedge x \neq u) \rightarrow \exists a \exists b (Bxya \wedge Bxzb \wedge Bavb))$$

It doesn't matter for our purposes what this means, but for the record '*Bxyz*' means 'y is on the line segment xz', or more briefly 'y is between x and z'.

A New Quinese counterpart of this sentence is:

$$V \subseteq (\uparrow V \subseteq (\uparrow\uparrow V \subseteq (\uparrow\uparrow\uparrow V \subseteq (\Phi\Phi((\uparrow\uparrow \Phi B \ \ \& \Phi\Phi\uparrow\uparrow \phi B) \& \Phi\Phi\uparrow\Phi\Phi\Phi\uparrow\uparrow \sim =) \subseteq \uparrow \sim (\sim (\Phi\Phi\Phi((\uparrow\uparrow\Phi\Phi\Phi\uparrow B \& \Phi\uparrow\Phi\Phi\Phi\uparrow\uparrow B) \& \Phi\Phi\uparrow\uparrow\uparrow\Phi\Phi B) \subseteq \uparrow\uparrow\uparrow\uparrow\uparrow\Lambda) \subseteq \uparrow\uparrow\uparrow\uparrow\Lambda)))))$$

This is klutzy.

A proponent of New Quinese might respond that I'm giving LFOPL a head start here by *beginning* with an axiomatisation of geometry optimized for LFOPL before translating into New Quinese. A smart New Quinese speaker might be able to come up with a more efficient New Quinese axiomatization of geometry than that obtained in this indirect way. Perhaps so, but the general point remains: New Quinese sentences containing predicates of high adicity tend to be inelegant. The reason is simple. To put it loosely, lengthy inelegant sequences of predicate functors are needed to align the argument places of the predicates. You can see the problem by figuring out a New Quinese counterpart for this LFOPL sentence:

$$\forall x_1 \ldots \forall x_{10} (Fx_1 \ldots x_{10} \wedge Gx_{10} \ldots x_1)$$

Does this give us good reason to reject New Quinese in favour of LFOPL?

I think not. The key point is that when devising formal theories, there is often a trade-off to be made between the *size of one's lexicon* and the *length of one's theory*. Most of us have come across this trade-off when constructing theories in propositional logic. If your language has only a few connectives (say, just '$\rightarrow$' and '$\neg$') the sentences in your theory tend to be inelegantly long; on the other hand, you can get a more concise theory by bloating your stock of connectives (including perhaps '$\wedge$', '$\vee$' and '$\leftrightarrow$').

[23] See Tarski and Givant (1999) for details.

The same goes, I think, for the choice between New Quinese and LFOPL. When working with predicates of high adicity, one's New Quinese sentences tend to be longer and less elegant than their LFOPL counterparts. However, this is because LFOPL has an *infinite lexicon*—it contains infinitely many variables. New Quinese has only a finite lexicon, and in consequence New Quinese sentences are often less comely.

A proponent of LFOPL might respond as follows:

> It's true that standard LFOPL has an infinity of variables: but this is just for convenience. My total theory will contain only a finite number of sentences, and hence only a finite number of variables. So a restricted fragment of LFOPL, with only a finite number of variables, will suffice.

There are two problems with this. First, it's not clear that any of our most epistemically virtuous theories contain finitely many sentences or finitely many variables. If one includes first-order Peano arithmetic in one's total theory, for example, then the theory contains infinitely many sentences and uses infinitely many variables (because the induction schema has infinitely many instances).[24] Second, the proof theory for finite-variable fragments of LFOPL is unattractive. This remarkable theorem is of particular interest:[25]

> For every finite $n \geq 4$ there is a logically valid sentence ϕ_n with the following properties: ϕ_n contains only 3 variables...; ϕ_n has a proof in first-order logic with equality that contains exactly n variables, but no proof containing only $n-1$ variables.

So as I said, we have a trade-off here. LFOPL theories tend to look nicer, but only because LFOPL has a huge, indeed infinite, lexicon. It is hard to see any basis for drawing an overall conclusion as to whether LFOPL theories or New Quinese theories have the epistemological virtue of simplicity to a greater extent—so I doubt that one can choose between the two systems of notation in this way.

