QUINE AND INSTRUMENTALISM

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Is a scientific theory, for Quine, a true description of the World? His attitude in his essay "Identity, Ostension and Hypostasis"[1] indicates a negative answer. He argues[2] that the very question of whether a theory is a genuine reflection of reality is a meaningless one because we cannot detach ourselves from our theory of the world to compare it objectively with 'unconceptualized reality'. Hence

> . . . our standards for apprasing basic changes of conceptual scheme must be, not a realistic standard of correspondence to reality, but a pragmatic standard. Concepts are language, and the purpose of concepts and of language is efficacy in communication and in prediction. Such is the ultimate duty of language, science, and philosophy, and it is in relation to that duty that[3] a conceptual scheme has finally to be appraised.

His position here seems to be straightforwardly instrumentalist. According to instrumentalism,[4] a scientific theory is not empirically true or false, rather it is nothing more than a tool or an instrument for making predictions about observable phenomena. The meaningful question about a theory is not whether it is true, but whether it is adequate: i.e., whether it serves its purpose of co-ordinating sentences about observational data and hence enabling the prediction of further such sentences. These sentences, which are demarcated from the theory by instrumentalists, are truth-bearers. They report on reality, are verifiable or falsifiable by observation, and hence are capable of being true or false. By contrast, the theoretical sentences which constitute the theory do not talk about the real world and so are not empirical truth-bearers.

As just indicated, the defining feature of the instrumentalist is that he denies that the theory represents reality. Given that the theory is a set of sentences, he denies that these sentences are true. Since these sentences do not talk about anything real for the instrumentalist, he in effect repudiates the entities about which they seem to talk. In other words, he denies that theoretical entities exist. In the words of J.J.C. Smart, the sub-microscopic entities of physics for the instrumentalist

> . . . are not so much part of the furniture of the world as useful conceptual devices for predicting the behaviour of macroscopic objects . . . On this view to say that electrons are real is to say no more than that the word 'electron' plays a useful part in certain physical theories which enable us to predict and control events on the macroscopic level.[6]

Whether Quine shares this attitude or not will determine my verdict on his instrumentalism.

Before I begin analyzing the ontological status of theoretical entities in Quine's philosophy of science, I must clarify in what sense 'theoretical entity' is being taken. In the broadest sense, it can be taken to denote <u>any</u> entity assumed by the theory, thus embracing objects as diverse as tables, electrons, and numbers. Quine coins the term 'posit' to cover this interpretation. To posit something for Quine is to talk about something as if it were real. It is to use certain terms in a referential position in sentences which one takes to be true. This, of course, leaves open the question of whether posits are real or not, since to say that something is assumed to be real is not in itself to question the correctness of that assumption. As Quine puts it in chapter I of his <u>Word and Object</u>:

> To call a posit a posit is not to patronize it. Everything to which we concede existence is a posit from the standpoint of a description of the theory-building process, and simultaneously real from the standpoint of the theory that is being built.[6]

Since 'theoretical entity' in this sense makes no distinction between the different <u>types</u> of objects posited by a theory, it clearly is not the one at issue.

In another sense, 'theoretical entity' can be taken to denote any entity which is inferred rather than observed, whether it is observable in principle or not. In this sense, it can be applied, for example, to all suns other than our own, or to Earth's inner core, as well as to particles of modern physics such as neutrinos. Since a distinction is made by instrumentalism between observable and unobservable entities, 'theoretical entity' in the second sense is also too wide in its denotation for the purposes of the ensuing discussion.

A third sense of 'theoretical entity' is simply that it refers to any entity, of a physical nature, which is unobservable in principle. The stipulation that it be of a physical nature, though admittedly vague, serves its purpose of excluding abstract entities which, if real, do not obey physical laws as we know them. The particles of modern physics are a good example of what 'theoretical entity' in the third sense denotes. It is in this sense that the expression will be used in the following discussion of the existential status of theoretical entities in Quine's philosophy of science.

