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On What Exists

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One of W. V. Quine's most famous contributions to philosophy is his criterion, first proposed in 1939, for a theory's being committed to the existence of entities of a specific kind.[1] Here Quine's criterion of theoretical ontological commitment is assessed. I shall propose revisions. My objective is not to force the orthodox Quinean to concede. That is an impossible task. Rather, it is to persuade the agnostic and, far more important, to get matters right. With some notable exceptions, Quine's criterion is generally accepted as correct, or at least largely correct.[2] Yet it is subject to a variety of interpretations, all of which save one yield incorrect verdicts. Indeed, the interpretation that yields correct verdicts is evidently not what Quine and his followers have meant. Instead they have misapplied the criterion, unfairly imputing ontological commitments to theories that lack those commitments. I argue that insofar as Quine's criterion is interpreted so that it yields only correct verdicts, it is trivial and of questionable utility. Moreover, the correct criterion invokes a notion that Quine spent most of his life combating: analyticity. This yields a dilemma for Quinean philosophy: either his criterion of ontological commitment is incorrect, or else Quine is committed to a traditional philosophical notion that he emphatically rejects as disreputable. In his insightful article on ontological commitment Richard Cartwright pointed to a similar

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[1] Quine proposed his criterion in several venues over many years. Quine (1939), (1943), (1947), (1948), (1951), (1951). Much of this material is reprinted in Quine (1961a [1953]). See also Quine (1951c), reprinted in Quine's (1966: 126–34); Quine (1966b: 64–9) (slated to appear in the ill-fated *Journal of Unified Science*, 1940); Quine (1969: 91–113); Quine (1970: 89–103).

[2] I criticize Quine's criterion in my (1987); reprinted in my (2005a: 9–49). I argue there that Quine's criterion incorrectly imputes an inflated ontology to certain ontologically frugal theories. It will be argued below that one version of the criterion also incorrectly imputes a sparse ontology to ontologically extravagant theories.

Some critics complain that Quine's criterion incorrectly imputes an ontology including classes to certain "ontologically innocent" theories that are not formalizeable in a classical first-order language (without resorting to a special predicate ∈ for set membership). Others, notably George Boolos, reply that the problem sentences are formalizeable in a non-classical first-order language, e.g., employing plural quantification, with the result that Quine's criterion delivers the right verdict. I shall not engage this controversy here, except to state that in my judgement the reply on behalf of the criterion is essentially correct. The language mentioned in the criterion need not be classical in this respect.

Quinean predicament.[3] I argue that the predicament is rather more problematic than depicted in Cartwright's critique.

10.1 First Formulation

What exactly is a criterion of theoretical ontological commitment? It might be proposed that a criterion of ontological commitment should enable one, at least ideally, to determine whether a fully specified theory is ontologically committed to there being entities of this or that kind. The criterion, on this understanding, has a certain epistemological function. It is a kind of test by which one can correctly answer the question of what a theory's ontology is. I believe a criterion of ontological commitment is better construed in a more metaphysical vein: as a specification of what it *is* for a theory to be committed to there existing things of a given kind. Of course, it is desirable that a criterion that successfully meets this objective might also be employed to determine a given theory's commitments. This instrumental value is subordinate to the primary metaphysical objective of specifying what ontological commitment amounts to.[4]

One aspect of Quine's criterion is often misunderstood. According to that criterion, ontological commitment is not a matter of designation *simpliciter*; it is a matter of variable binding. Quine is explicit that a theory might designate something even by name without committing to that thing's existence. In "On What There Is," he writes:

> But, this is, essentially, the *only* way we can involve ourselves in ontological commitments: by our use of bound variables. The use of alleged names is no criterion, for we can repudiate their namehood at the drop of a hat unless the assumption of a corresponding entity can be spotted in the things we affirm in terms of bound variables. Names are, in fact, altogether immaterial to the ontological issue, for I have shown, in connection with "Pegasus" and "pegasize", that names can be converted to descriptions, and Russell has shown that descriptions can be eliminated.
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> (Quine 1961a: 12)

It would be a mistake to see Quine, as some have done, as intending that his criterion be applied only after all names in a formulation of a theory have been replaced by definite descriptions and eliminated in accordance with Russell's theory of descriptions. Quine explicitly says that the presence of a name in a formulation of the theory is 'altogether immaterial to the ontological issue', and that the name could simply be deemed instead an abbreviated definite description and thence eliminated *unless the theory is committed to the object through idioms of quantification*. The theory

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[3] Cartwright (1954: 316–25); reprinted in Cartwright (1987: 11–12).

[4] Some might put the point by saying that a criterion of ontological commitment specifies what theoretical ontological commitment "consists in." I do not. The phrase 'consists in' is a red flag in contemporary philosophical discourse, typically indicative of a crucial lack of clarity. Philosophers have yet to specify what consisting in amounts to. (Some of my readers have noted that I have not specified what amounting to amounts to. It is on my "To Do" list.)

formulated by '$\forall x\,(x \neq \text{Stephen Hawking})$' designates Hawking while avoiding ontological commitment to him, indeed while undertaking commitment precisely to his nonexistence.[5] According to Quine, 'Hawking' may be "converted" into 'some unique hawkingizer', then Russelled away leaving behind '$\sim \exists y \forall x\,(x\text{ hawkingizes} \leftrightarrow x = y)$', which is not committed to Hawking. By contrast, the commitment to Hawking by '$\exists x\,(x = \text{Hawking})$' remains intact even if the name is Russelled away. The name's presence is thus no obstacle to the criterion's immediate application.

Insofar as the language might include non-descriptive individual constants that fail to designate any element of the universe of discourse, Quine's criterion requires a *free logic*—a logic for a language in which some true sentences invoke non-designating singular terms.[6] Free logic modifies the classical inference rules governing quantification. Even the sentence 'Hawking is a theoretical physicist', of itself and properly interpreted, bears no ontological commitment to Hawking, nor to theoretical physicists in general. By Quine's criterion, ontological commitment to Hawking is not undertaken until the theory that Hawking is a physicist is expanded to include something entailing that if Hawking is a physicist then something is Hawking. Though the point is largely ignored in the literature, it should be recognized on Quine's behalf that even positive complex pronouncements involving a designating name can lack ontological commitment to the name's bearer. One who suspends judgement concerning whether there is any such person as Hawking can accept the disjunction 'Either Hawking first predicted Bekenstein-Hawking black-hole radiation, or else Bekenstein did' without undertaking ontological commitment to Hawking. In fact, one can consistently accept this disjunction while being confident that only one of the names, 'Hawking' and 'Bekenstein', actually designates while having no opinion which one. Ontological commitment is carried not through mere naming per se but through existential quantification, as expressed in Standard English by such locutions as 'there are such-and-such's', or 'some things are such-and-such's.'

Quine wishes to allow for such ontological disagreements as suggested in Hamlet's famous line, 'There are more things in heaven and earth, Horatio, than are dreamt of in your philosophy.' But Quine will suffer no excess. One condition of adequacy for a criterion of ontological commitment is that it must be possible for a theory to be ontologically committed to entities of a certain kind even though the theory explicitly denies that such entities exist. A primary rationale for Quine's criterion— perhaps the principal rationale—is to expose a certain disingenuousness he perceives in Meinong's defiant declaration, 'There are objects of which it is true that there are no

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[5] The present chapter was written prior to Hawking's death.

[6] David Kaplan and others have argued compellingly—contrary to Frege, Russell, and numerous others, including Quine—that the contents of proper names are inexpressible by definite descriptions (including the likes of 'the hawkingizer'). See Kaplan (1973: appendix X, pp. 503–5); and my (2005b: section 3, especially at pp. 32–40).

such objects;[7] and even in 'There are objects that do not exist.' Such pronouncements seem inconsistent.

Quine's resolution is appealing: being and existence are one and the same. One who says 'There are such-and-such's,' with its Standard English meaning (and with assertive intent, etc.), or things that entail it (e.g., 'Some things are such-and-such'), is ontologically committed thereby, whatever else he/she may say, to such-and-such's. Just as the theorist who designates a particular F is not *ipso facto* committed to F's, so also there can be ontological commitment to F's even on the part of the theorist who proclaims that there do not exist any F's. When David Lewis says that there are talking donkeys although they do not actually exist, according to Quine's criterion—and according to good and common sense—Lewis is ontologically committed to talking donkeys, and worse yet, he is inconsistent about it. The philosopher who proclaims 'There are F's but no F's exist,' says Quine, is 'one of those philosophers who have united in ruining the good old word 'exist'.'[8] Whatever those philosophers mean in saying that such-and-such 'exists', they cannot consistently mean that such-and-such *exists*.

Quine's proposal, in a nutshell, is that a theory couched in an interpreted language that expresses the concepts of *everything* and *something* through quantifiers and the binding of variables is committed to there being things of a given kind if and only if some things or other of that kind must be elements of the universe (domain) of discourse over which the variables range for the theory, so couched, to be true.[9] In particular, a theory is not ontologically committed to the objects individually designated in the theory unless those individuals must belong to the language's universe of discourse for the theory to be true. Furthermore, a theory is ontologically committed to entities of a given kind as long as its truth, as couched in the suitably regimented language, requires the presence of entities of that kind in the universe of discourse, even if the theory explicitly states that no such entities exist. Quine's most careful formulation is given as follows:

In general, *entities of a given sort are assumed by a theory if and only if some of them must be counted among the values of the variables in order that the statements affirmed in the theory be true.*[10]

A principal philosophical thrust of Quine's proposed criterion is that the issue of what ontology a theory requires is not as much metaphysical as it is semantic. It does not matter whether the theory explicitly rejects entities of a given kind. What matters is whether the universe of discourse of the theory, suitably formulated, must include such entities for the theory to be true. Certainly the road to Quine's criterion is paved

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[7] Meinong (1960: 83). Meinong freely concedes that the formulation is paradoxical. That is the very point of the example.

