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*Part I*

QUINE'S 1946 LECTURE  
ON NOMINALISM: A SYMPOSIUM

## 6. Quine's 1946 Lecture on Nominalism

*Peter van Inwagen*

Quine has endorsed several closely related theses that I have referred to, collectively, as his "meta-ontology".<sup>1</sup> These are, roughly speaking, those of his theses that pertain to the topic "ontological commitment" or "ontic commitment".

The *locus classicus* among Quine's early (that is, prior to the publication of *Word and Object*<sup>2</sup>) statements of his meta-ontology is his 1948 essay "On What There Is".<sup>3</sup> Hilary Putnam has said of this essay, "[I was bowled over] when I read it as a first-year graduate student in 1948–49, and I think my reaction was not untypical."<sup>4</sup> Indeed his reaction was not untypical, at least if I may judge by my own reaction to the essay as a new graduate student twenty years later. Although I enjoyed and agreed with the first part of the essay (the "anti-Meinongian" part), it was the second part that bowled *me* over, the part that begins "Now let us turn to the ontological problem of universals . . ." (p. 9). And what bowled me over was the ontological method on display in that part of the essay, not the particular things that Quine had to say about the problem of universals. (That is also the part, and the aspect, of the essay to which Putnam was describing his reaction.) But I think the 1946 lecture<sup>5</sup> is a *better* presentation of Quine's meta-ontology than "On What There Is". It would have been a good thing for the development of analytical ontology if Quine had written the lecture up and published it.<sup>6</sup>

<sup>1</sup> See my essay "Meta-ontology," *Erkenntnis* 48 (1998), 233–250. The essay is reprinted in *Ontology, Identity, and Modality* (Cambridge: Cambridge University Press, 2001), a collection of my papers on metaphysics.

<sup>2</sup> Cambridge, Mass.: the MIT Press, 1960.

<sup>3</sup> *From a Logical Point of View* (Cambridge, Mass.: Harvard University Press, 1953; 2nd edn., 1961), 1–19. (The essay was first published in *The Review of Metaphysics* in 1948.)

<sup>4</sup> *Ethics without Ontology* (Cambridge, Mass.: Harvard University Press, 2004), 79.

<sup>5</sup> W. V. Quine, "Nominalism," this volume, pp. 3–21. See the editor's introduction for an account of the circumstances of the lecture and the nature of the "manuscript".

<sup>6</sup> For one thing, if he had done that, his delightful coinage 'struthionism' might have become current. ('Struthionism' should not be confused with Armstrong's term

It's all there. (That is, all the meta-ontological theses that are on display in "On What There Is" are presented in the lecture.<sup>7</sup>) And it's set out—so it seems to me—more clearly and systematically than in "On What There Is". True, it is set out in the course of Quine's attempt to clarify certain questions of *ontology*—not *meta-ontology*, but *ontology proper*, the study that attempts to answer the question "What is there?"—but that's by far the best way to present a meta-ontology. The most effective way to present a meta-ontology is to display that meta-ontology at work, to use it to clarify ontological questions. The central ontological question that Quine addresses in the lecture is: What are the obstacles that face nominalism—the obstacles that face nominalism whether the nominalist recognizes them or not?

I will not discuss Quine's characterization of nominalism (<C5> – <C9>). This characterization consists in his attempt to say which sorts of entities the nominalist will wish to "countenance". In the discussion of the lecture that follows, I will speak very abstractly, and simply assume that certain sorts of entity are "nominalistically acceptable" and that other sorts are not. (Or, more exactly, I will assume that certain general terms are such that the nominalist—*qua*

'ostrich nominalism'. If I understand this term, Quine *is* an ostrich nominalist: a nominalist because he does not concede the existence of Armstrongian universals; a nominalist of the ostrich variety because—in Armstrong's view—he *refuses to see* that the fact that one predicate can apply to many objects implies the existence of universals.) And that would have been useful, for there has been a resurgence of struthionism in recent years. See, for example, Joseph Melia, "On What There's Not", *Analysis* 55 (1995), 223–9, Jody Azzouni, *Deflating Existential Consequence: A Case for Nominalism* (Oxford: Oxford University Press, 2004), and Putnam's *Ethics without Ontology*, cited in n. 4. My application of this dyslogistic term to Melia, Azzouni, and Putnam should not be taken to imply that I deny the following fact: the struthionism of Melia, Azzouni, and Putnam, like the earlier struthionism of Carnap, is philosophically very sophisticated and is informed by an awareness of Quine's arguments.