To begin, let us examine Quine's account of what is involved in accepting the existence of something. In his essay "On What There Is",[7] in discussing the nature of arguments over existence, he stresses that the acceptance of an ontology is, in effect, the adoption of

> . . . the simplest conceptual scheme into which the disordered fragments of raw experience can be fitted and arranged. Our ontology is determined once we have fixed upon the over-all conceptual scheme which is to accommodate science in the broadest sense.[8]

That is, the acceptance of any existents is simply the acceptance of the theory which postulates them. So, one accepts the existence of theoretical entities if one accepts a theory which assumes them. The question of Quine's stance on theoretical entities has shifted ground. I now have to consider what it is for a theory to assume or postulate entities and, more importantly, what criteria we have for accepting the theory we hold.

As is clear from many sources, particularly his "Existence and Quantification",[9] Quine considers the existential assumptions of a theory to be intelligible

only if that theory can be formalized into first order predicate calculus:

> . . . the question of the ontological committment of a theory does not properly arise except as that theory is expressed in classical quantificational form, or insofar as one has in mind how to translate it into that form.[10]

He rules out the desirability of translating theories into calculi other than first order predicate calculus on the grounds that (a) parochial existential sentences cannot be captured adequately by devices other than the one employed by the standard calculus; and (b) the standard claculus is better than its alternatives in that it does as much as they do, but also has complete coverage of validity and consistency by the Skolem proof procedure,[11] unlike its rivals.

The formalization of a theory involves, for Quine, the elimination of many linguistic devices which only complicate, and make less clear, the theory as expressed in ordinary language. To this end, he proceeds with a program of regimentation,[12] whereby he argues for the superfluity of devices such as names, indefinite singular terms, definite singular terms, tenses, etc. He ends up with a canonical notation consisting basically of atomic sentences, with all other sentences "built from the atomic ones by truth functions, quantifiers, and perhaps other devices".[13] From his account of logical grammar on pp. 22-23 of his Philosophy of Logic, the atomic sentences have the forms 'Fx', 'Fxy', etc., where 'F' is any one of a fixed list of predicates, joined with one or more variables to form a sentence; and where 'x' and 'y' are two of an indefinitely large number of variables. Quantification over a sentence can yield a closed sentence. This is any sentence whose variables are all bound (i.e., fall under the scope of a quantifier). For example, '(Ex)' is prefixed to 'Fx' to yield the closed sentence '(Ex)Fx', which says there is at least one thing which is an F, and is either true or false depending on whether or not there is something which is an F. (Universal quantification, i.e., (x), is simply defined as ' -(Ex)-'[14].)

Now, the closed sentence holds the key to what Quine meant by his claim that the acceptance of an ontology is the adoption of a theory. Adopting a theory is accepting its constituent sentences as true where only closed sentences are truth bearers. Since

"the truth or falsity of a quantified (i.e., closed) sentence ordinarily depends in part on what we reckon into the range of . . . values of the variables",[15] (when starting the connection between quantification and the world), accepting a set of sentences as true is in part accepting a range of values of the variables. And, as Quine emphasizes in many different contexts, the values of the variables are the objects designated by them. The range of values of the variables is the universe of discourse, i.e., the set of all the objects being talked about.[16] If any of these objects must be taken as a value of the variables, in order for some sentence of the theory to be true, then (and only then) is that object assumed by the theory.[17] Given this criterion of ontological committment, the accepting of the closed sentences of the theory as true involves the accepting of a set of objects as existents.

With respect to theoretical entities, then, a Quinean acceptance of the existence of theoretical entities is the acceptance of a theory, expressible in first order predicate calculus, whose bound variables must take at least one theoretical entity into their range of values in order for some of the sentences of the theory to be true.

Now, Quine explicitly embraces such a theory in his essay "Posits and Reality".[18] He adopts the molecular doctrine of physics, and consequently is committed to the existence of molecules. His reasons for doing so are pragmatic. The acceptance of molecular theory endows various important benefits to one's overall theory.[19] These are:

> (1) Simplicity: empirical laws concerning seemingly dissimilar phenomena are integrated into a compact and unitary theory
> (2) Familarity of principle: the already familiar laws of motion are made to serve where independent laws would otherwise have been needed
> (3) Scope: the resulting unitary theory implies a wider array of testable consequences than any likely accummulation of separate laws could have implied
> (4) Fecundity: successful further extensions of theory are expedited
> (5) Concurrence with observation: such testable consequences of the theory as have been tested have turned out well aside from such sparse exceptions as may in good conscience be chalked up to unexplained interferences.