[8] Quine (1961a: 3).   [9] It is not assumed that this universe of discourse is a set.

[10] Quine (1961b: 103).

with the best of intentions. A theory that accepts 'This and that have a single colour' is ontologically committed to colours even if it also accepts 'There are no such entities as colours.' It is important to expose philosophers' misuse of philosophical language, the more decisively the better.

Writers as different in viewpoint as Alonzo Church and Saul Kripke have made remarks that would seem, at least initially, to support the idea that Quine's criterion is not only correct but trivial. Church writes, 'Quine's proposal seems to me straightforward and in a sense obvious.'[11] In a similar vein Kripke says:

Can there be a serious question whether someone who says 'there are men' or 'there exist such things as men' thereby commits himself to the view that *there are men* or that *there exist such things as men?* After all 'there exist men' is true if and only if *there exist men*; what further question can there be? . . .

What indeed can the question whether 'there are rabbits' makes any "ontological commitment" to rabbits mean? Wasn't the term 'ontological commitment *defined* by such examples as 'there are rabbits?'[12]

Kripke's rhetorical questions support the contention that those who proclaim, 'There are rabbits, but none exist,' contradict themselves. Those who contradict themselves are committed to entities of every kind, including rabbits. Quine's criterion is aimed at providing a philosophical foundation for this verdict fair and just.[13]

Frequently Quine abbreviates his criterion by saying that a theory is ontologically committed to whatever the theory *quantifies over*. For example, the theory that there is life on Mars, suitably formalized, is said to quantify over Martians. This manner of speaking has helped to engender a common serious confusion. Some of Quine's remarks might have encouraged this confusion. He says, for example, that his criterion helps us:

to judge what we care to consider there to be. We can face the question squarely as a question what to admit to the universe of values of our variables of quantification.[14]

This remark strongly suggests that theories with different ontologies are *ipso facto* couched in languages that employ different universes of discourse, and that the range

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[11] Church (1958: 1009).   [12] Kripke (1976: 379).

[13] There is a significant problem with the motive behind Quine's criterion. In abstraction from details that vary among cases, there is no more reason to regard as deviant the use of 'exist' than the use of 'there are'. One who accepts 'There are F's but no F's exist' could mean by the second conjunct that that there are no F's and mean something nonstandard by first conjunct—for example, that there *might have* been F's. (Cf. David Lewis.) The same problem arises in the case of one who accepts a formalized sentence, e.g., '$\exists x\, Fx\, \&\, \sim \exists x\, [Fx\, \&\, \exists y\, (x\, =\, y)]$'. Classically '$\exists y\, (x\, =\, y)$' is a theorem. The accepted sentence, normally understood, is therefore classically inconsistent. Lacking further information, there is no telling which, if any, expressions are used non-standardly in the interlocutor's idiolect. Quine's thesis that correct translation is underdetermined by speakers' behaviour only exacerbates the problem. Strictly speaking, Quine's criterion must be restricted to theories framed in a suitable language in which variables and existential quantification receive their objectual (non-substitutional) interpretation.

[14] Quine (1960: 243).

of the variables of one who believes there is life on Mars includes Martians, whereas the range of the variable of one who disbelieves there is life on Mars excludes Martians. This judgement is incorrect. It has the absurd consequence that if anyone sincerely accepts 'There is life on Mars', then there is indeed life on Mars, since there are then Martians that belong to the theorist's universe of discourse. It also has the absurd consequence that one who sincerely utters 'There is no life on Mars' is also correct even if there is life on Mars—in fact, quite independently of whether there is life on Mars—since the theorist's universe of discourse then excludes Martians, making the sentence true as interpreted.

Quantifying over entities of kind K, as Quine uses this phrase, cannot be the same as employing a universe of discourse that includes such entities—if only because a theory might 'quantify over' entities of kind K when there is nothing of that kind, and equally the theory that there are no such entities might be wrong. Instead both the Martian theory and the No-Martian theory should be regarded, at least as far as their disagreement is concerned, as couched in the same suitably regimented language *employing the very same universe of discourse*—indeed, a universe that includes whatever Martians there are. The sense in which the Martian theorist 'quantifies over' Martians is not that Martians belong to the theory's universe of discourse, but that at least one Martian must belong to the theory's universe of discourse *for a suitable formulation of the theory to be true*.

In a graduate seminar at UCLA in April 1972, extrapolating from an April 1958 argument of Church's in an unpublished gem, 'The Ontological Status of Women and Abstract Entities' (*aka* 'Misogyny and Ontological Commitment'), Kripke raised a related problem for Quine's criterion.[15] Church exposes the folly of supposing that *ceteris paribus* nominalism is to be preferred over Platonism. Church proposes an analogy with *ontological misogyny*, a theory whose core axiom is '$\sim \exists x\,(x$ is a woman)'. This theory forswears the claim that Jane Fonda won an Academy Award; indeed it denies that she exists. Instead it postulates a class of new non-relational properties of men, and asserts that the late Henry Fonda is *Academy-Award-daughtered*. Despite its impoverished ontology (or its parsimonious ontology, as the ontological misogynist would have it), ontological misogyny can evidently accommodate all available empirical results by ascribing corresponding properties to men. The theory is more frugal ontologically than the conventional wisdom—severely so—but let no one conclude that it is in any significant respect therefore the better theory. Analogously, even if it can be made consistent with all observational results, nominalism is no more legitimate on that ground alone than sheer bigotry towards universals.

Modifying Church's example, Kripke considers a language L with an unrestricted universe of discourse over which the variables of L range and a reduced variant L',

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[15]   A transcription of Church's talk is available online. I reproduce Kripke's observations from notes I took as an undergraduate. The reader is cautioned that I cannot be certain I am recounting Kripke's objection accurately. (Kripke's remarks were general and did not present any particular example.)

identical in both syntax and semantics except that the universe of discourse of L' excludes one particular individual, say Stephen Hawking. Suppose that the letter 'h' is an individual constant that designates Hawking in L and hence also in L'. Though unusual, L' is surely a possible language.[16] L' might have been devised by a Hawking detractor who decided he does not 'care to consider there to be Hawking' and 'facing squarely the question what to admit to the universe of values of his variables of quantification' chose to modify L so as to exclude Hawking. In general sentences with variable-binding operators evidently express different things in L and L'. Kripke points out that despite its impoverished universe of discourse, L' can capture whatever might be expressed in L by making greater use of the constant 'h'. He provides the following simple translation scheme to this effect:

A quantifier-free sentence of L translates homophonically into L'.

A universal generalization $\ulcorner \forall \alpha \, \phi_\alpha \urcorner$ of L translates into L' as the conjunction $\ulcorner \forall \alpha \, \phi_\alpha \, \& \, \phi_h \urcorner$.

An existential generalization $\ulcorner \exists \alpha \, \phi_\alpha \urcorner$ of L translates into L' as the disjunction $\ulcorner \exists \alpha \, \phi_\alpha \vee \phi_h \urcorner$.

The translation into L' of any sentence of L containing quantifiers is obtained by replacing each part that is a universal or existential generalization by its translation.[17]

Kripke's $L \rightarrow L'$ translation scheme appears to expose an inadequacy of Quine's criterion. Recall that according to that criterion, ontological commitment is carried not by outright designation but through its bound variables in a suitably regimented formulation of the theory. Consider then a true existential sentence of L like:

S: $\exists x \, (x$ wrote *A Brief History of Time*).

According to Quine's criterion, S is committed in L to there being an author of the work in question. Consider now the translation of S into L':

S′: $\exists x \, (x$ wrote *A Brief History of Time*$) \vee (h$ wrote *A Brief History of Time*$)$.

Both S' and the negative existential '$\sim \exists x \, (x$ wrote *A Brief History of Time*)' are true as interpreted in L'—making for a *modus tollendo ponens* inference to the right-hand disjunct of S', which is true in L' and which translates homophonically between L and L'. Even more jarring, the negative existential '$\sim \exists x \, (x \; = \; h)$', although straightforwardly false in L, is true as interpreted in L'. According to Quine's criterion S' and its true right-hand disjunct each evidently evades commitment in L' to there existing any author of *A Brief History of Time*. Indeed, the envisioned history of contemporary physics, as formulated in L', is evidently committed to there being no such author.

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[16] The constant 'h' designates something external to the universe over which the variables range. L' thus requires a free logic. See note 6.

[17] Something similar must be done for any variable-binding operators present. (Many such operators are reducible to the familiar quantifiers.)

Something is amiss. A correct translation of the envisioned history into L' preserves the history's commitments. In particular, the sentence S', if it is a direct translation of S, must preserve the latter's commitment to there being an author of *A Brief History of Time*. Kripke observes that Quine's criterion thus evidently delivers the wrong verdict concerning the history's ontological commitments in L'. Furthermore, S' evidently undertakes a commitment to there being an author of *A Brief History of Time* not by including Hawking in the range of the variables, but, directly contrary to Quine, through its use of the individual constant 'h' to designate Hawking.

