

Occasional Papers—I

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To
TANI

PREFATORY NOTE

This paper does not pretend to make a contribution to philosophy ; it may, at best, claim to be making one towards philosophical understanding and interpretation. Contributions to knowledge, least of all to philosophical knowledge, are not to be expected from a person who is on the verge of drifting into professional oblivion due to academic exile. Having been deprived of opportunities to enter into a dialogue with professional colleagues, and discuss the issues that are on the top layer of my mind, I have to remain content with the indulgence of soliloquising. What is presented here is one of the parenthetical parts of the resultant monologue. As it might take some time to transcribe the whole of it, the parentheses are being detached. Another detached part appeared in *Logique et Analyse*, and three similar doodles are to appear soon in other journals. Whether these have any transpersonal significance, well, it is for others to judge. Anyway, one does these sorts of things primarily for personal satisfaction.

November 1970

A. P. RAO

QUINE'S CRITERION OF ONTOLOGICAL COMMITMENT

The modest aim of what follows is to give a survey of the literature on Quine's criterion of ontological commitment, and see, in the light of the subsequent critiques on it, whether it can be still held, and also indicate the boundaries of its stipulational range.

(I)

Russell's treatment of descriptive phrases in (15) is a significant advance in the field of logico-ontological studies, for implicit in it is a way to reduce the whole scheme of reference, and ontological commitments, to variables. In the framework of (15), the expressions 'Frege', 'the author of *Sinn und Bedeutung*,' and 'the author of *Function und Begriff*'—and all such triads of expressions—and the sentences in which they occur as grammatical subjects, for example

- i) Frege is the author of *Sinn und Bedeutung*,
- ii) The author of *Sinn und Bedeutung* is Frege, and
- iii) The author of *Sinn und Bedeutung* is the author of *Function und Begriff*

—and all such triads of sentences—have the same scheme of reference in the sense that all the three expressions refer to, and all the three sentences are about, the same entity ; and all those sentences, if they are true, commit us to the existence of the same entity. That entity is the one which is the value of the variable 'x' in all of its occurrences in each of the following three sentences :

- iv) (Ex) (x is Frege)
- v) (Ex) (x is the author of *Sinn und Bedeutung* & (y))

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- (y is the author of *Sinn und Bedeutung* $\rightarrow x=y$), and
vi) ($\exists x$) (x is the author of *Function und Begriff* & (y)
(y is the author of *Function und Begriff* $\rightarrow x=y$)

It is Russell's discovery that the first set of sentences constituting i)-iii), and the second set of sentences consisting of iv)-vi) are precisely *about* the same entity. The motive behind such an unification of the referential import of the two sets of sentences, in (15) is sufficiently well-known to be made explicit here, and so is the use for which it is put to. What is important to note in this connection is that the resultant reduction of commitment to entities through proper names and descriptive phrases to commitment to entities through variables. Russell exploited this reductionist strategy to eliminate descriptive phrases, and also to judge whether a given expression is, or is not, a referring expression. He did not, however, explore further, and generalise the results so as to arrive at a criterion which could be put to use in order to determine the ontological commitment of any given theory, or any given piece of discourse. Russell's failing to hit at such a criterion is rather surprising for he knew that the whole of significant discourse could be recast as an applied quantification theory. However, this was accomplished by Quine in (9). The criterion which he came to hit at in it, and was further articulated in several subsequent papers by him and others, tantamounts to this : a theory T commits us to the set E of all and only those entities e which are values of the bound variables occurring in any sentence S of T. And if T were to contain open sentences, i.e., sentences containing free variables, then an open sentence S of T is taken to be committing us to the set of all and only those entities which are values of the bound variables of the sentences S_i , S_{i+1} , \dots , S_{k-1} , S_k , where S_k ($i \leq j \leq k$) is a sentence of T and follows from S by virtue of the rules of inference of T. The tacit presupposition of this criterion—which we shall refer

to as Quine's criterion, though Quine himself did not frame it that way—is that the quantifier '(Ex)' is to be read as 'there is an x such that' or as 'there *exists* an x such that'. Here the two italicised words are used in their usual senses, namely the sense in which we say that Socrates *is* and that Pegasus *is not*, and the sense in which we say that Socrates *exists* and that Pegasus does *not exist*, respectively. The far reaching consequence of Quine's criterion is the demarcation that emerges between the *ontology* and the *ideology* of any given theory T, the former determined entirely by the bound variables of T and the latter determined solely by the primitive predicates of T. It is the bone of contention of Quine that in order to fix the ontological commitments of a given theory its predicates, be they primitive or those defined in terms of the primitive predicates, are irrelevant. This presupposition, as well as the consequence, of Quine's criterion have been questioned, the former by Lejewski (6) and Potter (8), and the latter by Church (4).

(II)

To consider the latter first, according to Church's criticism and emendation of Quine's criterion the predicates of T do play a significant role in fixing the ontological commitments of T, as the variables we use in T, if T were not to be a non-standard theory, which Quine thought would fall under the stipulational range of his criterion, are ones "with only a limited variety of ranges" and ones having non-empty ranges. And hence, he argues that "ontological commitment will have to be associated *specifically* with existential quantifiers rather than with bound variables *generally*"(4).

Church thinks that '(Ex) Px' does not commit us to all the values of the variable 'x', and that it does commit us so is not proximate to the intuitive sense of existential commitment that we have, and hence that Quine's criterion does not

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capture the intuitive meaning of "existential commitment", for what we intend to commit to in asserting that ' $(\exists x) Px$ ' are only those entities that are values of the variable ' x ' such that they exemplify the property ' P '. But, if the ontological commitments involved in the affirmation of ' $(\exists x) Px$ ' were to be fixed in that way, the denial of ' $(\exists x) Px$ ', that is the affirmation of ' $\sim(\exists x) Px$ ' does not commit us to the same entities which its affirmation does. For, granting that the denial of ' $(\exists x) Px$ ' is equivalent to an affirmation of ' $\sim(\exists x) Px$ ', and taking for granted the validity of the interdefinability of the existential and the universal quantifier, and the principles of double negation, Universal Instantiation and Existential Generalisation, it can be shown that the assertion of ' $(\exists x) Px$ ' and the assertion of ' $(\exists x)\sim Px$ ' commit us to the same entities. Similarly, on the assumption that the two quantificational rules, cited above, are valid ones—and Church does share this assumption—it can be shown that ' $(\forall x) Px$ ' and ' $(\exists x) Px$ ' have identical commitments. In this there is, of course, an implicit assumption, namely that an affirmation of a given sentence, and an affirmation of all and only those sentences that follow from it by virtue of the accepted rules of inference, have identical commitments.