<sup>7</sup> But not all the meta-ontological theses that Quine would ever endorse. One such thesis, at least, is present neither in the lecture nor in "On What There Is": that the only "true" variables are nominal variables, that (despite appearances) there can be no such thing as quantification into non-nominal positions. An important consequence of this thesis (important for the ontology of universals) is this: an expression like "There is an F such that for every  $x$ ,  $x$  is F" is either meaningless or is a disguised way of saying either 'There is a  $y$  such that  $y$  is an attribute and for every  $x$ ,  $y$  belongs to  $x$ ' or 'There is a  $y$  such that  $y$  is a class and for every  $x$ ,  $x$  is a member of  $y$ '. (A similar remark applies to apparent quantification into sentential positions.) See also note 12.

nominalist—will not object to anyone's affirming that those terms have non-empty extensions, and that certain other terms are such that the nominalist *will* object to anyone's affirming that they have non-empty extensions.) And I will assume, simply for the sake of the concrete illustrations of the Quinean meta-ontology at work that I shall present, that individual animals are "nominalistically acceptable entities", and that classes, attributes, relations, numbers, and biological species are not nominalistically acceptable. (That is, that any nominalist will maintain that there are no classes, attributes, etc.)

I will, moreover, refrain from discussing any matters relating to the following (very Quinean) thesis ("Nominalism", <C47> – <C52>):

Classical mathematics is irremediably committed to the existence of classes. And classical mathematics is a part of science. The nominalist will therefore wish to repudiate certain parts of science—at least those parts of classical mathematics that commit those who accept them to classes—as philosophically unsound. There is no reason to regard this repudiation as unacceptable, provided only that the nominalist "leaves us with" enough of science that our ability to predict experience is unimpaired. The problem that faces the nominalist, therefore, is this: to provide a nominalistically acceptable reconstruction of science that, while it discards much of classical mathematics, does not adversely affect our ability to predict experience.

Again, I will speak very abstractly and assume only that some of the declarative sentences we use (in science or in everyday life or in any other area or context) are regarded by the nominalist as indispensable. Indispensable, that is, to the nominalist's own projects and interests: sentences that the nominalist, for whatever reason, is not willing simply to discard, sentences that the nominalist will, for whatever reason, wish sometimes to use as vehicles of assertive utterance.

I will consider two sentences, each of which I will assume (without argument) that the nominalist will not wish simply to "discard".<sup>8</sup> Rather than simply recapitulate the meta-ontological theses

<sup>8</sup> In the end, it is the ontological implications of *theories* rather than of individual sentences that is the concern of the Quinean meta-ontology. But sentences play a special role in the meta-ontology, for, in Quine's view, a theory is identical with the set of sentences it "endorses", and the ontological implications of a theory are just the totality of the ontological implications of its constituent

presented in the lecture, I'll show them at work—that is, show how a nominalist (a nominalist who agrees with Quine about method in ontology) might deal with these two sentences. In the lecture, Quine himself gives several such examples (e.g. 'There are more dogs than cats'<sup>9</sup>). The examples I shall consider are rather more difficult—too difficult for Quine to have presented orally with much hope of his audience's being able to follow him—and, I think, more instructive.

My first example is taken from a much-quoted passage in "On What There Is":

[W]hen we say that some zoölogical species are cross-fertile we are committing ourselves to recognizing as entities the several species themselves, abstract though they are. We remain so committed at least until we devise some way of so paraphrasing the statement as to show that the seeming reference to species on the part of our bound variable was an avoidable manner of speaking. (p. 13)

Now why does Quine contend that saying that some zoological species are cross-fertile (although I yield to no one in my admiration of Quine's conservatism in matters of English usage, I'm going to omit the dieresis in the sequel) commits one *prima facie*—as one might put it—to the existence of species? The reason is simple: 'Some zoological species are cross-fertile' is, *prima facie*, represented in the idiom of quantifiers and bound variables like this:

- (1) There is an  $x$  and there is a  $y$  such that  $x$  is a zoological species and  $y$  is a zoological species and  $x$  is not identical with  $y$  and  $x$  and  $y$  are cross-fertile.

sentences. It is individual sentences, moreover, to which the technique of "paraphrase" is applied. (What sentences *does* a given theory "endorse"? The question has a clear answer only if the "given theory" is an axiomatic theory: exactly those sentences that are logical consequences—first-order logical consequences, the only consequences that can properly be called "logical"—of its axioms. And that means that the question 'What are the ontological implications of Theory X?' may well have no clear answer if "Theory X" is not a first-order axiomatic theory.)

<sup>9</sup> Curiously, Quine's discussion of this example (<C72> – <C82a>) contains a trivial mathematical error—the only one, I'm sure, in the whole Quinean corpus. The error is his assertion that if there are  $k$  "quanta in all space-time," the number of particulars is  $2^k$ . (The error made its first appearance at <C12>). A set with  $k$  members has  $2^k$  subsets, true, but Quine apparently overlooked the fact that this count includes the empty set, which has no fusion. (If he had wished to affirm the existence of the "the null individual", he would certainly have said so.) The right number is therefore  $2^k - 1$ .

We could put the matter this way. All textbooks of "symbolic logic" contain exercises in "symbolization". Suppose one such textbook contained (in the section on predicate logic with identity) the following exercise:

Symbolize 'Some zoological species are cross-fertile'. Use these predicate-letters: 'Sx' [*x* is a zoological species']; 'Cxy' [*x* and *y* are cross-fertile'].