10.2 First Reformulation

Kripke's thought experiment deviates from Church's: The universe of discourse of the ontological misogynist's language includes women, contrary to the ontological misogynist. In accepting the sentence '$\sim \exists x\,(x$ is a woman)' the ontological misogynist accepts a falsehood. The fact that his universe must exclude women for his theory to be true does not have the consequence that his universe excludes women; rather, it has the consequence that his theory is not true. Nor can the ontological misogynist make his theory true by modifying the language in which he formulates it. Analogously, one cannot legislate Hawking's nonexistence simply by excluding him from one's universe of discourse. The truth of '$\sim \exists x\,(x = h)$' in L' is irrelevant to the question of whether Hawking exists. The Hawking denier accepts '$\sim \exists x\,(x = h)$' even as interpreted in L.

Rather than pointing out an inadequacy in Quine's criterion, the preceding considerations draw attention to a significant fact: ontological commitment is a kind of *commitment*. There can be things one *ought* to do that one is not committed to doing. Perhaps one who ought to believe in things of a certain kind, or who secretly does so, might avoid the issue, and evade commitment, through logical tomfoolery. (We shall return to this matter in the closing section.)

On the other hand, an important point can be extracted by making one very significant improvement on Kripke's example. Suppose that, *salva pace* Kant, L' is augmented to include a predicate '*Exists*' whose semantic extension is the universal class of all and only existing things. Let us call this augmented language '$L+$'. We now consider a more nuanced scheme for translation of L into $L+$:

A universal generalization $\ulcorner \forall \alpha\, \phi_\alpha \urcorner$ of L translates into $L+$ as the conjunction $\ulcorner \forall \alpha\, \phi_\alpha$ & $[Exists(h) \rightarrow \phi_h] \urcorner$.

An existential generalization $\ulcorner \exists \alpha\, \phi_\alpha \urcorner$ of L translates into $L+$ as the conjunction $\ulcorner \exists \alpha\, \phi_\alpha \vee [Exists(h)\, \& \phi_h] \urcorner$.

Although it is not logically true if the underlying logic is a free logic, the $L+$ sentence '$Exists(h)$' is in fact true. (See footnote 5.) Any theory couched in $L+$ that logically entails '$Exists(h)$' is thereby ontologically committed to Hawking despite the fact that '$\exists x\,(x = h)$' is false in $L+$. This feature points to a critical but

routinely overlooked feature of Quine's criterion: the criterion must be restricted in its application to languages with an *ontologically inclusive* universe of discourse. That is, the language's universe must include everything that exists (or perhaps every existing thing with regard to the universe's logical type).[18] The criterion is therefore not directly applicable to a theory couched in either L' or $L+$. Instead, the theory must first be translated into a regimented language that is not only logically suitable by having idioms of quantification that quantify over a universe of discourse, but also ontologically suitable by having an ontologically inclusive universe of discourse.

In a certain sense, this observation reverses the order of analysis. Quine's intent was that his criterion should in some sense fix what it is for something to exist according to a theory, whereas in fact, for the criterion to be successful the very language in which the theory is formulated must conform to a prior notion of *everything that exists*. Contrary to Quine's remark quoted above, deciding what to believe in is not the same thing as deciding what to admit into the universe over which one's variables range. The latter issue is independent, and is in a certain sense pre-decided as regards the criterion's application: the universe of discourse shall include everything that exists. The ontological issue is whether to hold that everything that exists includes Martians, or classes, or Cartesian egos, or mermaids, or Hawking.

The following wording, although not Quine's, provides a more exact formulation of his criterion:

> *OC*1:   A theory T, couched in an interpreted language L_T employing objectual variables that range over exactly everything that exists, is ontologically committed in L_T to entities of kind K if and only if in order for the sentences of T to be true in L_T it must be that at least one entity or other of kind K is an element of the universe over which the objectual variables of L_T range.

According to *OC*1, ontological commitment—that which is expressed by the Standard English sentential matrix 'T is ontologically committed to Ks'—is a binary relation between an interpreted theory T (formulated in a particular kind of language) and a kind K. According to *OC*1, a given theory typically bears the ontological-commitment relation to a multiplicity of kinds simultaneously (*table, chair, material object, integer, even integer, prime integer, even prime integer*, etc.).[19] As a limiting case, a theory may be said according to *OC*1 to be ontologically committed to a particular individual x if *and only if* the theory bears the ontological-commitment relation to the particular

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[18]   There is controversy whether any language could have variables that range over absolutely everything there is. (Those on the negative side of the controversy face a well-known difficulty. What is it, exactly, that allegedly no language's variables can range over?) The universe of a language need not be a set.

[19]   Presumably according to *OC*1, if a given theory T is ontologically committed to entities of kind K, then where K' is any kind that is a sub-kind of K as a matter of logic, T is also ontologically committed to entities of kind K'. As a limiting case, on *OC*1 every theory with any ontological commitment bears the ontological-commitment relation to *entities that there are*.

kind *thing that is x*—a kind of which *x* is necessarily the only instance.[20] In particular, it is neither necessary nor sufficient that the theory designates *x* by means of a singular term.

One severe limitation of *OC*1 is that its application is restricted to theories couched in languages with objectual variables of a certain stripe. There are languages without variables—at least possible languages—and in some of these one can formulate ontologically committed theories. Consider for example the theory whose only axiom is the sentence 'Mermaids exist', with its normal Standard English meaning. This theory is ontologically committed to mermaids, but *OC*1 is inapplicable if the axiom's language (a fragment of Standard English) does not include variables. Our mermaid theory must be reformulated using inclusive, objectual variables before *OC*1 can be applied. Quine judges the restriction to languages with variables to be of little moment. He writes:

The quantificational form is a convenient standard form in which to couch any theory. If we prefer another language form . . . we can still bring our criterion of ontological commitment to bear in so far as we are content to accept appropriate systematic correlations between idioms of the aberrant language and the familiar language of quantification. . . .

It is not with ordinary language, it is rather with one or another present or proposed refinement of scientific language, that we are concerned when we expound the laws of logical inference or [other scientific] analyses . . . And it is only in this spirit, in reference to one or another real or imagined logical schematization of one or another part or all of science, that we can with full propriety inquire into ontological presuppositions. . . .

In a loose way we often speak of ontological presuppositions at the level of ordinary language, but this makes sense just in so far as we have in mind some likeliest, most obvious way of schematizing the discourse in question along quantificational lines.[21]

These dismissive remarks are dubious in the extreme. The familiar form of discourse—our mother tongue—is ordinary language, not quantification theory. Interestingly, Quine concedes this elsewhere:

Now I grant that the meaning of quantification is covered by the logical rules; but the meaning which those rules determine is still that which ordinary usage accords to the idioms 'there is an entity such that', 'an entity exists such that', etc. Such conformity was the logistician's objective when he codified quantification; existential quantification was designed for the role of those common idioms. It is in just this usual sense of 'there is' that we mean to inquire whether there is [for example] such an entity as roundness.[22]

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[20] A theory that bears the ontological-commitment relation to a given kind *K* is not thereby ontologically committed to *K* itself. Rather, the theory is thereby committed to (there existing) things of kind *K*. For a theory to be ontologically committed to *K* itself is for it to bear the ontological-commitment relation to the kind *thing that is (identical with) K*.

[21] Quine (1961b: 105–7).

Any regimented notation must be understood ultimately in terms of the everyday vernacular.[23] This in itself poses no problem for *OC*1 as long the theory couched in ordinary language can be formalized before applying the criterion. This is a genuine problem, however, for the philosopher who believes there is a deep difficulty—or worse yet, indeterminacy—about whether sentences of distinct language-forms are correct and literal, i.e., meaning-preserving, translations of one another. Those benighted philosophers are seriously hampered in the quest to discover a criterion for ontological commitment.

10.3 Some Misformulations

Quine's criterion invokes the overtly semantic idea of a universe of discourse. As Quine is quick to observe, this is an idea from extensional semantics (theory of reference), not from intensional semantics (theory of meaning). Quine's confinement to extensional semantics is to be expected, given his strictures against intensional semantic ideas.

On the other hand, *OC*1 does not employ the idea of a universe of discourse in a purely extensional manner. It is a serious problem for Quine that the concept of ontological commitment is not extensional. Church was evidently the first to make this important observation. Church relegated the point to a footnote, but it is devastating:

I remark in passing that ontological commitment is an intensional notion, in the sense that ontological commitment must be a class concept rather than a class. For example, ontological commitment to unicorns is evidently not the same as ontological commitment to purple cows, even if by chance the two classes are both empty and therefore identical.

(Church 1958: 1013–14*n*)[24]

One theory is committed to centaurs and not mermaids, another to mermaids and not centaurs; yet the extensions of the predicates 'is a centaur' and of 'is a mermaid' are the same. The same point can be made without resorting to the unreal. To modify an example of Quine's own, consider two theories, T_c and T_r, framed in the same language, having the following axioms, respectively:

T_c: $\exists x \, (x$ is a creature with a heart$)$
T_r: $\exists x \, (x$ is a creature with a kidney$)$

The two theories differ in their ontological commitments, but not extensionally.

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[22] Quine (1966b: 65).   [23] *Cf.* Kripke (1976: 379–80).