According to Quine ontological commitments will have to be unpacked with reference to theories taken as units, and not as Church suggests, with reference to assertions on individual sentences. However, in the extreme case, that is when $\{S\}=T$, we can take the sentence ' S ' itself to be the theory T . But this is not the case generally, for most of the theories that we come across and those that attract our attention are bunches of sentences. Church, though concedes this much to Quine, thinks that a theory T commits us to every entity that any *analytic* sentence of T commits us to, and hence, in a sense, the ontological commitment of T can be reduced to the ontological commitments of the assertions of individual

analytic sentences of T. And as such, he believes that, an unpacking of the ontological commitments of T *requires* a notion—and a precise one it must be—of analyticity. But for Quine this is a concept which resists an assignment of precise meaning, and hence it is desirable that we should settle ontological issues without invoking this concept with all its haziness. To achieve this aim there is no other go than to take whole bunches of sentences, i.e. theories, into consideration while fixing their ontological commitments, as Quine does.

Further, if we blur the Quinian distinction between ontology and ideology, and take the existential quantifier to be the determining factor in the fixation of the ontological commitments of theories, as Church does, then we will be forced to admit that what a theory commits us to is not the set of entities of which that theory is supposed to be about, or the set of entities to *describe* which that theory has been construed, but to the subsets of the set of those entities. This does seem to be rather paradoxical, for then what we would be saying amounts to: no theory serves the intended purpose. To show this let T be a theory intended to be about the set of entities E, and allow E to be $\{e_1, \dots, e_i\}$. Let S_1, \dots, S_n be the sentences of T such that each variable that occurs in S_k ($1 \leq k \leq n$) is existentially quantified. Let $i < n$, and P_1, \dots, P_n be the monadic predicates such that P_j occurs in S_j . Also assume that T contains sentences S^1, \dots, S_n whose variables have been universally quantified, and that there is a S_m ($1 \leq m \leq n$) such that S_m follows from S_m by virtue of the rules of inferences laid down for T. Then an assertion of S_i commits us to the set of all and only those entities that are P_1, P_2, \dots , and to the set of all those entities that are P_n . Now let the set of those entities that are P_i be E_i . We can no doubt assert that $E = E_1 \cup \dots \cup E_n$. But this we can do *only* when either i) it is established that for some h , $P_h = P_i$, as one of the assumptions is that $i < n$, or else

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ii) $i=n$, i.e when the number of the monadic predicates of T and the number of the entities that are members of E are taken to be the same.

It might be suggested that accepting the definitional equivalence of $P_n=P_i$ and admitting '(E x) (P $_n$ x \equiv P $_i$ x)' as a truth of T, it can be asserted that $E=E_1 \cup \dots \cup E_n$. But this additional truth has an additional import, for it is tantamount to saying that there are entities with multiple properties. And if ontological commitment is to be tagged to existential quantifiers, the existentially quantified statements do not commit us to just what they purport to say that they are, but also what they purport to say what they are. Thus either T does not commit us to what we intend it to commit us to, else it does commit us to more than what we intend it commit us to.

The hypothetical solution (in connection with i) (of the above paragraph is in fact an attempt to reduce the number of monadic predicates of T precisely to the number of entities that are members of E, by establishing numerical identity between some of them. And as such it is in the direction of ii).

Earlier we noted that Church considers the supposed use of variables with *limited ranges* as a support for tagging off ontological commitments to the existential quantifier. But if we take him to be using 'range', in the context cited above, in the sense in which it is used in his *Introduction to Mathematical Logic*, Vol. 1, the range of each variable of T, be it a variable quantified universally or one quantified existentially, becomes the whole of E. This is all the more so when T is a theory which contains or uses the standard first order functional calculus as '(x) F x \rightarrow (E x) F x ' is a truth in it. And Church does accept that the assertion of a sentence commits us to the set of all and only those entities to which the assertion of any sentence which follows from it, and those variables are existentially quantified does commit us to. By virtue of the rules

of inference of T, as T contains the standard first order logic, ' $(\exists x) (Fx \vee \sim Fx)$ ' follows from ' $(\exists x) Fx$ '. Hence an assertion of ' $(\exists x) Fx$ ' commits us to the something as the assertion of ' $(\exists x) (Fx \vee \sim Fx)$ '. And an assertion of ' $(\exists x) (Fx \vee \sim Fx)$ ', obviously, commits us to the whole of the universe of discourse on the one hand, and (when the quantifiers are interpreted in the standard fashion) to the non-emptiness of that universe on the other hand. So does ' $(x) (Fx \vee \sim Fx)$ ' of which ' $(\exists x) (Fx \vee \sim Fx)$ ' is a consequence; and ' $(x) Fx$ ' also has the same commitment as ' $(x) (Fx \vee \sim Fx)$ ', as the latter follows from the former.