The student who produced ' $\exists x \exists y (Sx \ \& \ Sy \ \& \ \sim x = y \ \& \ Cxy)$ ' would, of course, be rewarded with a smiley face. We may therefore say that the student's sentence is a "symbolization" of 'Some zoological species are cross-fertile'. And we may say the same thing of sentence (1), for the fact that the student's sentence contains symbols that are not words of English does not mark any significant difference between that sentence and (1). After all, the English words are symbols, too, and "logical symbols" like ' $\exists$ ' and ' $\sim$ ' are no more than abbreviations for words and phrases of English or of some other natural language.<sup>10</sup>

The rules of inference that will be found somewhere in the same imaginary (but typical) logic textbook in which we found our exercise in symbolization tell us that we may validly deduce

There is an *x* such that *x* is a zoological species

from sentence (1).<sup>11</sup> And 'There is an *x* such that *x* is a zoological species' is another way of saying—indeed, it is *the* way of saying—that at least one zoological species exists. And that statement is incompatible with nominalism. (The "variables" '*x*' and '*y*', Quine tells us, are simply third-person-singular pronouns. The sentence 'There is an *x* such that *x* is a zoological species' differs from

It is true of at least one thing that *it* is such that *it* is a zoological species

in no important way; the two sentences are notational variants. This example, however, illustrates only the simplest case of "variables

<sup>10</sup> The logic-text term 'symbolization', while it is convenient—and I shall continue to use it because it *is* convenient—is therefore not entirely appropriate. (Is 'Some zoological species are cross-fertile' not composed entirely of symbols?) An entirely appropriate, if rather cumbersome, phrase would be 'rendering into the canonical grammar of quantification'. (Cf. *Word and Object*, 231.)

<sup>11</sup> It is those rules that give "the canonical grammar of quantification" its point: the rules and the grammar are literally made for each other. See "Meta-ontology" (cited in note 1), 21. (The page citation refers to the reprint.)



as pronouns”, for “There is an  $x$  such that  $x$  is a zoological species’ contains only one variable. And, one may ask, what about sentences like (1), sentences that contain more than one variable? If each of the occurrences of two or more variables in a sentence is to be “replaced by” an occurrence of the one pronoun ‘it’, it will be necessary to indicate the antecedent of each occurrence of ‘it’ explicitly. Here is a way to do this (illustrated in application to sentence (1)):

It is true of at least one thing that  $it_1$  is such that it is true of at least one thing that  $it_2$  is such that  $it_1$  is a zoological species and  $it_2$  is a zoological species and  $it_1$  is not identical with  $it_2$  and  $it_1$  and  $it_2$  are cross-fertile.

But we need not invent a device to represent the antecedents of occurrences of third-person-singular pronouns, for the device already exists. Sentence (1) and the  $it_1$ / $it_2$  sentence differ only in details of notation: ‘ $x$ ’ and ‘ $y$ ’ are pronouns.<sup>12</sup>)

How shall the nominalist who does not wish to “discard” the sentence ‘Some zoological species are cross-fertile’ (who wishes in fact to use it as a vehicle of assertive utterance) respond to this argument—this argument whose conclusion is

A symbolization of ‘At least one zoological species exists’ follows by the rules of textbook logic from a symbolization of ‘Some zoological species are cross-fertile’?

The answer is simple. The nominalist must insist that he or she *does not accept* sentence (1) as a symbolization of ‘Some zoological species are cross-fertile’—as a rendering of that sentence into the canonical grammar of quantification.

“But,” a critic of nominalism may reply, “the symbolization is the obvious one. After all, the student who offered it got the smiley face.”

<sup>12</sup> If an argument is wanted for the thesis mentioned in note 7—that the only true variables are nominal variables—it would be the following. If there are non-nominal variables, they cannot be pronouns, for pronouns occupy nominal positions. But then what are non-nominal variables? “Pro-adjectives?” “Pro-verbs [as opposed to proverbs]?” “Pro-sentences?” No such items are to be found in natural language, and it is doubtful whether the idea of a pro-adjective (etc.) makes any sense. The premises of this argument can be, and have been, disputed. An evaluation of the argument lies outside the scope of this chapter.

“Well, yes. But the student was right only in relation to the two predicates that were given in the exercise.<sup>13</sup> The exercise in effect invites the student to suppose that those two predicates have non-empty extensions, a fact testified to by the fact that the student's sentence is true only if those two predicates have non-empty extensions—and I, nominalist that I am, deny that they have non-empty extensions. I would symbolize the sentence using other predicates than those two, predicates whose extensions comprise only nominalistically acceptable entities.”

“And what would those predicates be? How would *you* render ‘Some zoological species are cross-fertile’ into the canonical grammar of quantification? (You can't just beg off doing that. If you don't endorse *some* rendering of this sentence into the canonical grammar, there will be no way for us, your critics, to determine what you take the logical consequences of the sentence to be. And you agree, don't you, that responsible philosophers will wish to make it clear what are the logical consequences of the sentences they use to make assertive utterances?)”

This question brings us to what Quine has said about “paraphrase”:

We remain so committed [*sc.* to the existence of zoological species] at least until we devise some way of so paraphrasing the statement as to show that the seeming reference to species on the part of our bound variable was an avoidable manner of speaking.