[24] By his assertion that 'ontological commitment must be a class concept rather than a class', Church means that a syntactic string of the form '*T* is ontologically committed to ___' is an *ungerade* (indirect, oblique) context, so that a general term that fills the blank thereby designates not the class that is its default extension but the concept that it ordinarily expresses as its semantic content. Church presents a clear formulation of his Fregean account in his (1956: 8 n. 20). A kind may be identified with a class concept.

To capture the concept of ontological commitment one must break free of Quine's discrimination against the non-extensional. Whether aware of it or not, Quine did just that. As observed, *OC*1 treats ontological commitment as a binary relation between a theory (i.e., a set of interpreted sentences) and a kind. (See footnote 20.) A kind, unlike a class, is non-extensional; different kinds can converge on the same class. This is Church's point. It might be hoped that this feature can be avoided by taking ontological commitment to be a binary relation between a theory and a class instead of a kind, or alternatively, as a non-distributive relation between a theory and a plurality of *things*. But the example of differing commitments to cordates and renates dashes this hope.

There is in fact a second crucially non-extensional aspect to ontological commitment. On reflection, it should not be surprising that the concept of ontological commitment is non-extensional. The general concept of commitment is prescriptive rather than purely descriptive.[25] As Cartwright notes, a striking anti-Quinean feature of *OC*1 is that the relation cited in the analysans is a modal relation: *it must be that* something of kind *K* belongs to *T*'s universe of discourse in order that *T* be true.[26] Quine's criterion thus invokes a second nonextensional notion: necessity. Not only, as Church notes, is the object of ontological commitment an intensional entity; the ontological-commitment relation itself is a modal relation—appropriate for the purpose at hand but problematic for empiricism and deeply anti-Quinean.

The modal aspect of *OC*1 is crucial. This is illustrated through the contrast with its non-modal counterpart:

> *OC*1′:   A theory T, couched in an interpreted language L_T employing objectual variables that range over exactly everything that exists, is ontologically committed in L_T to entities of a kind K if and only if, at least one entity of kind K is (happens to be) an element of the universe over which the objectual variables of L_T range if the sentences of T are true in L_T.[27]

Perhaps the most immediate difficulty with this non-modal criterion is that it attributes to any untrue theory ontological commitment to entities of every conceivable kind. By this reckoning, anyone who falls into error (and who among us is untainted in this regard?) is committed therewith to mermaids, vampires, and fire-breathing dragons. The criterion is only mildly kinder to true theories. When Descartes cautiously and temporarily suspended judgement concerning every proposition whatsoever, save that he thought and therefore existed, according to *OC*1′ even then he was committed to tables, hands, pieces of wax, irrational numbers, and even to Martians if there are any. The de-modalized analysans is excessively weak.

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[25] More accurately, the notion of ontological commitment is *proscriptive*. One is under no rational obligation to acknowledge one's commitments, but one is rationally prohibited from disavowing them. A promise is a commitment and not merely a prediction concerning one's own conduct. (I am curious whether Quine's professed inability to apprehend non-extensional concepts led to problems in his interpersonal relationships.)

[26] *Op. cit.*, in Cartwright (1987: 4–5).   [27] *Cf.* Quine (1961c: 131).

The situation is not improved by strengthening the right-hand side as follows:

$OC1''$ A theory T, couched in an interpreted language L_T employing objectual variables that range over exactly everything that exists, is ontologically committed in L_T to entities of a kind K if and only if at least one entity of kind K is (happens to be) an element of the universe over which the objectual variables of L_T range.

On $OC1''$ the ontological commitment of a theory is dependent on the language in which the theory makes its claims, but altogether independent of the theoretical pronouncements themselves. According to $OC1''$ the only way for a theory to be onto-logically over-committed is for its variables to range over things beyond everything that there is. But there are no such things for variables to range over. Therefore, accord-ing to $OC1''$ a properly formulated theory *cannot* be ontologically over-committed. A theorist may countenance centaurs, mermaids, fire-breathing dragons, or talking donkeys without becoming ontologically committed to these unreal entities. Let theories T_1 and T_2, each couched in the same language L, differ in that T_1 includes the sentence '$\exists x$ (x is a Martian)' while T_2 includes the sentence '$\sim \exists x$ (x is a Martian)'. Then according to $OC1''$, T_1 is committed to there being life on Mars if and only if T_2 is. More to the point, since the variables of L have unrestricted range according to $OC1''$, if there is life on Mars even T_2 is committed to Martians, whereas if there is no life on Mars even T_1 is not committed to Martians. According to $OC1''$ all theories, properly formulated, have exactly the same ontological commitment—indeed, commitment to exactly the *right* ontology.

Cartwright pointed out that 'to inquire into the ontological commitments of a theory is not to ask *what there is* but only to ask what the theory *says* there is.'[28] As a criterion of ontological commitment $OC1''$ is insufficiently discriminating, precisely because it is utterly insensitive to what a theory states. By contrast, Quine's actual criterion is formulated in a manner that makes it dependent on the specific pronouncements of the theory in question.

A concept of necessity thus plays a crucial role in $OC1$—indeed, some concept of necessity that directly pertains to what the theory in question says. Such is the 'must' in what must exist in order that the theory's pronouncements be true. The exact type of necessity must be specified if $OC1$ is to qualify as an employable criterion for theoretical ontological commitment, let alone if it is to be assessed. Until the type of necessity is specified, Quine's proposal must be regarded as a promissory note.

On the other hand, the relevant concept of necessity evidently cannot be under-stood as metaphysical necessity. It also evidently cannot be apriority, nor can it be physical necessity, nor natural necessity. Virtually no properly semantic feature of a natural language like Standard English is either metaphysically necessary or knowable a priori or physically necessary or nomologically necessary. If the Standard English sentence 'Something is an even prime integer' is true then the Standard English

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[28] Cartwright (1987: 2).

universe of discourse includes at least one even prime integer. But this is neither metaphysically necessary nor a priori. The Standard English semantic contents of words like 'even' and 'prime' are contingent a posteriori features, not a consequence of any laws of nature.

Validity of an argument may be characterized thus: for the premises to be true, the conclusion must be true. The locution:

For the sentences in Γ to be true, it must be that ϕ

strongly suggests the idea of logical consequence. This sort of modality—logical necessity—may be analysed model-theoretically: ϕ is true in every model (i.e., true under every universe of discourse together with an admissible 'interpretation' of the non-logical vocabulary) in which the elements of Γ are true. Unfortunately, this explanation seems quite inapplicable in our present case. The sentence '$\exists x$ (x is a Martian)' is ontologically committed to Martians, yet there are models for the sentence whose universe consists entirely of natural numbers.

It is *epistemically* necessary for those able to read this essay that if 'There is life on Mars' is true in Standard English then the Standard English universe of discourse includes at least one Martian. This is because we know Standard English. But epistemic necessity is excessively weak for the purposes of *OC*1. It is equally epistemically necessary for us that the Standard English universe of discourse includes the number two, yet the nominalist sentence 'There are no numbers' is not thereby ontologically committed to two.

10.4 A Dilemma for Quinean Theory

The kind of necessity expressed by the 'must' in *OC*1 is indeed the necessity of law, but not of laws of nature or of metaphysics. What are relevant are the laws of *pure semantics*.[29] To explain, on a Fregean theory of definite descriptions it is a theorem of the pure semantics of Standard English that 'the sole author of *Waverley*' designates whoever uniquely wrote *Waverley*.[30] Combining this alleged meta-theorem with the historical fact that Walter Scott uniquely wrote *Waverley*, we may deduce that 'the sole author of *Waverley*' designates Scott in Standard English. This result is a truth of the semantics of Standard English. But it is a truth of *applied semantics*, not a theorem of pure semantics, because its derivation invokes a non-semantic fact. Likewise, it is a theorem of the pure semantics of Standard English that 'Snow is white' is true in

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[29] Cartwright evidently draws nearly the same conclusion (1987:10). Here I combine Cartwright's insights with a Carnapian distinction. (See note 32 below.) Mark Richard suggested a similar improvement of Cartwright's proposed criterion (1998: 259–60). For relevant background see my (1993).

Truth as a consequence solely of pure semantics is evidently also the modality involved in Kripke's distinction between rigidity *de jure* and *de facto*, in his (1980: 21n).

[30] Even on a Russellian theory, the phrase is said to 'denote' the sole author of *Waverley*. Given Russell's views, the fact that the phrase 'denotes' whoever uniquely wrote *Waverley*, if anyone did, might be described as a truth of pure *pseudo-semantics*.

Standard English if and only if snow is white, whereas the fact that 'Snow is white' is indeed true in Standard English is a fact of applied semantics.

I submit that Quine's criterion for theoretical ontological commitment, properly interpreted, is to be understood as invoking a particular, special modality: *a truth of pure semantics*.[31] The criterion invokes this notion as follows:

> *OC2:*   A theory T, couched in an interpreted language L_T employing objectual variables that range over exactly everything that exists, is ontologically committed in L_T to entities of kind K if and only if the sentences of T are such that it is a truth of pure semantics that if all those sentences are true in L_T then at least one entity or other of kind K is an element of the universe over which the objectual variables of L_T range.

This criterion of ontological commitment invokes two separate sources of non-extensionality: the notion of a *kind* as distinct from its extension; and the modality, *truth of pure semantics*. Both notions are essential. In particular, without the restriction to pure semantics, the criterion does not discriminate between T_c and T_r from the preceding section; as a matter of applied semantics, one is true if and only if the other is.