All this, however, fits into the framework of Church, in which ontological commitments are tagged to existential quantifier. But then the element of necessity explicit in Church's imperative that "ontological commitment *should* be associated *specifically* with the existential quantifier rather than with bound variables *generally*" is lost. The reason for this is that by restructuring the criterion of ontological commitment as follows:

an assertion of the sentence S commits us to the set of the values of the variables occurring in the sentence S_i , where S follows from S_i , and all the variables occurring in S_i are quantified universally,

ontological commitments can be transferred to the universal quantifier. If Church's criterion is an attempt to fix ontological commitments of an assertion with reference to the consequences of that assertion, this criterion aims at the same with reference to the assertions of which it is a consequence, i. e. with reference to what is involved by that assertion. Thus whether ontological commitments of a theory T are to be tagged to the existential quantifier or with the universal quantifier depends on whether the syntactical rules of T make use of the *evolutionary* technique or *involutionary* technique as distinguished by Carnap (I). In either case the range of the variables will be the whole universe of discourse.

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As can be noticed from what we have said, whether ontological commitments of a theory should be tagged to existential quantifier or universal quantifier is determined by the syntactical structure of the theory in question. This is to some extent true even in the case of Quine's criterion in the form in which we stated it, for according to it the assertion of a sentence 'S', when it contains free variables, is said to be committing us to the same as the assertion of the sentence 'S_i' which follows from it and whose variables are quantified. But this reference to syntactical matters can safely be eliminated by reformulating a theory T in which sentences with free variables do occur as a theory T* in which no such sentence occurs, without tampering with the expressive power of T. In fact free variables serve no purpose not already served by bound variables; and that is the import of the familiar theorem about the standard first order logic, namely that an open sentence is a theorem if and only if its universal closure is a theorem. When T is so reformulated to result in T*, Quine's criterion does not invoke syntactical notions in order to fix ontological commitment of T*. And the trouble with Church's criterion is that it cannot be stipulated without invoking the syntactical notion of the consequence or following on the one hand, and the imprecise notion of analyticity on the other.

The syntactical and the semantical parts of the issue of ontological commitment should be distinguished clearly before attempting an answer to it. The former concerns with the delimiting of the necessary and sufficient vocabulary of a theory which we use to talk about a set of entities that we intend to talk about in a theory, and the latter is concerned with finding out and framing a plausible criterion which could be stipulated on any given theory in order to find out what the vocabulary of that theory purports to refer. Church's criterion, and a restructuring of it, as is done above, tackle the

syntactical side of the issue, by providing a way to minimise the vocabulary of a theory either by deleting the universal quantifier or by deleting the existential quantifier, by suitable adjustments in the syntax of the theory. In order to tackle the semantical side of the issue using only semantical notions, there is no better way than to accept Quine's approach, and thus his criterion.

(III)

That Quine is taking '(Ex)' to mean 'there exists an x such that' is evident from his remark that "to say that *something* does not *exist* or that there *is* something which is *not*, is clearly a contradiction in terms" (II), for the contradictoriness-in-terms arises only when '(Ex) (x does not exist)' is taken to be an abbreviate of 'there exists an x such that x does not exist'. This rendering of the quantifier '(Ex)' is a consequence of his other philosophical predilections, the chief among them being that the truth of a sentence requires, among other things, the existence of the entity which the subject term of that sentence purports to refer. The pervasiveness of this Aristotlian bias in his theory of reference and his discussion of ontological issue makes even a statement of it dispensable. What is important to note in this connection is that what is meant by the existence of an entity is not its spatio-temporal existence but only its membership in the domain constituting the universe of discourse. It is also worth noting how Quine is led to give this reading of '(Ex)'.

The recognition of an expression as a referring expression does not involve in the acceptance of the existence of the referent of that expression. This recognition is only a grammatical, or a syntactical, one. But the truth of a sentence in which such an expression occurs as the subject term does have such an involvement; at least that is what Russell and Quine think. In addition, they share a "robust sense of reality";

and hence, they had to find out ways and means of reducing sentences in which expressions which can be syntactically recognised as referring expressions, i. e. as nouns, occur as subject terms, into sentences in which they do not occur so. This they accomplished by regarding the expressions that are grammatically recognisable as referring expressions to the syncategorematic realm, and thereby minimising the referring vocabulary to those expressions that have a referential linkage to the entities of the universe of discourse. This reduction, as is well-known, is based on the quantificational mode of discourse. This is to say that quantification is carried on pronouns in order to refer to entities of the universe of discourse whose names can be used as substituends of pronouns, and the sentences in which the expressions grammatically recognisable as referring expressions are so construed, and so formulated, that they involve quantification of pronouns only. Thus the "sole vehicle of reference" of a theory T becomes the bound variables of T (12).

Now let ' x_1 ', ' x_2 ', ' x_n ' be the variables, and 'P' a monadic predicate of T respectively. Similarly let ' a_1 ', . . . ' a_n ' be the individual constants, and E the universe of discourse of T respectively. Let for each ' x ', ' x_i ' range over E, and ' a_i ' be the name of the entity e_i of the universe of discourse. Also let the interdefinability of the universal and existential quantifiers hold in T. Then according to Quine, as long as n is some finite number, the existential quantifier can be defined away as follows :

$$(Ex_i) Px_i = Pa_1 \vee \dots \vee Pa_n$$

This definition holds good even for theory T* where T* is like T except for containing, in addition to the vocabulary of T, the constants ' a_1^* ', . . . ' a_n^* ' in its vocabulary. Even in T* ' $(Ex_i) Px_i$ ' will mean the same as ' $Pa_1 \dots Pa_n$ ' and ' $(x_i) Px_i$ ' the same as ' $Pa_1 \& \dots \& Pa_n$ '. That this definitional equivalence holds even in T* may not be evident *prima facie*.