(“Some way of so paraphrasing the statement . . .”: some way of rendering the statement in the canonical grammar of quantification that employs only nominalistically acceptable predicates.) This, I will remark, is probably too strong a statement on Quine's part.

<sup>13</sup> Earlier, I said, “‘Some zoological species are cross-fertile’ is, *prima facie*, represented in the idiom of quantifiers and bound variables like this . . .”—“this” being sentence (1). There is a certain tension between this statement and the words I have put into the nominalist's mouth, for the nominalist's words suggest that the two predicates specified in the logic-text exercise represent an arbitrary choice on the part of the author of the text—or of the graduate student who made up the exercise. We may reduce this tension a bit if we assume that ‘Some zoological species are cross-fertile’ can *naturally be supposed* to have a logical structure (whatever that means) analogous to that of ‘Some people don't like each other’ or of ‘Some national capitals are less than 100 kilometers apart’, and that the predicates specified in the exercise reflect this fact.

Suppose that a nominalist who wished to “retain” the sentence ‘Some zoological species are cross-fertile’ conceded that he or she had no such “paraphrase” to offer, and went on to say, “I’m sure there *are* such paraphrases,<sup>14</sup> but I’m unable to find any of them.” (Or “... I’m unwilling to take the trouble to try to find any of them.”) I think someone who said something along those lines could plausibly claim not to be “committed” to the existence of zoological species. But that sort of response to the argument seems rather lame, and there is no need for it in the present case, because nominalistically acceptable paraphrases of ‘Some zoological species are cross-fertile’ are not hard to come by. I will give an example of one. This example—purely illustrative—makes use of four predicates (abbreviated as indicated):

- $Ax$   $x$  is a (living) animal  
 $Cxy$   $x$  and  $y$  are conspecific (animals)  
 $Dxy$   $x$  and  $y$  are fertile (sexually mature and non-sterile)  
 animals of different sexes<sup>15</sup>  
 $Ixy$   $x$  can impregnate  $y$  or  $y$  can impregnate  $x$ <sup>16</sup>

And here is the paraphrase:

$\exists x \exists y [Ax \ \& \ Ay \ \& \ \sim Cxy. \ \& \ \forall z \ \forall w (Czx \ \& \ Cwy \ \& \ Dzw. \ \rightarrow Izw)]$ .

Informally:

There are two living animals  $x$  and  $y$  that are not conspecific and which satisfy the following condition: For any two fertile animals of different sexes one of which is conspecific with  $x$  and the other of which is conspecific with  $y$ , one of those two animals can impregnate the other.

<sup>14</sup> That statement, too, is in prima facie conflict with nominalism, of course, but let that go.

<sup>15</sup> If anyone protests that this predicate could be satisfied by a pair of organisms only if there were objects—presumably they would not be nominalistically acceptable objects—called “sexes” such that the members of this pair were “of” distinct objects of that sort, we may reply that we could have written ‘( $x$  is a fertile male animal and  $y$  is a fertile female animal) or ( $y$  is a fertile male animal and  $x$  is a fertile female animal)’.

<sup>16</sup> Quine, of course, does not like modal predicates, but we are trying to find a paraphrase of ‘Some zoological species are cross-fertile’ that is acceptable to the nominalist *simpliciter*—and not to the nominalist who also shares Quine’s distaste for modality. It is certainly hard to see how the thesis that some zoological species are cross-fertile could be anything other than a modal thesis.

We observe that the paraphrase has a feature that renderings of natural-language statements into the canonical grammar of quantification often have: it resolves an ambiguity of the original. It is not obvious whether, for example, 'Equus caballus and Equus asinus are cross-fertile' implies that *any* fertile horse can either impregnate or be impregnated by *any* fertile donkey—or only that *some* fertile horse can impregnate or be impregnated by *some* fertile donkey. But this is no more than a question about the intended meaning of 'cross-fertile'; it is of no ontological interest.

What is of some ontological interest is this. Our nominalistic paraphrase treats 'x and y are conspecific' as a primitive predicate. But if one were willing to "quantify over" zoological species, one could define this predicate in terms of 'x is a species' and '(the animal) x is a member of (the species) y'. Simplifying our ontology (adopting an ontology that includes animals but not species) has therefore led us to complicate our "ideology"—that is, has led us to expand our stock of primitive predicates.<sup>17</sup> (At any rate, it has led us to treat as primitive *one* predicate that we could define if we were willing to quantify over species.) The other three predicates used in the paraphrase are, of course, also undefined predicates that do not occur in sentence (1). But anyone with sufficient interest in biology to wish to assert that some zoological species are cross-fertile would probably find these predicates indispensable for making other biological assertions and would probably have to treat them as primitives.<sup>18</sup>

<sup>17</sup> See pp. 202–3 of W. V. Quine, "Ontological Reduction and the World of Numbers", in *The Ways of Paradox and Other Essays* (New York: Random House, 1966), 199–207. See also Quine's "Ontology and Ideology", *Philosophical Studies* 2 (1951), 11–15. A part of the latter essay (including Quine's remarks on "ideology") is incorporated in "Notes on the Theory of Reference" (*From a Logical Point of View*, 130–8). I have to say that I do not find the remarks on "ideology" in "Ontology and Ideology" and "Notes on the Theory of Reference" very enlightening. I would say the same thing about the brief discussion of the word in the final paragraph of "The Scope and Language of Science" (*The Ways of Paradox*, 215–32).