Quine is thus committed to accepting at least one kind of modality. It is easy to miss the significance of this. Quine's most famous contribution to philosophy has been his critique of the traditional concept of analyticity. Quine rejects analyticity on the ground (among others) that the traditional concept of a sentence that is 'true solely by virtue of meaning' has not been adequately explained. Yet traditional analyticity is more precisely definable in terms of the very modality invoked in his criterion for ontological commitment:

ϕ is *analytic in L* $=_{def}$ that ϕ is true in L (a semantic fact) is itself a meta-truth of the pure semantics of L, i.e., that ϕ is true in L is a logical consequence of (the semantic contents of) the axioms of the pure semantics of L.

I do not mean that this definition provides a Quinean surrogate for the traditional conception of analyticity (as with Quine's notion of *stimulus-analyticity*). I mean that the traditional phrase 'true solely *by virtue* of its meaning' is a misnomer for a sentence that is true *as a logical consequence of* its meaning. That is, a sentence is *analytic* (in a language) if the fact that it is true (in that language) is itself a meta-truth of pure semantics.[32] The basic idea is not that the pure semantics provides

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[31] I assume throughout that any logical consequence of truths of pure semantics itself qualifies as a truth of pure semantics.

[32] I defend this analysis in my (1993), cited in note 29 above. In his (1942: 11–12), Rudolf Carnap distinguishes between *pure* and *descriptive semantics*. In his terminology, 'pure semantics' pertains only to artificial languages, 'descriptive semantics' to historically spoken languages. The distinction I have in mind is analogous rather to the colloquial distinction between pure and applied mathematics. It makes perfect sense to speak of the pure semantics of an historically spoken language, e.g., German.

the fact or state of affairs that *makes* an analytic sentence true. We shall suppose throughout that 'bachelor' expresses in Standard English the concept *man who is eligible for marriage but has never married*. (A different example may be substituted.) Then the proposition expressed in Standard English by 'Bachelors are unmarried' does not 'correspond to', and is not 'made true by' any fact about language. The sentence describes extra-linguistic reality, the mundane fact that all marriage-eligible but never married men are unmarried. The core idea is that pure semantics, with no assistance from non-semantic facts, *logically entails* that the sentence is true.[33] For example, it is straightforwardly a meta-truth of the pure semantics of Standard English that 'Bachelors are unmarried' is true if and only if bachelors are unmarried. This is just to say that it is a meta-truth of the pure semantics of Standard English that 'Bachelors are unmarried' is true if and only if marriage-eligible but never married men are unmarried. Since the right-hand side of this biconditional is a truth of logic, it is a truth of the pure semantics of Standard English that 'Bachelors are unmarried' is true in Standard English. By contrast, 'Many bachelors are happier than many husbands' is true in Standard English partly as a consequence of a sociological fact.

My conclusion poses a dilemma for Quinean theory: his criterion of theoretical ontological commitment is correct only insofar as it invokes the crucial concept in terms of which the traditional concept of analyticity is properly analysed. Put another way, Quine's criterion of ontological commitment is philosophically reputable only to the extent that analyticity is. Either Quine's attack on analyticity is philosophically wrongheaded, or his criterion of ontological commitment is.

Our present criterion *OC*2 has the consequence that any theory whose axiomatic basis is analytically *false* (for example, the theory that there is a married bachelor) is on that ground alone ontologically committed to things of every kind whatsoever. This result does not seem immediately objectionable. Any theory whose axiomatic basis is analytically false is maximally committed, as much as any syntactically

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Carnap also proposes as a criterion of adequacy of a definition of analyticity-in-a-language ('L-truth'), in effect, that it must honour the following relationship: ϕ is *analytic$_L$* iff the pure semantics of L (in the sense used here) delivers $\ulcorner$'ϕ' is true$_L\urcorner$ as a theorem (Carnap 1942: 83–4). This relationship is very close to the definition of analyticity proposed here. Carnap explicitly declines to cite the relationship as defining analyticity, however, on the ground that the condition on the right-hand side of the biconditional is not merely meta-theoretic ($\ulcorner$'ϕ' is true$_L\urcorner$) but meta-metatheoretic ('$\vdash \ulcorner$'ϕ' is true$_L\urcorner$'), whereas Carnap believes that analyticity must be definable in the metalanguage. Against this it should be noted that the traditional conception of a sentence that is true in the object language *solely by virtue of* its meaning is arguably a meta-meta-concept. It should also be noted that the definition proposed here does not invoke the notion of logical validity to define logical validity. Rather it presupposes logical validity among meta-propositions to define analyticity-in-the-object-language of sentences. (Thanks to Michael Rescorla for discussion.)

[33] In his critique Quine misunderstands the relevant notion of truth *solely by virtue of meaning* as that of a sentence made true by no non-semantic state of affairs. Carnap and the other logical positivists whom Quine sought to debunk committed the same error, which is traceable to David Hume's distinction between *relations of ideas* and *matters of fact*. Pre-Quinean empiricists erred in insisting that 'Bachelors are unmarried' fails to describe a genuine extra-linguistic fact. Quine is correct that 'Bachelors are unmarried' is as much about a 'matter of fact' as is 'Some bachelors are happy'. It is a mistake, however, to conclude that the former is therefore like the latter in being *a posteriori*.

inconsistent theory is. Arguably, it is a further consequence that every theory is ontologically committed to the ontological commitments of logic, whatever those might be. If so, then so be it. The commitments of logic, ontological or otherwise, are utterly unavoidable.

On *OC*2 a theory's ontological commitments are closed under analytical super-kinds but not under sub-kinds. A theory that is committed to creatures that talk is committed to creatures, but it is not *ipso facto* committed to any particular talker. The theory that there are bachelors is ontologically committed to men, but not *ipso facto* to any particular bachelor.

One interesting application of this interpretation proves the criterion's mettle. The idealist George Berkeley professed to believe in tables, chairs, mountains, and trees, yet emphatically denied the existence of matter. Tables and chairs, said Berkeley, are made up of 'ideas', i.e., of visual sensations and the like. This raises an interesting and non-trivial question: is Berkeley's bizarre theory ontologically committed to material objects? That he denied the existence of matter does not settle the issue. He also accepted as true sentences like 'There are tables' and 'There are chairs'. Formalizing in the usual manner of '$\exists x$ (x is a table)', according to *OC*2 even if Berkeley's theory is ontologically committed to tables and chairs, the question of whether the theory is ontologically committed to material objects turns on a further, semantic question: Is the Standard English sentence 'Tables are material objects' analytic? If it is not—as Berkeley would have believed (and as I believe)—then even though his theory is committed to tables and chairs, it is not thereby committed to material objects.[34]

10.5 Extensional vs. Intensional Semantics

It might be thought that Quine can reconcile his criterion with his attack on analyticity by distinguishing, as Quine in fact does, two notions of truth of pure semantics: *truth by pure extensional semantics* and *truth by pure intensional semantics*—or as Quine would put it, *truth solely of the theory of reference* and *truth solely of the theory of meaning*. Quine rejects intensional semantics as disreputable but accepts extensional semantics. His criterion of theoretical ontological commitment, although non-extensional—and properly so—evidently makes do with the notion of a truth of pure extensional semantics. This is essentially Cartwright's assessment.[35] It may be argued that, unlike Quine's criterion of ontological commitment, in order to accommodate 'Bachelors are unmarried' (which is not syntactically valid) the definition of analyticity, must invoke truth by intensional semantics—e.g., that 'bachelor' expresses the concept *marriage-eligible but never married man* in Standard English.

The notion of truth solely by pure extensional semantics is not itself extensional. Indeed, it is one source of the modality that is built into ontological commitment.

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[34]   Richard (1998: 260 n. 29) suggests that even if Berkeley believed in (and referred to) material objects, he was not ontologically committed to material objects.

[35]   Cartwright (1987: 11).

Truth solely by pure semantics is, like other modalities (e.g., metaphysical necessity), an attribute not of truth-values but of propositions, in this case of meta-propositions. Anything that is true solely by pure extensional semantics is true. Other true meta-propositions are not true solely by pure extensional semantics (e.g., that 'Snow is white' is true in Standard English). Given Quine's rejection of intensional notions, he cannot simply avail himself of truth solely by pure extensional semantics without further ado.

Furthermore, the envisioned reconciliation does not succeed. Consider for example the theory whose sole axioms are the following three:

Smith exists; Smith is a man; Smith is married

with 'exists', 'man', and 'married', receiving their Standard English meanings. This theory is committed to the existence of at least one entity to which Smith is married. A viable criterion of theoretical ontological commitment needs to accommodate this.

In one sense the notion of analyticity requires no more intensional semantics than Quine's criterion of ontological commitment requires. As illustrated in the preceding section, it is meta-true solely by the pure extensional semantics of Standard English that 'Bachelors are unmarried' is true if bachelors are unmarried. But this, we are assuming, just is the meta-proposition that 'Bachelors are unmarried' is true if marriage-eligible but never married men are unmarried. It thus immediately follows from a truth of the pure *extensional* semantics of Standard English that 'Bachelors are unmarried' is true. Nothing about the Standard English *content* of 'bachelor' (as opposed to its extension) is invoked in the derivation. This last point can be illustrated, following Church, through translation. We begin with the meta-sentence:

(1)   'Bachelors are unmarried' is true$_{Eng}$ if bachelors are unmarried.