Further, Quine stresses that these basically pragmatic grounds for adopting the theory are not to be taken as a sign that molecules are unreal, because

> . . . the benefits of the molecular doctrine . . . are the best evidence of reality we can ask (pending, of course, evidence of the same sort for some alternative ontology).[20]

The same emphasis on pragmatic grounds being evidence for truth is found in other contexts as well. For instance, in chapter 7 of Word and Object, he contrasts the ideal laws of mechanics with molecular theory, stressing that pragmatic grounds lead on the one hand to the rejection of ideal objects such as frictionless surfaces and mass points, and on the other hand to the acceptance of molecules and electrons.

> . . . simplicity in a theory that squares with observation sentences so far as its contacts with them go, is the best evidence of truth we can ask; no better can be claimed for the doctrines of molecules and electrons. What makes for the mythicalness of the doctrine of ideal objects, as against the literal truth (by today's lights) of the doctrines of molecules and electrons, is that the former works its simplification in a limited domain of statements at the cost of more seriously complicating a more inclusive domain.[21]

We have just seen Quine's account of when we accept something as true, viz., when we have good pragmatic grounds. However, we still need to know his stance on what it is for something to be true. What theory of truth does he adopt? From many contexts, including his Philosophy of Logic, it is quite clear that he adopts an essentially Tarskian notion of truth.

In the above we saw that Quine considers the closed sentences of a theory to be its truth bearers. Basically, this is because they are formed by quantification over open sentences,[22] where open sentences are satisfied by sequences. Sequences are objects in the domain of discourse taken in succession; for example, ordered pairs are sequences. Open sentences are satisfied by sequences in that their free variables, when taken in alphabetical order, take as values certain objects of the domain taken in order. For example, the sequence ⟨Caesar, Gaul⟩ will satisfy the open sentence 'x conquered y', as will every

prolongation of ⟨Caesar, Gaul⟩, such as ⟨Caesar, Gaul, the Moon, Λ, an apple⟩. A closed sentence is satisfied by every sequence or none according to whether it is true or false. Truth is satisfaction by all sequences. Hence, a deductively closed set of only true sentences which is itself satisfied by all sequences, is itself true. The truth of the whole set is determined by the truth of its constituent sentences.

So when Quine claims that molecular theory is true ('by today's lights'), he presumably is claiming that its constituent sentences are true by virtue of being satisfied by sequences of objects which include molecules. This means that the pragmatic grounds, which have led him to adopt molecular theory and to hold it as true, are also evidence for the existence of molecules. This is not surprising when one recalls that pragmatic grounds, for Quine, cover a wide spectrum of considerations, including concurrence with observation. He concedes that all the benefits attributable to molecular theory are not, in fact, attributable to every theory; but all are prized when available.[23] Nonetheless, pragmatic grounds in a broad sense settle one's theory and one's ontology. Quine makes this clear in his discussion, in Roots of Reference, of the various factors involved in the making of ontological decisions. He summarizes his case as follows:

> How then should we settle our ontology? . . . That last question is littles less than the general question of scientific method: the question how best to develop an inclusive scientific theory. We want to maximize predictions, that is, we want a theory that will anticipate as many observations as possible, getting none of them wrong. We develop the theory by progressive observation and correction. When we have to modify the theory to accommodate a wayward observation sentence, we have various possible corrections from which to choose; and here the guiding considerations are simplicity and conservatism. We prefer the correction that is more conservative, that is, a less drastic departure from the old theory. But a big simplification can warrant a fairly drastic departure. We arbitrate between these two interests, simplicity and conservatism.[24]

The important thing to bear in mind here is that the outcome of all this weighing up of the evidence, whether experiential or pragmatic, is a theory which is taken to be true. Further, it is a theory taken to be true in the sense of corresponding with the domain of discourse in the way outlined above. Therefore, Quine's adoption of a theory and the acceptance of its posited entities into his ontology make him a realist with respect to those entities. In particular, since he adopts molecular theory he must be a realist with respect to molecules (i.e., theoretical entities of one kind).

I now seem to have fulfilled the aim of this paper, which was to elucidate Quine's position with respect to instrumentalism. Since theoretical entities do exist on Quine's account, he cannot be an instrumentalist.