This concludes my discussion of simplicity. Now I want to look at whether other aesthetic virtues can be used to choose between LFOPL theories and their New Quinese counterparts. I confess I don't have much to say about this: I can't do much more than simply report that I don't find in myself any aesthetic preference for LFOPL vocabulary over New Quinese vocabulary or *vice versa*. Perhaps some readers are so repulsed by long sentences that they think that LFOPL theories are to be preferred, or are so attracted by theories with small lexicons that they think New Quinese theories are superior. But I neither have these preferences nor see any justification for them. So I don't think that aesthetic considerations can help the elitist choose between LFOPL and New Quinese.

[24] One can't avoid the problem by using *second*-order Peano arithmetic—the comprehension axiom for second-order logic has infinitely many instances.

[25] From Hirsch et al. (2002).

Finally, let's look at (5). According to a principle sometimes called 'Ockham's razor'[26], a theory with more modest ontological commitments is to be preferred, *ceteris paribus*, to a more ontologically extravagant one. The principle is often endorsed, though it should be noted that many reject Ockham's razor and among those who accept it there's controversy about how 'modest' and 'extravagent' are to be understood.[27]

It might seem that Ockham's razor gives us some reason to prefer New Quinese theories to LFOPL theories—after all, New Quinese theories arguably carry no ontological commitments whatsoever.

Sider would not accept this argument. He thinks that ontological parsimony is an important desideratum for theories about the world's fundamental structure if, *but only if*, the first-order quantifiers are elite. If the first-order quantifiers are not elite, Sider thinks, then ontological parsimony doesn't matter (or rather, it doesn't matter for those whose concern is the world's fundamental structure—it might still be important, say, in the special sciences):

> Fixating on ontology ... is ... incautious ... It is incautious because it uncritically assumes that quantificational structure is fundamental. If quantificational structure is indeed fundamental (as I think it is), ontology deserves its place in fundamental metaphysics. But if quantificational structure is not fundamental, then ontological inquiry deserves little more attention within fundamental metaphysics than inquiry into the nature of catcher's mitts.[28]

According to Sider's usage, to say that 'quantificational structure is fundamental' is to say that the quantifiers are elite. I think that Sider's claim in this passage is correct. It follows that Ockham's razor does not justify a preference for New Quinese theories over LFOPL ones. Any argument for New Quinese as the elite language is an argument against the use of Ockham's razor in the metaphysics of the fundamental; hence, if you use Ockham's razor to defend the claim that New Quinese is the elite language, your argument is self-undermining.

So after looking at some epistemic virtues, no way of choosing between LFOPL theories and their New Quinese counterparts has been found. I'm now in a position to tentatively conclude that the first-order quantifiers are dispensable, as are the predicate functors of New Quinese. However, before endorsing this conclusion with full confidence I need to discuss a paper by Shamik Dasgupta—that's my task for the next section. In Sect. 7 I'll consider the claim that both the first-order quantifiers and the predicate functors of New Quinese are elite. I'll conclude in Sect. 8.

6 Dasgupta's argument

In the abstract to his paper 'Individuals, An Essay in Revisionary Metaphysics',[29] Shamik Dasgupta summarises his position like this:

[26] For my purposes, it doesn't matter whether this label is historically appropriate.

[27] See Burgess (1998) for some discussion.

[28] From the preface to Sider (2011).

[29] Dasgupta (2009).

> We naturally think of the material world as being populated by a large number of individuals. These are things, such as my laptop and the particles that compose it, that we describe as being propertied and related in various ways when we describe the material world around us. In this paper I argue that, fundamentally speaking at least, there are no such things as material individuals.

Dasgupta goes on to say that to describe the fundamental facts about the physical world, it is Quinese (rather than LFOPL) that we should use.

Dasgupta doesn't discuss the distinction between elite and plebeian words in his paper, so his argument is not directly relevant. However, it's plausible that words needed to describe fundamental facts are elite, so his argument is pertinent in an indirect way.