<sup>18</sup> 'Ax' might be defined as 'x is a member of some zoological species', but only by someone who did not wish to be unable to raise questions like 'Are all animals—hybrids, for example—members of some zoological species?' I note that, strictly speaking, 'A' is not necessary for the paraphrase: 'Ax & Ay' could have been replaced by 'Dxy'.

Our second example comprises all sentences of the form, ‘There are  $n$  times as many dogs as cats’ where ‘ $n$ ’ represents the occurrence of a numeral (‘1’, ‘2’, ‘3’ . . .). This example is similar to an example Quine considers in the lecture (‘There are more dogs than cats’) but more definite. (Quine mentions a similar case: “Other related idioms, e.g. ‘there are more than twice as many dogs as cats’ . . . can be handled in ways closely related to this example” <C78>). The example is taken from “Steps toward a Constructive Nominalism”,<sup>19</sup> and the technique of paraphrase I shall present is an adaptation of a technique used in that essay. This technique is, I think, more interesting than the techniques Quine applies to ‘There are more dogs than cats’ in the lecture. It does not depend on an appeal to ‘and so on’ (the paraphrases are of finite length), and it does not depend on there being some particular finite number of individuals (or on the number of individuals being finite at all).

The object of the paraphrase is to eliminate the numerals from sentences of the form displayed above. Now one might well ask why nominalists would want to have such paraphrases at their disposal. Nominalists do not “countenance” numbers, of course—but *does*, for example, the sentence ‘There are 3 times as many dogs as cats’ imply the existence of numbers or at least the existence of *a* number (the number 3, if any, presumably)? Various considerations militate against supposing that it does. First, it is not at all clear that in this sentence ‘3’ is a noun,<sup>20</sup> and, secondly, assuming that it is a noun, its being a noun does not entail that the position it occupies is subject to existential generalization. If the occurrence of ‘3’ in our sentence is a noun, that fact does not entail that

There are 3 times as many dogs as cats

hence,

For some  $x$ , there are  $x$  times as many dogs as cats

<sup>19</sup> Nelson Goodman and W. V. Quine, “Steps toward a Constructive Nominalism,” *Journal of Symbolic Logic* 12 (1947), 105–22.

<sup>20</sup> That ‘3’ does not function as a noun in ‘There are 3 times as many dogs as cats’ is strongly suggested, if it is not entailed, by the fact that one cannot substitute the noun-phrase ‘the number 3’ for ‘3’ in this sentence: ‘There are the number 3 times as many dogs as cats’ is ungrammatical. (Compare this case with the case of the occurrences of ‘3’ in the sentences ‘3 is the square root of 9’ and ‘The number of planets is greater than 3’; these occurrences pass the “substitution test”.)

is a valid argument. After all, as Quine observes, the undoubted fact that the final word of 'He did it for my sake' is a noun does not entail that

He did it for my sake

hence,

For some  $x$ , he did it for my  $x$

is a valid argument. (To use a word that Quine was fond of, the occurrence of '3' in 'There are 3 times as many dogs as cats' may be syncategorematic.) These reflections show that the nominalist's interest in eliminating occurrences of numerals by paraphrase is not so straightforward as the nominalist's interest in eliminating apparent quantification over species by paraphrase.

Why, then, should Quine suppose that nominalists would be interested in "paraphrasing away" the occurrences of numerals in sentences of the form 'There are  $n$  times as many dogs as cats'? I suppose Quine would answer that the nominalist's vocabulary, like Caesar's wife, must be above suspicion. A nominalist who accepted this answer might present it in more detail as follows:

Let us call a sentence *numerical* if it in any way involves numerical vocabulary. There are many numerical sentences that I, despite my denial that there are such objects as numbers, am not willing simply to discard, and (given that it is factually right) 'There are 3 times as many dogs as cats' is certainly one of them. Of the two options,

- continue to use this sentence as a vehicle of assertive utterance, and insist, legalistically, that it has not been *demonstrated* that the assertions I make when I so use it are true only if there is such an object as the number 3
- continue to use this sentence as a vehicle of assertive utterance, all the while having "in reserve" a paraphrase of the sentence that I should be willing to use in its place if anyone contended that the assertions I made by uttering 'There are 3 times as many dogs as cats' would be true only if there were such an object as the number 3—a paraphrase such that no one, the objector included, would suppose that its truth depended on the

existence of the number 3 or any other nominalistically unacceptable object,

the second is obviously superior to the first.