But when we take into consideration that an open sentence of T is true if and only if its universal closure is true, that those sentences in which a_j^* ($i \leq j \leq n$) occurs function in T^* just like open sentences, and that the standard rules of quantificational inference hold in T^* it would be easy to see the point. Now consider sentences in which a_j^* 's, for which no interpretation has been provided, are present, for example

$$(A) \quad (x_i) Px_i \rightarrow Pa_i^*, \text{ and}$$

$$(B) \quad Pa_i^* \rightarrow (Ex) Px_i.$$

(A) and (B) are true in T^* ; and

$$(A^*) \quad (x_j) (x_i) (Px_i \rightarrow Px_j), \text{ and}$$

$$(B^*) \quad (x_j) (Ex_i) (Px_i \rightarrow Px_j)$$

where $i \leq j$, are also true in T^* . By virtue of the definition above, and the interpretation of the variables of T , and hence of T^* , (A*), respectively, turn out to be,

$$(A_1^*) \quad (Pa_1 \& \dots \& Pa_n) \rightarrow (Pa_1 \& \dots \& Pa_n)$$

$$(B_1^*) \quad (Pa_1 \& \dots \& Pa_n) \rightarrow (Pa_1 \dots Pa_n)$$

which are tautologous. And

$$(x_i) Px_i \rightarrow (Ex_i) Px_i$$

turns out to be the same as (B_1^*) . Thus to accept the definition given above as valid with reference to T^* , it is not necessary to provide an interpretation for ' a_j^* 's by accepting that for each ' a_j^* ' there is some ' a_k ' such that ' a_j^* ' is ' a_k ', or by augmenting the vocabulary of T^* by functions say

$$f_1, \dots, f_n$$

and then identify ' fa_i^* ' and ' a_k ', or by considering a_i^* 's as names of a null entity that is a member of E , or as names of a (or the) null set that is a subset of E .

Such a definition of the existential quantifier does not, as it has been supposed to be, by Lejewski, affect the validity of the accepted interpretation and the truths of the standard predicate logic. Assuming that it does so affect, in order to save it, Lejewski gave a new interpretation of the quantifiers. That the standard interpretation of the quantifiers, i.e. the

one involved in the definition above, has that undesirable consequence is the result of some inadvertent remarks by Quine himself. Consider for instance, the remark of Quine that has already been cited above, namely that "to say that something does not exist or that there *is* something which *is not* is clearly a contradiction in terms, and hence '(x) (x exists)' must be true". This remark, as it stands, is so ambiguous that it cannot be made to convey the intended meaning unless it is paraphrased at least as : to say *in* the theory T^* , making use of the vocabulary of T^* and the syntactical rules of T^* only, that something does not exist in the universe of discourse T^* , is a contradiction in terms; and hence ' x_i exists' must be true, when ' x_i ' is a variable whose values are the members of the universe of discourse of T^* . It must be kept in mind that ' x_i exists' here means the same as 'the referent of ' x_i ' is a member of the universe of discourse E of T^* ', or 'the values of the variable ' x_i ' of T^* are members of E'. These coextensive predicates are not predicates of T^* , but of the metatheory MT^* of T^* . Then neither the sentence ' $(\exists x_i) \sim (x_i \text{ exists})$ ' nor its denial ' $(x_i) (x_i \text{ exists})$ ' is a sentence of T^* . Hence we cannot say *within* T^* what in fact is included in its universe of discourse and what is not included. When 'exists' is taken as a primitive predicate of a theory, and when it is used in the way mentioned above, we arrive at not just a contradiction but a semantically anomalous expression, for then ' $(\exists x_i) (x_i \text{ does not exist})$ ' means the same as ' $(\exists x_i) (x_i \text{ is not a 'value of the variable } x_i \text{ of } T^*')$ ' where $i \neq j$. We may treat the occurrence of ' x_i ' in the above sentences as if it is occurring in its autonomous mode; and in that case they would be plain truths by virtue of the interpretation that is provided for T^* , for we assigned to the variables of T^* the members of E, and not, obviously the variables themselves. But then ' $(\exists x_i) (x_i \text{ does not exist})$ ' and ' $(x_i) (x_i \text{ exists})$ ' would be a truth and falsehood, respectively, about

the interpretation of T^* , and do not say anything about the existence or the non-existence of entities. This shows how treating 'existence', in the sense in which it is talked about above, as a primitive predicate of T^* is of no avail in unpacking the ontological commitments of T^* .

Leaving apart the difficulties involved in accepting 'existence' as a primitive predicate of a theory like T^* , what we should note first in order to save the standard predicate logic is that what is needed for that purpose is neither a *de novo* interpretation of the quantifiers, *a la* Lejewski, nor a ban on the use of constants before it is established that they do have referents in the universe of discourse, as has been suggested by Quine. All that is required for this purpose is to understand Quine's criterion a bit more carefully and notice its implications.

To say that *to be*, or to exist, is to be a value of a bound variable is not the same as to say that every substituent of a bound variable has a referent in the universe of discourse. The use of a noun need not necessarily commit us to the existence of a corresponding entity. The irrelevancy of names in the determination of the existent is implicit in the criterion itself, as we have seen earlier. That is why sentences in which the constants ' a_i^* 's occur do not pose any threat to the standard predicate logic. Nor does the truth of sentences in which ' a_i^* 's create serious problems. Quine, no doubt, accepted the Aristotelian assumption that the truth of a sentence requires the existence of the entity referred to by the subject term of the sentence, but gave it a twist relativising the notion of truth to theories. In the Quinian framework, for a theory to be true, among other things, the existence of the entities which it is supposed to be about is required. This is to say that in that framework the truth of a theory is determined, and is determinable with reference to, and only worth reference to the entities that are the members of the

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domain constituting the universe of discourse. And according to Quine we should not talk about sentences taking them as units, but only theories, for as he would say "our statements about external world face the tribunal of sense experience not individually but as a corporate body" (13). Thus the truth-value of ' Pa_i^* ' is not to be judged taking itself as a unit but only in the context of the universal set of sentences asserted to be true in T^* . And a way is provided for this by the standard predicate logic, in the sense that

- i) $(x_i) Px_i \rightarrow Pa_i$, and
- ii) $Pa_i \rightarrow (Ex_i) Px_i$

which are logically true, take care of the truth-value of ' Pa_i ' in T^* . Similarly, in the case of ontological commitments and existence assumptions too. The assertion of a sentence of T^* in which ' a_i^* 's occur does not commit us to any more entities than the assertion of sentences of T^* containing only bound variables, and are either implied by that sentence or imply that sentence, commit us to.