I've been saying that we have no idea whether it is the quantificational apparatus of predicate logic, or Quinean predicate functors which are elite. If Dasgupta is right, however, the conclusion can be avoided. We can be confident that it is the predicate functors which are elite, and not the quantifiers and variables of predicate logic.

In Sect. 6.1 I'll explain Dasgupta's argument; I'll criticise it in Sect. 6.2.

6.1 Dasgupta's argument

Dasgupta begins by attacking a view which he calls 'individualism'. According to individualists, 'the most basic, irreducible facts about our world include facts about what individuals there are and how they are propertied and related to one another'.

On this view, the fundamental facts about the material world are what he calls 'individualistic facts'—facts like:

> a is F, b is G, a bears R to b, …

Dasgupta's case against individualism, which will be described only in outline here, begins with an analogy. *NGT* is a fragment of classical mechanics which consists of Newton's laws of motion together with his law of gravity. We can distinguish two different versions of this theory:

> NGT_A: *NGT* combined with an absolute theory of space (i.e. a theory according to which there are facts about the absolute positions and velocities of particles).[30]
>
> NGT_R: *NGT* combined with a relational theory of space (i.e. a theory according to which there are no facts about the absolute positions and velocities of particles).

It is widely felt that NGT_R is superior to NGT_A, for the following reason. NGT_A posits facts about absolute position and velocity, but the laws of *NGT* are (in a sense that can be made precise) *insensitive* to these facts. Facts about *relative* position are important in *NGT*, because they help to determine the forces that act on the

[30] Dasgupta's discussion can be reformulated so as to avoid the reification of facts—but to keep things simple I will follow Dasgupta by indulging in this reification.

particles. And the laws specify the way in which the *acceleration* of each particle is determined by its mass and the forces that act on it. But, to put it loosely again, the laws don't constrain the absolute positions and velocities of the particles at all, except by constraining their accelerations and relative positions. Now there seems to be something objectionable about positing facts about absolute position and velocity, when these facts are redundant: NGT_A seems to be overly complicated, inelegant and unlovable for this reason.[31]

Dasgupta thinks that individualism is unlovable for a similar reason: individualistic facts are redundant and so we should avoid positing them if we can. Suppose we have some particles moving around according to the physical laws; facts about the relative positions of these particles might be important, as might facts about their charges, or their masses, or facts about the structure of space, or facts about the wave-function of the universe—and so on. But, barring some huge surprise in physics, it doesn't matter at all which particle is Alfredo, or which is Benedetta. The laws of physics are insensitive to facts about which individual is which; individualistic facts are redundant. And so we do better to omit such facts from physical theory.

Having rejected individualism, Dasgupta goes on to look at an alternative, which I will call 'naïve generalism'.

On this view, the fundamental facts are *quantificational*—facts of the form:

$\exists xFx$; $\exists yGy$; $\exists x\exists yRxy$; ...

Dasgupta rejects naïve generalism with a quick argument:

> [Naïve generalism] is unacceptable. After all, we have been brought up to understand that quantifers range over a domain of individuals. So our natural understanding of the facts listed above is that they hold in virtue of facts about individuals, and it would therefore appear that we have made no progress.

Put another way, the objection is this. Dasgupta thinks that an existential fact, a fact of the form $\ulcorner\exists x\psi(x)\urcorner$ must be grounded in a 'witnessing fact', a fact of the form $\psi(a)$. It follows that existential facts cannot be fundamental.[32] So Dasgupta rejects naïve generalism. In its place, he advocates an alternative form of generalism (Dasguptan generalism?) according to which the fundamental facts are such as to be properly described using Quinese.

6.2 A response to Dasgupta

I am not going to criticise Dasgupta's argument against individualism. For the record, I think it's a strong argument. I am going to do something much more modest: I'm going to criticise Dasgupta's argument against naïve generalism.

[31] Dasgupta also makes an epistemic point: absolute velocities cannot be measured, if *NGT* is true—and so NGT_A posits facts which are epistemically inaccessible to us. To save on space I don't discuss this idea.

[32] It is assumed here that facts are ordered by the relation *x partially grounds y*, and that fundamental facts are *minimal* with respect to this ordering. For some discussion of the notion of grounding, see Fine (2001), Schaffer (2009) and Rosen (2010).