Now the paraphrase. The intuitive idea is this: we take an imaginary "bite" from each dog and an imaginary bite from each cat, all these bites being of the same size (= volume); if there are  $n$  times as many dogs as cats, then the fusion (sum) of the "dog-bites" will be  $n$  times the size of the fusion of the cat-bites; this will reduce our problem to the problem of expressing for each  $n$  the thesis that one object is  $n$  times the size of another in nominalistically acceptable terms.

The primitive non-logical vocabulary we shall use in the paraphrases comprises four items: ' $x$  is a dog', ' $x$  is a cat', ' $x$  is a part of  $y$ ', and ' $x$  is the same size as  $y$ '. We shall make use of various items of mereological vocabulary that can be defined in terms of 'part'—'proper part', 'overlap', 'fusion/sum of', and so on. We proceed to define some words and phrases in terms of our four primitives:

—an "animal" is either a dog or a cat

—a "dog-biter" is any object that overlaps every dog and overlaps nothing but fusions of parts of dogs; alternatively, a dog-biter is any part of the fusion of all dogs that overlaps every dog (and similarly for "cat-biter")

—a "biter" is either a dog-biter or a cat-biter

—for any biter  $x$ , an object  $y$  is "one of  $x$ 's bites" or "an  $x$ -bite" if  $y$  is, for some animal, the *largest* part of  $x$  that is a part of that animal; that is,  $y$  is a part of  $x$  and a part of some animal, and  $y$  is not a *proper* part of anything that is both a part of  $x$  and a part of that animal<sup>21</sup>

—two biters  $x$  and  $y$  are "comparable" if everything that is either an  $x$ -bite or a  $y$ -bite is of the same size as any other such thing.

We note that it is obvious that, for any positive integer  $n$ , there are  $n$  times as many dogs as cats if and only if

For every  $x$  and for every  $y$  (if  $x$  is a dog-biter and  $y$  is a cat-biter and  $x$  and  $y$  are comparable, then  $x$  is  $n$  times the size of  $y$ ).

<sup>21</sup> A biter is thus the sum or fusion of its constituent bites. (Cf. the statement of the "intuitive idea" behind the paraphrase in the text.)

What we must do, therefore, is to show how, for every numeral in the sequence '1', '2', '3', ..., to express in the vocabulary we have at our disposal the sentence that consists of 'x is' followed by that numeral followed by 'times the size of y'. We do this as follows. We express

*x* is 1 times the size of *y*

as

For some *z*, *z* is a part of *x* and every part of *x* overlaps *z* and *z* is the same size as *y*. (This expression is equivalent to '*x* is the same size as *y*'; we offer this elaborate paraphrase of '*x* is 1 times the size of *y*' so that our paraphrase in the '1 times' case may be seen as an instance of the same technique we shall employ for '2 times', '3 times', etc.)

We express

*x* is 2 times the size of *y*

as

For some *z* and for some *w*, *z* is a part of *x* and *w* is a part of *x*, and *z* and *w* do not overlap, and for all *y* (if *y* is a part of *x*, *y* overlaps *z* or *y* overlaps *w*), and *z* is the same size as *w*, and *z* is the same size as *y*.

We express

*x* is 3 times the size of *y*

as

For some *z*, *w*, and *v* (*z*, *w*, and *v* are parts of *x*, and *z*, *w*, and *v* do not overlap, and every part of *x* overlaps *z* or *w* or *v*, and *z*, *w*, *v*, and *y* are all of the same size).

(In this last case, I have used a few informal abbreviations; the unabbreviated sentence would be well-nigh impossible to parse.) And so for each successive numeral in the sequence. Our paraphrase of 'There are 3 times as many dogs as cats' is thus,

For every dog-biter *x* and every cat-biter *y* (if *x* and *y* are comparable, then for some *z*, *w*, and *v* (*z*, *w*, and *v* are parts of *x*, and *z*, *w*, and *v* do not overlap, and every part of *x* overlaps *z* or *w* or *v*, and *z*, *w*, *v*, and *y* are all of the same size)).



And the devices on display in this particular case can obviously be used to provide, for each sentence of the form ‘There are  $n$  times as many dogs as cats’, a paraphrase that does not contain a numeral.<sup>22</sup>

There are two important things to note about this technique of paraphrase. The first is that the paraphrases it yields have ontological presuppositions—and ontological presuppositions that it seems highly doubtful are presuppositions of the sentences of which they are paraphrases. Suppose, for example, that there are no dog-biters. (A sufficient condition for there being no dog-biters is there being no object that overlaps every dog.) In that case, *all* our paraphrases of sentences of the form ‘There are  $n$  times as many dogs as cats’ are vacuously true—an untoward result.<sup>23</sup> I myself believe very firmly that there are no dog-biters (for I believe that nothing overlaps more than one dog). And I believe just as firmly (if you can follow this) that there are almost none of the objects that would be the bites of dog-biters if there were dog-biters for them to be bites of: I do not believe that dogs have “arbitrary undetached parts”. And I believe even more firmly that the sentence ‘There are 3 times as many dogs as cats’ is true or false (whichever it is) quite independently of the question whether there are bites or biters.