Quine thinks that when ' a_i^* ' is a non-referring name i) and ii) above cannot be held valid; and Lejewski accepts this. But in their arguments, the invalidity of i) and ii) is not shown to be following so much from the non-referential nature of those expressions; it is shown to be a consequence of the interpretation they provide for 'P' in i) and ii). Both of them take 'P' to be 'is non-existent', and use this in establishing the invalidity of i) and ii). But if 'is existent as a member of the domain of interpretation of T^* ' cannot be treated as a primitive predicate of T^* 'is not existent as a member of the domain of the interpretation of T^* ' too cannot be treated as a primitive predicate of T^* . This means to say that their proofs of the invalidity of i) and ii) are based on an impermissible interpretation of 'P'.

(IV)

Till now we have been using 'existence with respect to T*' assuming that its sense is clear. But a clarification seems to be obligatory if we intend to preclude a confusion of the notion of existence involved in that expression with what can be called full-blooded existence. Such a possible confusion can be eliminated by taking it to mean 'is assumed to exist by the theory T*'. Quine himself noticed the necessity of such a clarification and reformulated his criterion of ontological commitment as : "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 by the theory be true" (14). The shift from a consideration of 'to be with respect to T' to a consideration of 'to be assumed to be by T' (or a shift from 'to be is to be the value of a bound variable', (which Hintikka (5) calls Quine's thesis and distinguishes from Quine's criterion) has an important consequence, namely that what is aimed at in the stipulation of the criterion in its reformulated form is not to unpack the ontological commitments of a given theory—much less to tell what is existent and what is not so, making use of the theory itself—but only to make explicit what a theory *proclaims* itself to be ontologically committed to. As Quine himself would say "what is under consideration is not the ontological commitments of a discourse. What there is does not in general depend on one's use of language, but what one says there is does" (14).

The twist given to the discussion of ontological problem in the passage quoted above, constitutes the second Copernican revolution in philosophy, the first being due to Kant who showed the impossibility of metaphysics as a science of *being-as-such* and tried to delimit metaphysics as a science of the limits of the knowledge of *being-as-known*. If in Kant the passage is from knowledge of *being-as-such* to *being-as-known*, in Quine it is from *what a theory commits us to* to *what a theory*

proclaims to commit us to. When once the impossibility of the specification of what is existent and what is not existent outside the discourse is noted, the compulsiveness of Quine's criterion in fixing ontological commitments and assumptions becomes clear. However, there are a number of objections that have been raised against it. It was shown, by Scheffler and Chomsky (16), for instance, that there arise stipulational difficulties, and that these force us to draw unintended and undesired consequences from Quine's criterion.

Scheffler and Chomsky think that the sentence '(Ex) (x is a phlogiston)' assumes something that is a phlogiston. Now, the copula in this sentence is used either i) in the predicative sense, or else ii) in the sense of identity. If i), 'is phlogiston' is a predicate. (As is obvious, the copula, in this case, is taken together with the predicate expression as a function, in the fashion of Frege). And then, taking 'P' as an abbreviate of 'is phlogiston' we can recast '(Ex) (x is phlogiston)' as '(Ex) Px'. And if ii) were to be the case, taking 'phlogiston' as a name and 'p' as its abbreviate, we can recast it as '(Ex) (x=p)'. Now let T be a theory in which all and the only primitive predicates are 'is phlogiston', 'is hlogiston' and 'is logiston', and allow 'P', 'H', and 'L' to be abbreviates of those respectively. Also, let it be the case that T is T₁, where T₁={ (Ex) Px, (Ex) Hx, (Ex) Lx }. And if T does not contain the primitive predicates 'P', 'H' and 'L', but only the primitive constants 'p', 'h', and 'l' let T be T₂, where T₂={ (Ex) (x=p), (Ex) (x=h) (Ex) (x=l) }. If Scheffler and Chomsky are right, T₁ must assume something that is phlogiston, something that is hlogiston, and something that is logiston. But here an issue creeps in, namely does T, then, has three distinct assumptions. Unless we can establish that 'P', 'H', and 'L' are identical predicates we will be obliged to accept that it does assume three distinct sets of entities. The import of this is that Scheffler and Chomsky's interpretation

presupposes that each existentially quantified sentence has its own assumption. If so, it will follow that, a theory T commits us to or assumes the set S of entities, such that $S = S_1 \cup S_2 \cup \dots \cup S_n$ where there is no i and j such that $S_i = S_j$. T contains exactly n sentences in which the variables have been quantified existentially, say S_1, S_2, \dots, S_n , and S_k is the set assumed by S_k . But this, as we have seen while discussing Church's criterion, leads us to the view that no theory can assume to exist what we intend it to assume to exist. Moreover, the force of Scheffler and Chomsky's argument seems to be rather illusory, for we can recast T_1 as T^1 , where T^1 does not contain existential quantifiers. Then $T = T_1 = T^1 = \{ \sim(x) \sim Px, \sim(x) \sim Hx, \sim(x) \sim Lx \}$, whence what is assumed by T can be shown to be S and not S_1, S_2, \dots , and S_n .

Perhaps, Scheffler and Chomsky would not have given that reading of the criterion had Quine himself been a little more careful in framing the sentence in which he stated the criterion, so as to make it convey precisely what he intended to convey. In the first edition of *From a Logical Point of View* he states it thus: "an entity is assumed by a theory if and only if it must be counted among the values of the variables in order that the statements affirmed in the theory be true". What he meant by this was, as he himself stated, in the corresponding page of the revised edition of that work, that "*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*" (14).