Dasupta's main concern seems to be the 'generalism vs. individualism' issue, so perhaps it doesn't matter so much to him which form of generalism is true. (This would explain why his criticism of naïve generalism is so terse). So perhaps Dasgupta would regard my criticism as somewhat peripheral.

As we've seen, in making his argument against naïve generalism, Dasgupta uses this premise:

> *The existential grounding thesis:*
> Every fact of the form $\ulcorner\exists x\psi(x)\urcorner$ is grounded in a fact of the form $\psi(a)$.

I think that this premise is not well motivated, and so Dasgupta's argument is unconvincing.

In this passage, which I have already quoted, Dasgupta hints that he has an argument for the existential grounding thesis:

> [Naïve generalism] is unacceptable. After all, we have been brought up to understand that quantifers range over a domain of individuals. So our natural understanding of [facts like $\exists xFx$; $\exists yGy$; and $\exists x\exists yRxy$] is that they hold in virtue of facts about individuals, and it would therefore appear that we have made no progress.

Apparently, Dasgupta is trying to derive the existential grounding thesis from the standard model-theoretic treatment of the quantifiers of predicate logic.

Now it is true that the standard model-theory for predicate logic has (for example) this consequence:

> The statement '$\exists xFx$' is true at a model $\mathcal{M}$ just in case some element of the domain of $\mathcal{M}$ is also an element of the set that $\mathcal{M}$ assigns to 'F'.

But it doesn't follow that:

> If '$\exists xFx$' is true, then the fact that $\exists xFx$ is grounded in some fact of the form Fa.

Compare: you can't establish that facts expressed using second-order quantifiers are grounded in facts about the universe of sets, just by appeal to the fact that the standard model theory for second-order logic is set-theoretic. And you can't establish that modal facts are grounded in facts about possible worlds just by appeal to the standard Kripke model theory for modal languages.

But maybe I am being unfair to Dasgupta: perhaps he didn't intend to offer an argument for the existential grounding thesis, perhaps he just took it as an assumption, thinking it obviously true.

I agree that the existential grounding thesis is very plausible, but I don't think that it is legitimate for Dasgupta to appeal to this intuition at this stage in his argument. To see why not, think about *why* the existential grounding thesis is plausible. The reason, I think, is that we have in mind a sort of hierarchical picture of how quantified facts relate to one another—I'm going to call this the 'Fregean Hierarchy', though of course the history of the picture is not of great importance now. Here's the picture:

...

...

Third Floor: $\exists X Instantiated(X)$; $\exists X More(F, X)$

Second Floor: $\exists x Fx$; $\exists x \exists y Rxy$; $Instantiated(G)$

Ground Floor: Fa; Gb, Rab;

On the ground floor there are individualistic facts like Fa, Gb and Rab. On the second floor there are facts about first-order concepts, facts like $\exists x Fx$ and the fact that G is instantiated. Then on the higher floors there are facts about higher-order concepts.

Now when making his case against naïve generalism, Dasgupta assumes that fact of the form $\ulcorner \exists x \psi(x) \urcorner$ is grounded in a fact of the form $\psi(a)$—this is the existential grounding thesis. I think that the thesis is plausible because we have the Fregean hierarchy in mind when we think about quantification. Now the problem is that Dasgupta has just given us an argument for removing the ground floor of this hierarchy—he's given us an argument for rejecting the claim that individualistic facts are fundamental. Now if Dasgupta's argument is convincing, this should motivate us to reject or modify the Fregean hierarchy—and this undermines the motivation for the existential grounding thesis. On this reading of his argument, Dasgupta is appealing to an intuition that he himself has just undermined!

7 Why not both?

It might be said that throughout the last four sections I've been missing the obvious: why can't the elitist just say that *both* the predicate functors of New Quinese *and* the quantifiers and connectives of LFOPL are elite, thereby avoiding the difficult task of having to choose between them? In this section, I assess this proposal, which I'll call 'pluralism'.

Recall Sider's indispensability criterion.

The indispensability criterion:
We are justified in believing that a term is elite just in case we are justified in believing that either it or a synonym occurs in all of the most virtuous total theories.