This is the right-to-left half of a *T*-sentence. As such, it expresses a truth of the pure extensional semantics of Standard English. The content of (1) can be equally well expressed without using the word 'bachelor' (except to mention it). Assuming that 'bachelor' and 'marriage-eligible but never married man' are strictly synonymous, (1) may be reformulated as:

(2)   'Bachelors are unmarried' is true$_{Eng}$ if marriage-eligible but never married men are unmarried.

Since they express the same thing, (2) expresses a truth of the pure extensional semantics of Standard English no less than (1) does; no truth of intensional semantics proper is invoked by (2) any more than by (1). It is a trivial logical consequence of (2) that 'Bachelors are unmarried' is true in Standard English. Thus it is an immediate consequence of the truth of pure extensional semantics expressed by (1) that 'Bachelors are unmarried' is true in Standard English. It follows by the proposed definition that 'Bachelors are unmarried' is analytic in Standard English.[36]

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[36] More specifically, that 'Bachelors are unmarried' is true in Standard English is a meta-truth of pure *extensional* Standard English semantics. The derivation of the Standard English truth of 'Bachelors are unmarried' from the meta-proposition expressed by (1) does not invoke any truth or inference rule of

Contrary to what might be expected from the terminology the distinction between extensional and intensional semantics is not mutually exclusive. Any separation is only temporary; the two cannot be divorced. The extensional semantics of a language that has non-extensional operators invokes ideas from intensional semantics. The Tarski-style definition of truth for a language with modal operators, for example, proceeds along the same lines as the classical definition of truth except relativizing extensional semantic notions to possible worlds. Relativization of extensional semantic notions to possible worlds is precisely a version of intensional semantics. Even more blatant, the extensional semantic evaluation of the Standard English sentence 'Chris believes that the Earth is round' involves essential reference to the Standard English semantic content of 'The Earth is round', the proposition that the Earth is round.

These observations point to yet another fly in the ointment. Quine's criterion, as he applied it, is unjust; he and his followers have been too quick to condemn the innocent. Consider the metaphysical theory

$A$1: $\Diamond \exists x$ (x is a donkey that talks)
$A$2: $\sim \exists x \Diamond$ (x is a donkey that talks)

This theory clearly avoids ontological commitment to entities that might have been talking donkeys. Indeed, the theory is committed to there being no such entities. While it explicitly states that there *might have* been talking donkeys, it consistently denies that there are any entities that themselves might have been talking donkeys. On classical modal semantics, the truth of axiom $A$1 requires that the variable 'x' include in its range at least one possible entity that is a talking donkey in at least one possible world. Quine himself would have rejected the theory given above as unintelligible, in that one of its axioms quantifies across a modal operator. But this example does not beg the question. Whatever Quine might have said about the matter, the metaphysical theory is perfectly consistent (formally analogous theories are even true), and therefore free of any commitment to there being entities that might have been talking donkeys.

An exactly analogous situation arises in temporal semantics. There are also examples of the same sort involving propositional attitude in lieu of modality and temporality. Care must be taken, for example, to avoid imputing an inflated ontology to the social anthropologist who holds the following theory:

Hob thinks that $\exists x$ (x is a witch & x has blighted Bob's mare).
$\sim \exists x$ [Hob thinks that (x is a witch & x has blighted Bob's mare)].[37]

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intensional semantics proper; rather, the inference is directly from one truth of pure extensional Standard English semantics to another. (Thanks to Felipe M. Hernandez for pressing me to address this issue.)

[37] The example is due to Peter Geach.

These considerations suggest a straightforward repair:

*OC*3:   A theory *T*, couched in an interpreted language L_T employing objectual variables that range *with respect to the actual world at the present time* over exactly everything that *actually presently* exists, is ontologically committed in L_T to entities of kind *K* if and only if the sentences of *T* are such that it is a meta-truth of pure semantics that if all those sentences are true in L_T then at least one entity or other of kind *K* is an element of the universe over which the variables of L_T range *with respect to the actual world at the present time*.

Again, this formulation invokes semantic ideas that Quine rejected; but again, the immediate objective is not to satisfy any particular philosopher, whether that philosopher's demands be reasonable or not. The objective, rather, is to provide a correct, and preferably employable, criterion for theoretical ontological commitment. The present candidate appears promising, and has the distinct virtue over *OC*2 that it recognizes *A*1's lack of commitment to entities that might have been talking donkeys.[38]

The criterion under consideration may be extended into one for general theoretical commitment:

*C*3:   A theory *T*, couched in an interpreted language L_T, *is committed in L_T to p*'s being the case if and only if the sentences of *T* are such that it is a meta-truth of pure semantics that if all those sentences are true in L_T then *p* is the case in the actual world at the present time.

Subsuming *OC*3 under *C*3 we may say that a theory *T* is ontologically committed to entities of kind *K* if and only if *T* is committed according to *C*3 to there being entities of kind *K*. The prior restriction to languages with variables and variable-binders is removed.

10.6 Ontological Commitment as a Species of Theoretical Commitment

Church deems it a shortcoming of Quine's criterion that its actual application does not provide a theory's ontological commitments immediately and directly. Instead one must first demonstrate in a metalanguage that the truth of the theory requires that the universe over which the variables range shall include entities of a given kind.[39] Church submits a more direct criterion. However, Church's proposal provides merely

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[38] Our present candidate cannot be put forward as a necessary or eternal truth, in view of its indexical reference to a particular possible world and time. It can be offered instead as a sentence that is true in every possible context in which it might be uttered. If *OC*3 is true in every possible context, then there is a necessary and eternal counterpart.

[39] Church (1958: 1013–14). Church evidently construes Quine's proposal epistemologically, as a test for determining a theory's ontology.

a sufficient condition, and this only for a theory of a particular form—*to wit*, among the theory's theorems (or perhaps among its axioms) is an existentially quantified sentence. Church's criterion must be formulated in a metalanguage of which the theory's language is itself a fragment. Moreover Church's 'criterion' is actually infinitely many criteria, a different criterion for each open sentence of the object language. For example, Church asserts:

'There is at least one entity x such that x is a donkey and x talks' (interpreted as a sentence of a fragment of the language of this very sentence) is ontologically committed to entities x such that x is a donkey and x talks.

Similarly for each object-language open formula in place of 'x is a donkey and x talks'. (The parenthetical phrase is not Church's. I have included it on his behalf.)

I am not persuaded that the feature Church deems a shortcoming of Quine's proposal is genuinely problematic, or that Church's criterion is superior to *OC*3 in this regard. I am also unpersuaded that Quine's criterion is superior to Church's alternative criterion. Church's is immune to counterexample. Quine's can also be made so. By contrast with Church's alternative, *OC*3 is content to state a theory's ontological commitments in a disjoint metalanguage. It allows that the theory's ontology might not be an actual theorem of the theory, in fact perhaps that the ontology is not even expressible in the language of the theory itself. Quine deems this significant. He writes:

It is instructive to observe that the ontology of a theory may embrace objects of some kind K even where K is not definable in the terms of the theory   (Quine 1961c: 132).

However, this feature of Quine's criterion is not a significant advantage. If a theory bears the ontological-commitment relation to a kind K for which there is a term in the metalanguage, then a term for K can simply be added to the object language.

Doing so affords a possible improvement. Conspicuously absent from *OC*3 is the natural idea of theoretical commitment as logical consequence. Some might prefer to have a criterion of ontological commitment that looks explicitly at theoretical consequences expressible by means of existential quantification in the language of the theory. To this end I would offer a new criterion, which invokes the idea of a general term (e.g., the common noun 'tiger') *designating* a kind. A general term τ of a language L designates a kind K in L only if for every world w and time t, τ applies in L with respect to w and t to an individual i if and only if i is an instance of K in w at t.[40] I submit the following as an alternative to *OC*3, where Π_τ is the predicate corresponding to τ (e.g., 'is a tiger'):

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[40] This condition is necessary and insufficient. *Cf*. my (2005b: 52–4, 69–75, 385); and (2012). The worlds in question need not be genuinely *possible* worlds. Thus, even if it is impossible for there to be any mermaids, and it is equally impossible for there to be any centaurs, there is an impossible world in which there are individuals of one of these mythical kinds and none of the other.

OC4:   For any theory T couched in an interpreted language L_T with a variable-binding existential quantifier ∃ (and employing the standard syntactic formation rules), and employing objectual variables that range with respect to the actual world at the present time over exactly everything that actually presently exists, for any general term τ of L_T and for any kind K such that it is a truth of pure semantics that t *designates K* in L_T, T is ontologically committed in L_T to entities of kind K if and only if $A_T \vDash \ulcorner \exists \alpha \, \Pi_\tau \alpha \urcorner$, where A_T is the set of T's axioms.

This criterion is applicable to any theory that has been formalized in an appropriate quantificational language.

What is the relationship between the two criteria $OC3$ and $OC4$? Assume the following: (i) there is a theory T, couched in an interpreted language L_T with a variable-binding existential quantifier ∃ and objectual variables, and axiomatized in L_T by A_T; and (ii) there is a general term τ of which it is true by pure semantics for L_T that τ designates a particular kind K in L_T. Then T is ontologically committed to entities of kind K according to $OC3$ if and only if it is equally thus committed according to $OC4$.[41]

$OC4$ is extendable into an alternative criterion for general theoretical commitment:

C4:   For any theory T couched in an interpreted language L_T employing objectual variables, for any sentence ϕ of L_T, and for any proposition p such that it is a truth of pure semantics that ϕ expresses p as its semantic content, T is committed in L_T to p's being the case if and only if $A_T \vDash \phi$, where A_T is the set of T's axioms.