This revised formulation amounts to saying that a theory assumes all and only those entities that fall within the domain constituting the universe of discourse of that theory. In the revised formulation of the criterion, the crucial expressions are 'given sort' and 'some of them', for the emphasis seems to be on the fact that "entities of a *given sort* are assumed. . . . if and only if at least *some of them*, and not necessarily all,

must be counted among the values". This implies that '(Ex) Px' assumes not only something that is P, but also something that is Q, where Q might be P, as long as 'Q' is also a primitive predicate of the theory in which '(Ex) Px' is a sentence. Similarly '(Ex) Qx' assumes not only something that is Q, but also something that is P, where 'P' is also a primitive predicate of theory in which '(Ex) Qx' is a sentence. This is what is meant by 'entities of a given sort'. Hence, in the Quinian framework, when 'P' and 'Q' are the only two primitive predicates (that are not identical) of a theory T, and '(Ex) Px' and '(Ex) Qx' the only two true sentences, the two sentences assume the same entities; and these being the only true sentences of T, T assumes precisely these entities, and the set of these entities is the same as the set of those entities over which the variables of T are allowed to range over. This means that any sentence of T, if it is existentially quantified will assume the entities which are assumed by any other existentially quantified sentence of T. Thus all existentially quantified sentences of T assume the same entities. And earlier we have shown how a sentence S, whose variables have been existentially quantified, and a sentence S¹, which is like S except that wherever existential quantifiers occur in S universal quantifiers occur S¹, and where S and S¹ are sentences of the same theory, do assume the same entities.

The second consequence of Quine's criterion drawn and held to be undesirable and unacceptable by Scheffler and Chomsky, is not, however, related to the first presumably objectionable consequence which they have drawn from it, and which we have been discussing till now. For it is possible to show it to be a consequence of Quine's criterion even without raising the first objection. This task needs only a confusion between use and mention of an expression, or between what belongs to a theory and what belongs to its metatheory. Consider T to be a theory whose only true sentence is

(1) $(\exists x) Px$.

Then $T = \{ (\exists x) Px \}$. Now in stipulating Quine's criterion, in order to dig up the assumptions of T, Scheffler and Chomsky arrive at :

(2) $(\exists x) (x \text{ is assumed by } \{ (\exists x) Px \} \ \& \ Px)$

According to them the stipulation of Quine's criterion on T results in 2). But 2) is semantically ambiguous. 2) belongs to be metatheory MT of T, and hence the variables occurring in it must belong to MT. But the predicate tagged to one of the occurrences of the variable 'x' belongs to T. Similar ambiguity can be found in the expression ' x is assumed by $\{ (\exists x) Px \}$ ': And only accepting the *truth* of 2), we will be able to conclude, as Scheffler and Chomsky do accept and conclude, that Quine's criterion will place us in "the predicament of having to accept the ontological assumptions of every theory, no matter how ridiculous, just by virtue of adopting" it (16).

Thinking that Quine's criterion has *this* consequence, Scheffler and Chomsky, doubted whether 'is assumed by' can be considered as a relation between entities and theories at all. They held that, as relation terms involve a built-in disposition for existential inferences, and as when we say that a theory T assumes an entity, "we should not want it follow that there exists something such that it is assumed by that theory", we should either treat 'is assumed by' 1) as a non-relational term, an alternative which they did not consider, or else construe it as 2) a relation between theories and non-entities, so as to eliminate unwanted ontological commitments of theories. In their attempt to free the stipulation of Quine's criterion from false existential inferences and unwanted ontological commitments, Scheffler and Chomsky considered, and found it of no avail, the plausibility of adopting the second course. They showed how an interpretation of 'is assumed by' as a relation between classes of entities and theories, does not meet

the purpose, for, though "to assume a class is . . . not to assume it to exist but to suppose it non-empty", to say that a class is non-empty is the same as to say that there exists at least one entity which is a member of it, we will be forced to admit, again "rediculous" entities. Further, as they themselves have shown, the distinction between '(Ex) (x is a centaur)', and '(Ex) (x is phlogiston)' will be broken, as both these sentences will be having the same assumption, namely the null assumption.

The usually followed method to escape this predicament is to take a flight from extensionality to intensionality, instead of treating 'is assumed by T' as a metatheoretic predicate, and distinguish between 1) what a theory assumes, and 2) how it characterises what it assumes. But before considering this alternative, let us consider some intensional approaches, namely those of Church, and of Sheffler and Chomsky, and show why they are not acceptable.

Church thinks that "ontological commitment is an intensional notion, in the sense that ontological commitment must be to a class concept rather than to 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, therefore identical" (4). And Scheffler and Chomsky think that the occurrence of 'x' in 'x is assumed by T' is referentially opacous—opacous in the sense of the term in which Quine has used it. They maintain that as a "description of what a theory says" is in its structure, similar to a "description of what a man says", and hence sentences stating the ontological assumptions of theories must be understood in the same way as "belief-sentences" or the way in which sentences of indirect discourse are to be understood. The difficulty involved in the sentences of intensionality, or sentences whose subject terms are supposed to refer to intensional entities, like classes, individual concepts, and propositions, are too well-known to be mentioned, and so

are Quine's objections to intensional discourse in general, and intensional semantics in particular. However, we shall note here just one difficulty and try to show that the intended flight of Church, Sheffler and Chomsky from extensionality to intensionality in interpreting sentences of ontological commitments and assumptions is only a move from fire of the difficulties they show to be involved in an extensional interpretation of these sentences to the frying pan of infinite regress and entification. Treating sentences of ontological assumptions on par with belief-sentences raises the issue of intensional identity, for in the absence of a criterion of intensional identity we will not be in a position to tell for any two given theories, say T and T', whether they have the same ontological assumptions or different ontological assumptions. And any criterion which enables us to tell what a theory T assumes, will only be a partial criterion, if it does not also enable us to tell whether it does assume the same as the theory T¹ or not. But embedded in the concept of identity is, as Quine would say, the process of entification, for to identify without entifying is impossible. Further when two conceptual entities, say C and C¹ are either identified or distinguished we will have to assert, on the intensionalist count, in which their identity or difference is stated. This in turn will assume, by virtue of the intensionalist interpretation of the ontological criterion, the concept of C and the concept of C¹, i. e. two new entities. This ends up in an infinite regress of concepts with multiplication of entities at each stage of identification and differentiation. To fix an end to this process of entification and multiplication of entities, i. e. to consider some stage as the last stage, is to end up in, what Carnap calls the *antinomy of name relation* (2).