If the pluralist maintains that Sider's criterion is correct, in order to defend his pluralism he will have to argue that all of the most epistemically virtuous total theories contain both first-order quantifiers and synonyms of the New Quinese predicate functors. I'll look at this position in Sect. 7.1. In 7.2 I'll look at versions of pluralism which involves modifying Sider's criterion.

7.1 Combining the predicate functors with quantifiers in a single theory

I'll say that a theory is 'mixed' if it contains both synonyms of the New Quinese predicate functors, and the quantifiers and sentential connectives of LFOPL. In this subsection, I'll argue that mixed theories are not among the most virtuous, because they lack the virtue of 'ideological simplicity'.

Ever since Quine's pathbreaking writings on meta-metaphysics in the 1940s and 1950s,[33] it has been a commonplace among metaphysicians that 'ideological simplicity' is an epistemic virtue. It is claimed that, other things being equal, a theory with a smaller lexicon is for that very reason simpler, and so more virtuous. Moreover, when one adds extra terms to one's language, one is typically forced also to add extra principles to one's theory. For example, a mereologist who uses only the term '*x* overlaps *y*' can get by with fewer mereological axioms than one who uses both '*x* overlaps *y*' and '*x* is a part of *y*'. Sider appeals to this norm of ideological simplicity in several places in his book, calling it the 'ideological Ockham's Razor'.[34]

My claim is that mixed theories are to be rejected on grounds of ideological simplicity. They contain, as Sider would put it, 'redundant' terms and so we can reject them using the 'ideological Ockham's razor'.

The pluralist may defend himself against this criticism by appeal to an argument which Sider develops in a section of his book titled 'Hard Choices'. Sider claims that some of the truth functional connectives are elite (or 'joint-carving'), but then asks:

> But which ones? Just $\wedge$ and $\sim$? Just $\vee$ and $\sim$? Or perhaps the only joint-carving connective is the Sheffer stroke $|$? (p. 217)[35]

Sider's somewhat tentative answer to this question is that *all* of the unary and binary truth-functional connectives are elite.[36] He admits that a theory couched in a language which contains this plethora of connectives is objectionably ideologically complex, but argues that we should prefer such theories anyway (p. 219). Roughly speaking, the idea is that we have no reason to prefer some connectives to others, and so we should use all of them. Rather more precisely, Sider's claim is that we should reject theories which contain only some of the connectives, because such theories have the vice of 'ideological arbitrariness', defined as follows:

> A theory is 'ideologically arbitrary' if it contains some word w, but not some other non-synonymous alternative word w', even though there is no reason to prefer w to w'.[37]

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33 See in particular Quine (1951).

34 He does this, for example, in his chapter on the philosophy of time. Sider claims that tense operators (like 'it will always be the case that' and 'it was once the case that') are not elite; he defends this claim by saying that these operators will not occur in any of the most virtuous theories because one can 'describe temporal reality without them—by quantifying over past and future entities and predicating features of them relative to times' (p. 241). His most sustained discussion of ideological simplicity is on p. 219.

35 A parallel question can be raised about '$\forall$' and '$\exists$'.

36 Similarly, he argues that both '$\forall$' and '$\exists$' are elite.

I say that his answer is 'somewhat tentative' because on p. 220 Sider parenthetically suggests a view on which the only elite truth functional connectives are conjunction, disjunction and negation.

37 Sider does not give such a careful definition of 'ideological arbitrariness'. But I think it is clear that this is what he has in mind.

Not that the 'ideological' in 'ideological arbitrariness' is not redundant, for there are other sorts of arbitrariness.[38]

Now the pluralist might borrow this idea, and argue that we should prefer 'mixed' theories on the grounds that theories written exclusively in New Quinese, or exclusively in LFOPL, are ideologically arbitrary. Like Sider, the pluralist should admit that it is a vice of the mixed theories that they contain many redundant terms; nevertheless, he may say that in this case considerations of ideological arbitrariness trump considerations of ideological parsimony.