As an alternative to $OC4$ we may say that a theory T is ontologically committed to entities of kind K if and only if T is committed according to $C4$ to there being entities of kind K.

Our proposal has significant limitations. Arithmetic has ontological commitments but it is not axiomatizable. Goldbach's conjecture is false if and only if arithmetic is ontologically committed to even integers greater than two that are not the sum of two primes. It is presently unknown whether arithmetic is committed to such numbers. If Goldbach's Conjecture is false, then at least it is discoverable that arithmetic is so committed. However, Church's theorem taken together with the Church-Turing thesis have the consequence that if $C4$ is mathematically certain, then there is no effective decision procedure—no automatic recipe—for determining of any given proposition

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[41] The pure semantics of L_T may be thought of as a direct specification of the *intended model* for L_T, in which truth coincides exactly with the absolute notion of truth in L_T (with respect to the actual world and the present time). Trivially, if T is ontologically committed according to $OC4$ to entities of kind K, then this is equally so according to $OC3$. Suppose conversely that it is meta-true by pure semantics that if T is true in L_T then at least one element of the universe over which the variables of L_T range is an instance of K. In that case, the axioms of T analytically entail $\ulcorner \exists \alpha \, \Pi_\tau \alpha \urcorner$ in L_T. An *admissible model theory* (one that represents the space of genuine logical possibilities) must validate all the analytically valid entailments of L_T. Then $A_T \vDash \ulcorner \exists \alpha \, \Pi_\tau \alpha \urcorner$. Hence if T is ontologically committed according to $OC3$ to entities of kind K, then this is equally so according to $OC4$.

p whether an axiomatized theory is committed to it. Nevertheless *C*4 might correctly capture what theoretical commitment is, and *OC*4 what ontological commitment is, for axiomatized theories.

10.7 Existential Commitment

I have been holding in abeyance a crucial fact that conflicts with one of the central motivations for Quine's criterion: such Standard English constructions as 'some', 'a', and 'there is' are rather more flexible, and often broader in their application, than the Standard English verb 'exist' and its cognates ('there exist', etc.). This is indicated by sentences like the following:

> There have been forty-four US presidents, most of whom no longer exist.
>
> This petrified bone is a fossil of a particular organism that no longer exists.
>
> This was caused by something that no longer exists.
>
> Their actions will bring about something that does not yet exist.
>
> There are languages that once existed but do not anymore.
>
> Someone who does not yet even exist will discover what you have done.
>
> There is a particular possible individual who does not exist but who would have existed had these gametes united to develop into a zygote.[42]
>
> There are true propositions whose components are jointly incompossible, yet no such proposition can exist.[43]

By Quine's lights, each of the displayed sentences is committed to the existence of a certain kind of entity whose existence the sentence denies. Yet each sentence may be interpreted so that it could be true. This is a prima facie difficulty for both *OC*3 and *OC*4.

There is no inconsistency if a distinction is drawn—anti-Kantian, anti-Fregean, anti-Russellian, anti-Quinean—between a generic notion of metaphysical *being* and a metaphysically special notion of *existence* as a special case of being. Unrestricted 'there is' or '∃' may then be conscripted for the former (begging the reader's pardon for the misnomer, 'existential quantifier') while a special and restricted predicate is introduced for the latter, as was done in section 10.2 above.[44] What Quine sees as 'ruining the good old word "exist"' would be recognized instead as recognition of the word's special metaphysical status. Indeed Quine might be seen as joining with his predecessors in ruining the good old idiom 'there is' of quantification, by imposing a

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[42] In Francis Coppola's masterpiece, *The Godfather*, Marlon Brando, portraying the mobster patriarch Don Corleone says, 'Some day—and that day may never come—I'll call upon you to do a service for me.'

[43] I make this claim in Salmón (1987). Possible entities are *incompossible* if it is impossible for them to exist jointly.

[44] I argue contrary to Kant that existence is a 'real predicate', in Salmón (1987) and in Salmón (2014).

restriction. This is not to say that the universe of discourse—the universe of things that are said to *be*—cannot be restricted to existing things, or even that such a restriction is not indeed the default interpretation. It is to recognize that alternative interpretations of the quantifiers are permissible, even if the Standard English verb 'exist' is a univocal and non-indexical term for a specific and metaphysically honorific (and therefore non-universal) property.[45]

There is no pressing difficulty with the proposed distinction, but it does raise a question: does the metaphysically generic notion of being have some generic *ontological* status broader than full-fledged existence? It is tempting from the present perspective to view Quine's criterion as blurring together two different kinds of theoretical ontological commitment: (i) general commitment to there *being* entities of a given kind; and (ii) as a special case, *existential commitment*, i.e., a more specific commitment to there *existing* entities of the kind in question. This gives rise to a form of neo-Meinongianism. Each of the sentences displayed above evidently bears general ontological commitment while disowning an existential commitment to things of a specific kind.

In fact, each of those sentences is then bearing the ontological-commitment relation to the kind *entity that does not exist*. A criterion of theoretical ontological commitment might then be seen as having the same purpose it always had: to clarify what it is for a theory to require, in order that it be true, that there *be* things of a given kind. A theory T is furthermore *existentially committed* to entities of a given kind K when, but only when, it is ontologically committed to entities that both exist and are instances of K—where *entity that exists and is an instance of K* is an analytical sub-kind of K, and thence to which a theory may bear the ontological-commitment relation. This is encapsulated in the following definition:

> A theory T is *existentially committed* to entities of kind $K =_{def} T$ is ontologically committed to entities that exist and are of K.

Thus *OC*3 and *OC*4 may be seen as yielding alternative criteria of existential commitment.

It emerges on reflection that Meinongianism is not a very happy path. The *being* expressed in each of the sentences displayed above—the *there-is*-ness—need not be regarded as an ontological status, as opposed to some other sort of metaphysical status. The issue is at least partly terminological. The sort of being in question is not a weak or pale kind of existence. Nevertheless at least some of the sentences displayed above can be translated into sentences that employ variables ranging with respect to a world w and a time t over exactly everything that exists in w at t, thereby avoiding commitment to entities that do not exist. For example, the first displayed sentence can be recast as the following, where 'Σ' is the existence-restricted (so-called *actualist* and *presentist*)

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[45] These sentences in the metalanguage employ a universe of discourse that extends beyond the things that exist.

existential quantifier 'there exists an entity such that',[46] 'Π' is its dual 'every existing entity is such that', 'H' represents the tense operator 'at some past time' (or 'it has been the case that . . .'), and 'HA' is its dual 'at every past time':

$H\Sigma x_1$ [x_1 be a U.S. president & $H\Sigma x_2$ [$x_1 \neq x_2$ & x_2 be a U.S. president] & . . . &

$H\Sigma x_{44}$ [$x_1 \neq x_{44}$ & $x_2 \neq x_{44}$ & . . . $x_{43} \neq x_{44}$ & x_{44} be a U.S. president]] . . .]

& $HA\Pi y_1$ [y_1 be a U.S. president $\rightarrow$ $HA\Pi y_2$ [y_2 be a U.S. president $\rightarrow$ . . .

$\rightarrow$ $HA\Pi y_{45}$ [y_{45} be a U.S. president $\rightarrow$ $y_1 = y_2 \vee y_1 = y_3 \vee \ldots \vee y_{44} = y_{45}$]] . . .]

& $H\Sigma y$ [y be a U.S. president & *Today* $\sim \Sigma x (x = y)$].

We may rest content for the time being—perhaps until a better understanding is achieved—to deny ontological status to being, and to require simply that the variables range over exactly everything that exists—no less and, at least as important, no more. (See footnote 9 above.) Our current criteria of ontological commitment are then restored to their original status as criteria of a theory's commitment to there *existing* entities of a given kind, there being no difference between ontological and existential commitment.

Here then is our final rendering of the criterion:

*OC*5:   A theory T, couched in an interpreted language L_T employing objectual variables such that it is a truth of pure semantics that the objectual variables range with respect to a world and a time only over things that exist in that world at that time, is ontologically committed in L_T to entities of kind K with respect to a world w and a time t if and only if the sentences of T are such that it is a meta-truth of pure semantics that if all those sentences are true in L_T then at least one entity or other of kind K is an element of the universe over which the objectual variables of L_T range with respect to w at t.[47]

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[46] A quantifier is *actualist* if the universe over which it quantifies with respect to a possible world is restricted to things that exist in that world. A quantifier is *presentist* if the universe over which it quantifies with respect to a time is restricted to things that exist at that time. A quantifier is *existence-restricted* if it is actualist and presentist. Where the universe over which variables range with respect to a world and a time is exactly everything that exists in that world at that time, existence-restricted quantifiers may be replaced with the standard quantifiers.

If an existence-restricted existential quantifier, Σ (read: 'there exists an entity . . . such that'), is taken as primitive, the existence predicate is definable in terms of it:

Exists $=_{def}$ $\lambda x[\Sigma y (x = y)]$.

If instead (and more naturally) the existence predicate is taken as primitive, the existence-restricted universal and existential quantifiers, Π and Σ, are definable in terms of it:

$\Pi\alpha\phi_\alpha =_{def} \forall\alpha$ [α exists $\rightarrow \phi_\alpha$]
$\Sigma\alpha\phi_\alpha =_{def} \exists\alpha$ [α exists & ϕ_α]

[47] An example due to C. Anthony Anderson brought to my attention that an additional restriction is required. The truth of pure semantics that at least one entity of kind K is an element of the relevant universe if the theory is true must not depend on the meta-proposition that the universe over which the objectual variables range with respect to a world and a time includes *all* those things that exist in that world at that time, as opposed to including *only* such things, i.e., as opposed to being *restricted* to such things.