Thus we are led to consider the other alternative left to us, namely to treat 'is assumed by T' as a metatheoretic predicate, and give an extensionalist interpretation of Quine's criterion. When that expression is treated as that, the

problem that would naturally arise would be what should be considered as a candidate to which that predicate could be predicated. Obviously, it cannot be a unitary entity of the universe of discourse, nor a set of entities of the universe of discourse determined by an atomic sentence of T and is existentially quantified. The reasons for this are evident from our discussion above. Then the only candidate left is the universal set of entities belonging to the universe of discourse. Now let T be a theory and E its universe of discourse where $E = \{e_1, \dots, e_n\}$. As usual allow the variables ' x_1 ', ... ' x_n ' of T range over E . Then we have the sentence ' E is assumed by T ' in the metatheory MT of T . Let ' S_1 ', ... ' S_n ' be the true sentences of T , and let S be a variable of TM whose substituends are ' S_i ' for each i . It is obvious that $T = \{S_1, \dots, S_n\}$. Now Quine's criterion can be given an extensionalist interpretation by defining ' E is assumed by T^1 ', within the extensional and semantical part of the metatheory TM , as follows: *E is assumed by T if and only if (S) (if $S \in T$ then the value of the variables occurring in S are members of E .)*

Consider two theories T and T^1 where $T = \{(Ex) (\text{Pegasus } x)\}$, and $T^1 = \{(Ex) (\text{Centaur } x)\}$. We can ask with reference to T and T^1 whether they have the same assumptions. And we can also ask whether they are the same theories. We shall try to answer these questions with reference to an hypothetical theory T^* of which T and T^1 are subtheories. If they are subtheories of the theory T^* , T and T^1 will have the same ontological assumptions, for to say that they are subtheories of T^* is the same as to say that set of the primitive predicates of T^* contains 'Pegasus' and 'Centaur' as its members. Then both T and T^1 assume the something as T^* , for, for any theory T , if S is a sentence of T , S assumes the same as S^1 , where S^1 is any other sentence of T . This was shown earlier. In some cases it might be the case that the variables of T and the variables of T^1 have different ranges.

Let the variables of T range over E , where $E = e_1$, and the variables of T^1 over E^1 , where $E^1 = \{e_i + 1, \dots, e_n\}$. Then by interpreting the variables of T^* , i.e. the variables of T plus the variables of T^1 , range over $E \cup E^1 = E^*$, it can be shown that T and T^1 have the same ontic commitments. Thus '(Ex) (Pegasus x)' and '(Ex) (Centaur x)' can be allowed to assume the something, though they differ in characterising what they assume, for one characterises what it assumes to be pegasising and the other characterises what it assumes to be centauring. To say that something pegasises, and to say that something centaurs might be saying two different things, yet to say these things what is assumed to be existing might be the same. Now if T were to be a decidable theory either '(x) (Pegasus $x \equiv$ Centaur x)' is true or else ' \sim (Ex) (Pegasus $x \equiv$ Centaur x)' is true. If the former $E = E^1 = E \cup E^1$, and if the latter $E \cup E^1 = E_i^*$. In either case the values of the variables of T and T^1 are in E^* . The two theories commit us to the same entities, or have the same assumptions.

Thus all theories commit us to the same. This does not, however, mean that they are identical. Two theories, for example T and T^1 , will be identical only when the way in which the entities assumed by them are characterised in the same way, i.e. in the case of the example chosen here, when it is the case that '(x) (Pegasus $x \equiv$ Centaur x)' is true. Identity of theories is identity of ideologies. When we notice that theories can have common ontological assumptions and yet have ideological differences, the predicament in which Scheffler and Chomsky thought that we end up if we accept Quine's criterion, namely that either we fail to consider T and T^1 as two different theories, or we will have to consider T and T^1 to be having two different assumptions, seem to be an illusory predicament only.

On this count, the ontological assumptions of '(Ex) Px ' are not relative to its truth-value. Assume that '(Ex) Px '

assumes E when it is true. Now when $'(Ex) Px'$ is false $'\sim(Ex) Px'$ i.e. $'(x)\sim Px'$ is true. And $'(x)\sim Px'$ would be true if and only if for each entity e_i that is a member of E, e_i does not exemplify the property P. As is obvious $'(x)\sim Px'$ assumes E, and hence $'(Ex) Px'$, when false, cannot assume or commit us to either more or less than what $'(x)\sim Px'$ assumes, for $'(x)\sim Px'$ would be a truth of the theory in which $'(Ex) Px'$ is a false sentence. Thus there is nothing like false ontological assumptions, i.e commitments to non-existent entities. And *all sentences be they true or false assume something and they assume the something.*

(V)

But this may sound rather counter-intuitive, *prima facie* at least, for as is evident, on this count, $'(Ex) (Pegasus x)'$, $'(Ex) (Centaur x)'$, and $'(Ex) (Socrates x)'$ all assume the same set of entities, some of whose members pegasize, centaur, and socratisize respectively, but not only those members that pegasize, centaur, and Socratisize respectively. This view of ontological commitment has been attacked by Parsons (7).