The lesson is this: Although the sentences that are the fruit of our technique for eliminating numerals from sentences of a certain form are certainly consistent with nominalism in the abstract, they will not be automatically acceptable to just any nominalist: they will not be acceptable to nominalists (if such there be) who share my taste for desert landscapes. (*My* desert landscape, in contrast with the Quine–Goodman mereological jungle, contains very few fusions and very few undetached parts.)<sup>24</sup> And one would expect

<sup>22</sup> Note that these paraphrases make no use of the fact that nothing is both a dog and a cat. The same technique could be applied to, e.g., ‘There are 4 times as many Britons as Scots’.

<sup>23</sup> Exercise for the reader: What are consequences of a parallel treatment of ‘There are 6 times as many time machines as cabbages’? (Assume that there are all the cabbage-biters and cabbage-biter-bites that Quine and Goodman could wish for, but no time machines.) Hint: Although my dachshund Sonia overlaps every time machine, it is false that she overlaps nothing but sums of parts of time machines.

<sup>24</sup> It would be possible to avoid committing oneself to the strong mereological presuppositions of Quine–Goodman style paraphrases by investing in some ideology—in an extended sense of the word, for additional primitive predicates will be of no use toward this end. Suppose, for example, that we add “plural variables” (‘the  $xs$ ’, ‘the  $ys$ ’) to our logical apparatus, and that, having done this, we introduce two

that there will be many among the opponents of nominalism who will find these paraphrases ontologically objectionable for the same reason. This expectation is demonstrably satisfied in at least one case, for I am myself such an opponent of nominalism, and I say: All right, you've shown how to dispense with numerals (in certain contexts)—but at what cost! You've had to assume the truth of the Calculus of Individuals and the Doctrine of Arbitrary Undetached Parts; at any rate, you've had to assume the truth of *some* theories that share many of the bizarre ontological implications of those theories.<sup>25</sup>

And now the second point. While our technique of paraphrase provides, for each numeral in the sequence '1', '2', '3', ... a paraphrase of the sentence formed by writing 'There are' and then that numeral and then 'times as many dogs as cats', it does not provide a paraphrase of the open sentence 'there are  $x$  times as many dogs as cats'. (That open sentence may not be grammatical, for the reasons mentioned in note 20. It may be that the only grammatical open sentences "in the vicinity" of that sentence are sentences along the lines of 'the product of (the positive integer)  $x$  and the number of cats is the number of dogs'. Well, we certainly have not got a paraphrase of *that* sentence that contains no numerical vocabulary—although our technique does provide, for each numeral in the sequence '1', '2', '3' ... a paraphrase of the sentence formed by

"variably polyadic" predicates: ' $x$  is one of the  $ys$ ' and 'there are exactly as many of the  $x$ s as there are of the  $ys$ '. (For a discussion of plural variables and variably polyadic predicates, see my book *Material Beings* (Ithaca, NY: Cornell University Press, 1990), 22–8.) It is not difficult to construct "numeral-less" paraphrases of sentences like 'There are 3 times as many dogs as cats' using only this apparatus. It is, of course, always possible to insist that 'there are exactly as many of the  $x$ s as there are of the  $ys$ ' is not "above suspicion"—and to insist on this while conceding that 'the  $x$ s' and 'the  $ys$ ' range only over nominalistically acceptable objects.

<sup>25</sup> In note 16, I said, "... we are trying to find a paraphrase of 'Some zoological species are cross-fertile' that is acceptable to the nominalist *simpliciter*—and not to the nominalist who also shares Quine's distaste for modality." One might wonder whether that statement and what was said in the paragraph to which this note is appended are consistent with each other (as regards the ontology that it is permissible for a "nominalistic paraphrase" to presuppose). In my view, the two cases are not parallel. In the earlier case, a modal predicate was needed in the paraphrase because (this seems undeniable) "cross-fertile" is an inherently modal idea. In the present case—so I contend—the sentences to be paraphrased imply nothing about the existence of proper parts of dogs and cats or the existence of fusions of dogs, cats, and their parts.

writing ‘The product of’ and then that numeral and then ‘and the number of cats is the number of dogs’.) The idea of “threeness” is expressed in our paraphrase of ‘ $x$  is 3 times the size of  $y$ ’ by the number of existentially bound variables—three—that it contains. The paraphrase contains no noun or nominal phrase that denotes the number 3 (or that suggests “threeness” in any other way).

Of course, this is in one sense just what the nominalists want. But it has the consequence that our technique of paraphrase will not take them very far toward the realization of their program. It does not, for example, enable them to provide nominalistically acceptable paraphrases of ‘The ratio of the number of dogs to the number of cats is 3 times the ratio of the number of lions to the number of tigers’—or none other than, ‘(There are 1 times as many lions as tigers and there are 3 times as many dogs as cats) or (There are 2 times as many lions as tigers and there are 6 times as many dogs as cats) or . . . *and so on*’. (This device is, of course, applicable only to the case in which the ratio of the number of dogs to cats and the ratio of the number of lions to tigers are integers.) The nominalist paraphrase project becomes progressively more difficult as nominalists are forced to confront occurrences of numerals—and, worse, variables in numeral positions—in ever more recondite contexts. (What can nominalists say about ‘For no integer  $n$  greater than 2 and no integer  $m$  greater than 3 does a central-force law according to which force varies inversely with the  $n$ th power of distance yield stable orbits in  $m$ -dimensional space?’) And, as everyone knows, positive integers are the least of the nominalists’ mathematical worries, for they must also say something about fractions, negative numbers, irrational numbers, complex numbers, vectors, tensors, . . ., all of which are everyday tools of applied mathematics—and all of which are more difficult to “paraphrase away” than integers. In point of fact, the nominalist paraphrase project, at least if it is to be carried out using tools at all like those employed in “Steps toward a Constructive Nominalism”, is not simply difficult. It is hopeless.