The requirement that the universe of discourse with respect to a circumstance be restricted to things that exist in that circumstance has significant consequences. A theory that includes a sentence like 'There are forty-four present-or-former US presidents' must be translated into a language whose variables range over only things that presently exist before applying $OC5$. To do this, it must first be determined whether the theory holds that there *presently exist* forty-three former US presidents. More significantly, special care must be taken when assessing a theory formulated by employing a universe that includes nonexistent things. The theory must first be translated, if possible, into a language whose universe of discourse with respect to the actual world at the present time is not only ontologically inclusive but ontologically proper, i.e., consisting of exactly what actually exists now. $OC5$ must then be applied to the translation. If a theory's formulation is not translatable into a language with an ontologically proper universe, strictly speaking $OC5$ then issues no verdict concerning the theory's ontology. Contrary to Quine, a theory whose formulation employs a universe that extends beyond what exists is not *ipso facto* committed to nonexistent things.

Oversimplifying, the basic idea underlying $OC5$ is straightforward: for a theory T to be ontologically committed to entities of kind K is exactly for the conditional $\ulcorner A_T \to \exists \alpha \Pi_\tau \alpha \urcorner$ to be analytic in a language in which A_T is a conjunction of the axioms of T, the universe of discourse is ontologically proper, and Π_τ is the monadic predicate constructed from the general term τ, which designates K. (See footnote 41.) On reflection, it should be none too surprising that a criterion for a theory's commitment to there existing some entities or other of a given kind should presuppose an unrestricted notion of everything that *exists*. If the criterion is trivial, then at least it is not incorrect.

Its potential usefulness is another matter. To settle a theory's ontology it is not pertinent to determine what kinds of entities belong to the theory's universe of discourse. There are women in the universe of ontological misogyny; there are no mermaids in the universe of mermaid theory. That is precisely why both of these theories are wrong. Rather one must determine what kinds of entities *have to* be among everything that exists if the theory in question is to be true. When fully spelled out, at bottom the criterion (without invoking intensional semantics proper)[48] fixes a theory's ontological commitment to be to whatever kinds the theory analytically

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Otherwise the ontological commitments of the semantic meta-theory itself (e.g., to sets, to sequences, to expressions, etc.) will be incorrectly imposed on the object theory. The needed additional restriction may be captured thus:

$OC5'$:   A theory T, couched in an interpreted language L_T with objectual variables such that it is a truth of pure semantics that the objectual variables range with respect to a world and a time over exactly everything that exists in that world at that time, is ontologically committed in L_T to entities of kind K with respect to a world w and a time t if and only if the sentences of T are such that, *for every language L'_T that results by replacing the universe of L_T with respect to a world and a time by a sub-universe of that universe*, it is a truth of pure semantics that if all those sentences are true in L'_T then at least one entity or other of kind K is an element of the universe over which the objectual variables of L'_T range with respect to w at t.

48 Contrary to Richard (1998). See note 36 above.

entails there exist entities of. Perhaps this is not an utterly useless intellectual tool, but neither is it a magic wand.

We saw in section 10.1 that Quine's criterion self-consciously declines to impute ontological commitment merely on the basis of designating, and that this is indeed a virtue in light of the apparent absence of ontological commitment to Stephen Hawking in a sentence like 'Either Hawking first predicted Bekenstein-Hawking black-hole radiation, or else Bekenstein did.' Quine is correct that a theory's ontological commitments are evidently not carried merely by what the theory names; rather, such commitments depend directly and entirely on what the theory analytically entails exists. We also saw that Quine's criterion of ontological commitment therefore requires free-logical versions of universal instantiation and existential generalization. The premise that if Hawking is a theoretical physicist then there is such a thing as Hawking, although obvious and trivial, is not true solely by logic. Rather it is true by the nature of being a physicist, as distinct from (for example) being admired or being mentioned. The formally analogous premise that if Isaac Newton is admired then there is something admired, is not true by logic–at least not for all notions of metaphysical being—and the premise that if Isaac Newton is admired then there is Newton is not even true. Newton no longer exists; he is admired nevertheless. For some more generous notions of being, it is a matter of logic that if Newton is admired, then 'there is' something that is admired. Not so with arbitrary formulae that invoke singular terms. Even for the more generous notions of being, the disjunction 'Either Hawking wrote *A Brief History of Time* or Bekenstein first predicted Bekenstein-Hawking black-hole radiation' does not free-logically entail 'There is something such that either it wrote *A Brief History of Time* or Bekenstein first predicted Bekenstein-Hawking black-hole radiation.'

On the other hand, we also saw from Kripke's argument in connection with a universe of discourse lacking Hawking that ontological commitment seems sometimes to be carried through naming rather than through existential quantification. How are these conflicting facts to be reconciled?

What kind of language a theory is couched in is one issue, what it is committed to another. To determine the ontological commitments of a theory, it is often helpful to recast the theory in an ontologically perspicuous language. A useful translation procedure for the purpose of assessing the ontology of the envisioned history of contemporary physics as couched in L' runs in exactly the opposite direction from Kripke's:

A quantifier-free sentence of L' translates homophonically into L.

A universal generalization $\ulcorner \forall \alpha \, \phi_\alpha \urcorner$ of L' translates into L as a restricted universal generalization $\ulcorner \forall \alpha \, (\alpha \neq h \rightarrow \phi_\alpha) \urcorner$.

An existential generalization $\ulcorner \exists \alpha \, \phi_\alpha \urcorner$ of L' translates into L as a restricted existential generalization $\ulcorner \exists \alpha \, (\alpha \neq h \,\&\, \phi_\alpha) \urcorner$.

The translation into L of any sentence of L' containing quantifiers is obtained by replacing each part that is a universal or existential generalization by its translation.

Where ϕ is a sentence of L and ϕ' is a sentence of L' such that one translates the other by either Kripke's $L \rightarrow L'$ scheme or this $L' \rightarrow L$ scheme, it is meta-true solely by the pure semantics of both L and L' that ϕ is true in L if and only if ϕ' is true in L'. But the $L' \rightarrow L$ scheme is superior to Kripke's scheme in at least two important respects.[49]

First, it is apparent that at least one of the schemes takes liberties, failing to preserve semantic content. The result of translating the translation back again into the original language, although classically equivalent to the original sentence, apparently means something different in the original language. For example, the translation of S', as a sentence of L', back into L is '$\exists x\,(x \neq h\,\&\,x$ wrote *A Brief History of Time*) $\vee$ (h wrote *A Brief History of Time*)', which is classically equivalent, but not free-logically equivalent, to the sentence S of L from which S' was obtained. Between the two schemes it is considerably more plausible that the $L' \rightarrow L$ scheme is genuinely content-preserving. The $L' \rightarrow L$ scheme provides a usable decoder that specifies for speakers of L how sentences like '$\sim \exists x\,(x$ wrote *A Brief History of Time*)' and '$\sim \exists x\,(x = h)$', both false in L but true in L', are to be understood as interpreted in L'. Kripke's $L \rightarrow L'$ scheme does not do the same in reverse. A sentence of L and its translation under Kripke's scheme into L' evidently differ in logical form. Moreover, the content of a universal generalization is not a conjunctive proposition; the content of an existential generalization is not a disjunctive proposition. If it is stipulated that the variables range in L over exactly the entities that exist, then the negative existential '$\sim \exists x\,(x = h)$' may be regarded as expressing in L that Hawking does not exist, whereas in L' this same sentence expresses the truism that Hawking is not someone else.

Second, insofar as the $L' \rightarrow L$ scheme is content-preserving, it provides exactly what is needed in order to apply $OC5$ to determine the ontology of a theory couched in L'. Kripke's $L \rightarrow L'$ translation scheme produces a sentence whose truth conditions in L' are the same as those of '$\exists x\,(x = h)$' in L. Despite this, Hawking's existence is not genuinely expressible in L'. In particular, the simple reflexive identity '$h = h$', which translates homophonically, does not free-logically entail '$\exists x\,(x = h)$', and therefore does not provide a means to express in L' that Hawking exists. Even if the envisioned history of contemporary physics is ontologically committed to Hawking, its 'translation' *via* Kripke's scheme is not. Indeed, since no sentence of L' translates into a sentence of L that entails '$\exists x\,(x = h)$', no theory formulated in L' is committed to Hawking. By the same token, since no sentence of L' translates into a sentence of L that entails '$\sim \exists x\,(x = h)$', no theory formulated in L' is committed to Hawking's nonexistence. It should be noted, though, that if a means for expressing

existence is added to L', then the theory formulated in the expanded language by 'h is a physicist & (h is a physicist $\rightarrow$ h exists)' is ontologically committed to physicists in general, and to Hawking in particular. What matters for ontological commitment is not whether '$\exists x\,(x = h)$' fully translates into L'—with full preservation of content, including ontological commitment. (It does not.) What matters is whether the envisioned history of physics analytically entails '$\exists x\,(x = h)$' when 'x' ranges only over things that exist. This, according to *OC*5, is precisely what it is for the history to be ontologically committed to Hawking.[50]

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