Now even if we accept Sider's claim that ideological arbitrariness is a vice, it is far from clear that the case for pluralism will succeed; if it is a virtue of the mixed theories that they are not ideologically arbitrary, it is not clear that this virtue outweighs their ideological complexity. Let's think for a moment about how many logical terms the pluralist will need in his language, if he takes this line. He will need 14 sentential binary truth-functional connectives (see footnote 39), and 14 corresponding predicate functors. He will need both a term for sentential negation and negation predicate functor. There are various predicate functors that permute argument places of predicates that he will have to include alongside Φ and ϕ. There are also alternatives to $\uparrow$, $\downarrow$ and $\subseteq$ which must be included. In the end, the pluralist will end up with at least 40 symbols where others get by with just $\wedge$, $\neg$, and $\exists$. For my purposes, it would suffice to argue we are not justfied in believing that, on balance, the (non-arbitrary but ideologically bloated) mixed theories are superior to the (ideologically svelte but arbitrary) theories couched just in New Quinese, or just in LFOPL.

But my reply to the pluralist will be more ambitious than this: I do not accept that ideological arbitrariness is a theoretical vice. (Though there may be other kinds of arbitrariness which are vicious—see footnote 38).

My argument is this: in claiming that ideological arbitrariness is a theoretical vice, Sider is at odds with the received methodological standards in mathematics and the physical sciences. For example, in set theory the symbol '$\in$' for *is an element of* is ubiquitous, but very few writers use any symbol for the converse of this relation: sometimes '$\ni$' is used, but this is rare. It is never suggested that this is objectionable because it is 'arbitrary' that '$\in$' has been used but not '$\ni$'. Now it may be that mathematicians are just in error here: it is possible that they are simply failing to acknowledge that their theories have the vice of ideological arbitrariness. But we philosophers should criticise the methods of mathematicians and scientists only when we can back up our criticisms with some very powerful argument. Sider has no such argument.

The example of the logical connectives further supports my case. Sider is correct that if ideological arbitrariness *were* a theoretical vice, this would push us towards a view on which the most virtuous theories contain all (or almost all) of the truth

[38] For example, in Unger (1984), Peter Unger defends modal realism on the grounds that it 'minimizes arbitrariness'. The idea is that if there is only one concrete universe, at least some of its contingent features will be inexplicable. This argument has nothing to do with ideological arbitrariness in my sense. In Horgan (1993), Horgan briefly discusses a 'principle of non-arbitrariness' that is widely presupposed in debates about mereology. Again, the relevant kind of arbitrariness is not *ideological* arbitrariness.

functional connectives.[39] But mathematicians never suggest that we should such a strangely inflated language. On the contrary, if they address the question at all, most writers on logic and mathematics express a preference for languages with very few propositional connectives (ideological simplicity again!); other connectives are introduced by explicit definition and are described as merely a convenience.[40,41]

7.2 Modifying the indispensability criterion

The pluralist should concede that mixed theories are not among the most virtuous; he must try another approach. In this section I'll discuss pluralist view according to which none of the most virtuous theories contain all of the elite vocabulary. On this view, some of the most virtuous theories use the elite terms of LFOPL (including an elite quantifier), while some of the most virtuous theories use the elite predicate functors of New Quinese. In order to defend this position, the pluralist will have to modify *The indispensability criterion* in some way. Here's one approach:

> *The pluralist's criterion:*
> We are justified in believing that a term is elite if and only if we are justified in believing that the term occurs in some theory T such that (i) T is a maximally virtuous total theory; and (ii) T is true.[42]

The pluralist can argue that we are justified in believing that among those theories which are both maximally virtuous and true, some are couched in LFOPL while others are couched in New Quinese. By *The pluralist's criterion*, he can infer that both LFOPL terms and New Quinese terms are elite.

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[39] I say 'or almost all' for the following reason. A connective '$\rightharpoondown$' which is such that $\ulcorner(\alpha \rightharpoondown \beta)\urcorner$ is equivalent to α should surely be omitted, as should a connective '$\leftharpoondown$' which is such that $\ulcorner(\alpha \leftharpoondown \beta)\urcorner$ is equivalent to β.