When $\{x: \mathcal{F}\}$ is the set of all and only those entities e such that $e \in \{x: \mathcal{F}\}$ if and only if $e\mathcal{F}$ s, and when $'(Ex)\mathcal{F}'$ is a sentence in which 'x' is not free, where $C'(Ex)\mathcal{F}$ is the set of the entities which $'(Ex)\mathcal{F}'$ commits us to, there are three possible relationships that can hold between $\{x: \mathcal{F}\}$ and $C(Ex)\mathcal{F}$; and they are, as Parsons shows,

- 1) $C(Ex)\mathcal{F} = \{x: \mathcal{F}\}$
- 2) $C(Ex)\mathcal{F} \subseteq \{x: \mathcal{F}\}$
- 3) $\{x: \mathcal{F}\} \subseteq C(Ex)\mathcal{F}$

Parsons' attack on the extensionalist interpretations of the ontological criterion is based on two norms which he thinks that any criterion of ontological commitment must satisfy; and they are

- (I) $C(Ex) Px \neq C(Ex) Qx$, where 'P' and 'Q' are two atomic predicates, and
 (II) $C\mathcal{F}_i \subseteq C\mathcal{F}_j$, where \mathcal{F}_i and \mathcal{F}_j are any two sentences, but not identical, and \mathcal{F}_i is a logical consequence of \mathcal{F}_j .

(I), with an additional condition to the effect that 'P' and 'Q' are logically independent, together with 1) tantamounts to Church's interpretation of ontological commitment; and we have shown earlier why that interpretation cannot be accepted. (I), moreover, purports to identify distinctness of ideology with distinctness of ontology. We have argued earlier that the distinction between the identity of ontologies and the identity of theories should not be blurred; and *pari passu* the argument applies to the distinctness of ideologies and the distinctness of ontologies. Parsons, however, rejects the extensionalist interpretations of ontological commitment, only to preserve his norms, which clearly bring in such blurs. His second norm presupposes the tacit assumption of (I), namely that there is a necessary determination of ontology by ideology. Further, it has an undesirable consequence. Let T be an axiomatic theory, and A the set of the axioms of T. Let $\mathcal{F}_1, \dots, \mathcal{F}_n$ be the truths of T, such that \mathcal{F}_i for each i is a logical consequence of {A}. Let it be the case that for some $j > i$, \mathcal{F}_i is a logical consequence of $\{A\} \cup \mathcal{F}_j$. Then according to Parsons' contention {A}, \mathcal{F}_i , and \mathcal{F}_j must commit us to the union of all sets $\sum_{i=1}^n C\mathcal{F}_i$, and each set $C\mathcal{F}_i$, for each i , where \mathcal{F}_i is a logical consequence of {A}. If this is so, as Parsons thinks it to be, \mathcal{F}_i is ontologically committed to the union of all sets, and \mathcal{F}_i is committed to a set which is a unit of that union.

It is true, as Parsons thinks, that (I) and (II) together with 2) will lead us to the conclusion that every sentence is committed to nothing: and equally true is that this

conclusion is a product of the incompatibility of (I) and (II) taken together with 2). But instead of rejecting 2) and retaining (II), we can as well retain 2) and reject (II) and (I). And that is precisely what an extensionalist follower of Quine would do. But he will not reject (II) *in toto*, for he would accept it in the weakened form, namely that

(II) $C\mathcal{F}_1 \subset C\mathcal{F}_j$, where \mathcal{F}_1 and \mathcal{F}_j are any two sentences, not necessarily identical, and \mathcal{F}_1 is a logical consequence of \mathcal{F}_j .

He would also reject (I) and accept

(Ia) $C(\text{Ex})Px = C(\text{Ex})Qx$, even if 'P' and 'Q' are not identical predicates

This implies that in the extensionalist theory of ontic commitments, designed after Quine, not only 2) but also

2a) $C(\text{Ex})(Px F \mathcal{F}_1) = C(\text{Ex})Px = C\mathcal{F}_1 = C(\text{Ex})Px \cup \{x : \mathcal{F}_1\}$ where F is any truth-functional connective whatsoever, and \mathcal{F}_1 and \mathcal{F}_j are any two sentences, not necessarily atomic, but with no free x in \mathcal{F}_1 and a free y in \mathcal{F}_j

is accepted. It would also be noted that in the Quinian framework 1) and 3) in their weakened forms, namely

1a; 3a) $\{x : \mathcal{F}\} \subset C(\text{Ex})\mathcal{F}$

is accepted. This shows that contrary to the view held by Parsons, there is systematic, or systemic, relation between $C(\text{Ex})\mathcal{F}$ and $\{x : \mathcal{F}\}$. This relation does show precisely what Parsons affirms, namely that "[$C(\text{Ex})\mathcal{F}$] does not depend on any aspects of \mathcal{F} that fall within the domain of the theory of reference" (7). But this is what Quine himself incessantly and assiduously argued out. He too would gladly subscribe to the view that $C(\text{Ex})\mathcal{F}$ does not depend on the subdomain of the domain constituting the universe of discourse of the theory of which ' $(\text{Ex})\mathcal{F}$ ' is a sentence, and is determined by ' \mathcal{F} '. It is only the recognition of the non-dependence of ' $C(\text{Ex})\mathcal{F}$ ' on ' \mathcal{F} ' that led Quine to contend that ideology does not determine ontology. But, Parsons jumps at an erroneous

conclusion from this, namely that "the only recourse of a meaningful notion of ontological commitment is to move into the domain of the theory of meaning" (7). Quine's attempts to show how such a move is not necessary and how 'C(Ex) \mathcal{F} ' can be determined with reference to the values of the variable 'x', i.e. how it can be determined within the realm of reference, are, thus, of immense significance.

(VI)

In the end we should note that Quine's criterion of ontological commitment, which we have discussed in broad terms, reserving the intricacies to another discussion, has a specific purpose. It does not, as he himself showed, help us to tell what there is. This is an empirical issue to be settled experientially. Nor does it tell us whether the entities which a theory assumes to exist, do have full-blooded or spatio-temporal existence. It tackles only one of the several issues in ontology. Some of them, as Cheng and Resnik tried to formulate, are :

"(I) is T consistent in the empty universe? (does it have an ontology at all) ; (II) what kind of things must T's bound variables range over? (what is T ontologically committed to?) ; (III) do the things over which T's bound variables range over exist? (is T's ontology empty or partially empty?) "(3)

Quine's criterion is intended as a tool to handle (I) and (II) only.

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