In the 1946 lecture, Quine professes agnosticism about whether the nominalist project will ultimately be a success. But one might well ask why. In my view, the most interesting historical question about Quine’s early advocacy of nominalism and his work on this topic with Goodman is this: Why didn’t he concede at the outset

that the nominalist project was hopeless?<sup>26</sup> It is true that—as he and Goodman showed—one can paraphrase various numerical sentences into sentences that contain no numerical vocabulary of any description (sentences that convey the idea of *n*-ness by their incorporation of *n* existentially bound variables or *n* bound variables flanking occurrences of the non-identity sign or some such device). But it is just obvious that one cannot do this for the whole class of such sentences. (Not at any rate by the use of devices at all similar to the devices Quine and Goodman used. For all I know, some technique vastly more powerful than any they consider—some technique that involved its advocates in some very serious and far-reaching ontological commitments indeed—might be successful. I am thinking of the devices employed by Hartry Field in *Science without Numbers*<sup>27</sup>, a work I am not competent to evaluate.<sup>28</sup>) The “Quine–Goodman project” can be compared to an

<sup>26</sup> He certainly conceded this later—as everyone knows. (For a concise and straightforward statement of Quine's rejection of the possibility of providing nominalistically acceptable paraphrases for all scientifically indispensable sentences, see the article “Universals” in *Quiddities: An Intermittently Philosophical Dictionary* (Cambridge, Mass.: the Belknap Press, 1987), 225–9.) Quine's later remarks about his friendliness to nominalism in the middle forties seem evasive and disingenuous. (This friendliness went far beyond a hopeful agnosticism about the feasibility of the nominalist paraphrase project. “Steps toward a Constructive Nominalism” opens with the authors' statement that they think that nominalism is *true*, and anyone who accepts Quine's meta-ontology and thinks that nominalism is true is committed to the feasibility of the nominalist paraphrase project. Saying “Nominalism is true and I don't know whether the nominalist paraphrase project can be carried out” would be, from the point of view of Quine's meta-ontology, comparable to saying “Nominalism is true, but there is an objection to *accepting* nominalism that may be insurmountable.”) Consider, for example, this remark, which was inserted as a parenthesis following the entry for “Steps toward a Constructive Nominalism” in the biographical references at the end of *From a Logical Point of View* (pp. 173–4): “Lest the reader be led to misconstrue passages in the present book by trying to reconcile them with the appealingly forthright opening sentence of the cited paper, let me say that I should now prefer to treat this sentence as a hypothetical statement of conditions for the construction in hand.” The appealingly forthright sentence is ‘We do not believe in abstract entities’. That sentence is given a similar gloss in a footnote in *Word and Object* (p. 243).

<sup>27</sup> Oxford: Blackwell, 1980.

<sup>28</sup> For an ingenious technique that dispenses with ontology altogether by introducing a powerful innovation in *ideology*, see Rolf Eberle, “Ontologically Neutral Arithmetic”, *Philosophia* 4 (1974), 67–94. As in note 24, I use ‘ideology’ in an extended sense. Eberle's ideology overlaps the standard ideology of first-order formal theories only in that its items include the usual sentential connectives and sentences containing free variables. To this base Eberle adds a single very powerful variable-binding

attempt to reach the moon by climbing ever-higher trees (or, since Quine and Goodman have spoken of “steps”, by walking toward the horizon at moonrise): not only should any reasonable person be aware at the outset that you can’t get there that way, but that same reasonable person should be aware at the outset that the distance you can travel by that method is not even a significant portion of the distance you would have to travel to get there.

But attempts can be instructive even if they are failures—even if they are abject failures. The value of Quine’s lecture is not to be measured by its failure to make any significant progress toward a goal that is—as he should have seen—impossible. It is to be measured by the enduring value of the tools that he introduced to define and clarify that goal. Its value is to be found in its demonstration, by example, of the way in which an ontological project should be undertaken, and not in the particular ontological project that provided the example. Its value lies in its contributions to meta-ontology, not in its contributions to ontology.

operator (he does not need quantifiers as separate items of his ideology, since they can be defined in terms of his primitive variable-binding operator). I think it probable that many nominalists will contend that this operator is not “above suspicion”. It should be noted that Eberle’s technique applies only to integers and that it is not obvious whether a parallel treatment of the real numbers (or even of fractions) is possible.