[40] In his textbook on logic, Tarski was very explicit on this point:

> We . . . attempt to see to it that the system of primitive terms is INDEPENDENT, that is, that it does not contain any superfluous terms, which can be defined by means of the others. Often, however, one does not insist on [this principle] for practical, expository reasons . . .Tarski (1994), p. 122.

A similar line is taken in Church (1956) and Quine (1937).

[41] Sider might defend himself by appealing to an analogy. It's sometimes said that when stating one's fundamental physical theory one should avoid mentioning any particular unit of measurement (e.g. the kilogram, or the metre). The argument is that to mention any one such unit would be objectionably arbitrary. [See for example Field (1980, p. 45), or Liggins (2012)]. This provides some precedent for Sider's claim that ideological arbitrariness is a theoretical vice.

I'm afraid that I don't have space to discuss this important issue in any depth, but for the record my position is this. I endorse the methodological point that we should if possible avoid mention of any particular unit of measurement in our fundamental theory. However, the '$\in$'/'$\ni$' example strongly supports the view that 'ideological arbitrariness' is not an epistemic vice. So some other explanation of the methodological point is necessary. I think that an alternative explanation of this claim can be found in the theory of measurement [Suppes and Zinnes (1963) is a useful introduction] but I do not have space to rehearse this explanation here.

[42] Thanks to an anonymous reviewer at *Philosophical Studies* for suggesting this criterion.

I won't dwell on the details of the construction of *The pluralist's criterion*, because these details won't matter in what follows.[43] My goal in the rest of the section is to convince you that this pluralistic position is untenable.

I'll begin by describing a crucial premise in my case against this version of pluralism. Elitists will agree that, when metaphysicians work on a 'total' theory, one of their goals should be to construct a theory which is 'structurally complete' in this sense[44]:

> A theory T is structurally complete just in case for every elite word w, T contains a synonym of w.

Suppose, just for example, that Sider is right that the symbol '$\in$' from set theory is elite.[45] Then from an elitist point of view any theory which failed to contain this symbol (or a synonym) would be missing something: any such theory would fail to depict the set-theoretic structure of the world. Any such theory would omit some of the 'metaphysical laws'[46] such as the axioms of the true set theory.[47]

Now the pluralist's position is that among the most virtuous theories there are some which are couched in New Quinese. Let's suppose that T_{NQ} is one of them. The pluralist also thinks that among the most virtuous theories there are some which are couched in LFOPL. T_{LFOPL}, the 'translation' of T_{NQ} into LFOPL, is presumably one of them. My criticism is as follows. The pluralist must admit that the theory T_{NQ} is structurally incomplete: it's missing some elite terms, for it does not contain first-order quantifiers. The theory also omits certain metaphysical laws, such as '$\forall x x = x$'.[48] As Sider would put it, the theory T_{NQ} fails to capture the world's 'quantificational structure'. So the pluralist must agree that the theory T_{NQ} is demonstrably inadequate as a 'total theory'. But then it is not maximally virtuous after all. The pluralist position is unstable.[49]

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[43] It is perhaps worth pausing briefly to explain why condition (ii) is necessary. Suppose it turns out that some of the most virtuous theories are incompatible with one another—so that at least one of the most virtuous theories is *false*. In this case, we would presumably not be justified in thinking that all of the most virtuous theories are couched in elite vocabulary.

[44] Strictly speaking this is not implied by my characterisation of elitism in the opening of this paper, but it is hard to believe that any elitist would reject this claim. Sider certainly accepts it—see his discussion of 'conformity to the world' on p. 62.

[45] See Chap. 13 for this claim.

[46] Roughly speaking, 'metaphysical laws' are simple, powerful generalisations in elite terms. See Sect. 12.5 of Sider's book for discussion.

[47] Notice that my term 'structurally complete' has nothing to do with Sider's term 'completeness' in section 7.1 of Sider's book. What Sider calls 'completeness' is the claim that 'every nonfundamental truth holds in virtue of some fundamental truth' (p. 105).

[48] Of course, a similar point can be made about T_{LFOPL}. This theory is structurally incomplete because it does not contain, for example, the term '$\subseteq$'. And it omits some metaphysical laws, such as '$V \subseteq V$'.

[49] The pluralist might try to resist the claim that T_{NQ} fails to depict the world's quantificational structure, on the grounds that T_{LFOPL} does depict the world's quantificational structure and the two theories are analytically equivalent. This is mistaken. From an elitist point of view, even analytically equivalent statements may differ in the extent to which they faithfully depict the structure of the world. To see the point, suppose that E is an elite monadic predicate (perhaps E means *electron*), while P is a plebeian

8 Where does this leave us?

I hope to have convinced you that we don't currently have any good reason for preferring the familiar first-order quantifiers to the foreign predicate functors of New Quinese. So for all we know the first-order quantifiers are dispensable, and we are not (by Sider's own criterion) justified in thinking that they are elite. I hope to have shown too that we don't currently have reason to prefer New Quinese theories to LFOPL theories, and so again (by Sider's criterion) we are not justified in claiming that the Quinean predicate functors are elite. Personally, I am sceptical that we will *ever* be in a position to know whether the first-order quantifiers are elite, and I hope that the above discussion motivates this scepticism to some degree. Of course, I can't prove that some ingenious argument won't eventually be found that establishes that the first-order quantifiers are elite (or that New Quinese predicate functors are elite), but I haven't the faintest idea what such an argument would look like.

I've been discussing the first-order quantifiers, but as I said at the beginning what interests me is the broader question of whether the attempts of Sider and his followers to figure out which words are elite will ever be successful. And there are other examples that can be used to motivate scepticism about this project.

Take mathematics. People say that 'mathematics is indispensable', but this slogan can be misleading. I accept the received view that mathematics as a whole is indispensable (in the sense that all of our maximally epistemically virtuous total theories contain some mathematical claims);[50] nevertheless, it seems that no *particular* mathematical expression is indispensable. It is well known that every expression of standard mathematics can be defined *eliminatively* using the basic predicates of set theory, specifically 'x is a set' and 'x is an element of y'. So all mathematical vocabulary outside of set theory is dispensable. But set-theoretic vocabulary is dispensable too: we can avoid the predicates of set theory by using the theory of functions instead. The idea is that just as we can avoid number-theoretic vocabulary by 'identifying' numbers with sets, so we can avoid set-theoretic vocabulary by 'identifying' sets with functions.

Footnote 49 continued
monadic predicate (perhaps P means *dove*). Suppose that Q_1 and Q_2 are defined as follows, so that they are also plebeian:

$\ulcorner\forall x[Q_1x \leftrightarrow (Ex \vee Px)]\urcorner$ $\qquad\qquad$ $\ulcorner\forall x[Q_2x \leftrightarrow (Px \wedge \neg Ex)]\urcorner$

Now contrast the following two sentences:

(1) $\exists xEx$ $\qquad\qquad$ (2) $\exists x(Q_1x \wedge \neg Q_2x)$

These two statements are analytically equivalent, but elitists will agree that (1) is nevertheless a better representation of reality's structure, since (2) contains plebeian terms.

[50] This is the *received* view, but it is not unquestioned. See Field (1980) for a different take on the issue. Colyvan (2001) is a recent defence of the received view.

For example, we could ‘identify’ each set S with a function F_S such that:

For all $x \in S$, $F_S(x) = 0$
For all $x \notin S$, F_S is undefined at x.[51]

So it seems that even though any serious total theory is going to have to contain some mathematical vocabulary, no particular mathematical word is indispensable. To use Sider’s ‘structure’ metaphor, it seems that elitists must conclude that the world has a mathematical structure which is, and always will be, hidden.

None of this motivates the extreme claim that *no progress at all* can be made on the question ‘Which are the elite words?’ But I hope to have shown that Sider’s optimism is not well founded.

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[51] In his classic paper Neumann (1967), von Neumann presented an axiomatic theory of functions and explained how to interpret the theory of sets within it. Von Neumann’s axioms are less than ideal for my purposes, because some of his axioms contain the word ‘set’ (which was, for von Neumann, a defined term). His system also contained a rather large number of axioms. However, it is not difficult to axiomatise the theory of functions in a way that makes no reference at all to sets, and without excess complexity.

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