But, of course, this conclusion is made too hastily. Quine cannot be an instrumentalist, no matter what theory he adopts, given his criterion of ontological committment. For the instrumentalist cannot adopt any theory which commits him to the existence of theoretical entities. In other words, he cannot adopt any theory which contains at least one sentence whose variables need to range over theoretical entities in order for that sentence to be true. But every theory, by its very nature, includes theoretical terms and sentences which prima facie commit one to the existence of theoretical entities in this way. Hence, instrumentalism is impossible unless there is some way of avoiding such committments.

Quine offers a means by which such committment can be avoided, in that he offers a device for avoiding unwanted ontological committments in general. This device is contextual definition or, as he sometimes refers to it, paraphrase. Contextual definition is simply the reformulation of all the sentences in which an unwanted term occurs into sentences lacking that term. It is used by him for many purposes, such as to simplify and clarify language by regimentation[25]; to define or explicate certain terms -e.g., 'tan' defined as 'sin/cos'[26]; to formalize theory into standard calculus[27]; and to avoid unwanted ontological committments.

When contextual definition is used to avoid ontological committment, it is the reformulation of all the sentences, in which an unwanted term occurs in a referential position, into sentences in which that term can no longer be represented by a predicate letter conjoined with variables to form well-formed formulae.

For example, if the term is initially represented by 'F' in atomic sentences of the form 'Fx', 'Fy', etc., contextual definition will prevent it from further being represented that way. It will also prevent the term from being represented by 'F' in any of the sentences built up form the relevant atomic ones. This reformulation of the entire linguistic context within which the unwanted term occurs is, in effect, the reformulation of the entire theory. Given the successful[28] execution of contextual definition, the range of the theory's variables is now different. The range of values does not need to include the objects to which the term purportedly referred in order for the reformulated sentences to be true. In this way, ontological committment to these objects is avoided.

Given that instrumentalism is viable in Quine's philosophy, in that he offers a means for avoiding unwanted ontological committments in general, the question arises as to whether molecules, in particular, are unwanted by him. In retrospect, his remarks about molecules and molecular theory seem tinged with reservations. The repetitive qualification, of 'by today's lights', to his attribution of truth to molecular theory is a good example of this. Also, his statement, that the benefits of molecular theory are the best evidence of reality (pending evidence of the same sort for some alternative ontology), makes one wonder if he would drop molecules from his ontology as soon as another merely equally good theory came along. Ontological reduction is always couched in terms of unwanted ontological committment. Are the posited molecules of molecular theory a wanted ontological committment, analogous to this, or are they accepted by Quine in the light of there not being a better, or merely equally good, alternative?

As already seen, Quine adops molecular theory on pragmatic grounds, stressing that pragmatic grounds are evidence for truth. It should therefore be illuminating to examine his grounds for rejecting meanings since his attitude towards them is so unreservedly negative. If his grounds for rejecting meanings as existents are the same type as those which have led to his adoption of molecular theory, one may conclude that he treats molecules as seriously as he treats meanings. If, on the other hand, there are other considerations which influence Quine's attitude towards meanings, then his acceptance of molecular theory may well need to be fortified if he is to claim the literal truth of molecular theory.

In his essay "Ontological Relativity",[29] Quine offers two reasons for rejecting meanings, preparing the way for the exposition of his indeterminacy thesis which then follows. The first takes the form of an argument:

> Meanings are, first and foremost, meanings of language. Language is a social art which we all acquire on the evidence of other people's overt behavior under publicly recognizable circumstances. Meanings, therefore, those very models of mental entities, end up as grist for the behaviorist's mill.[30]

But if one takes this argument seriously, one can by parity of reasoning refute all theoretical entities, including molecules. For example, consider the case of molecules: These are, first and foremost, the molecules of molecular theory. Molecular theory is a science which we all acquire on the evidence solely of observable objects and their behaviour under publicly recognizable circumstances. Molecules, therefore, those very models of theoretical entities, end up as grist for the instrumentalist's mill.

However, Quine does not apply this type of argument to molecules, so why does he apply it to meanings? The fact that they are mental entities (according to him) is sufficient reason for rejecting them.[31] Even if they are not taken as mental entities but as something else, such as 'Platonic ideas', the primary objection to them remains:

> Semantics is vitiated by a pernicious mentalism as long as we regard a man's semantics as somehow determinate in his mind beyond what might be implied in his dispositions to overt behavior.[32]

But why is Quine so strongly opposed to mentalism and the entities posited by it? His argument for physicalism, in chapter 7 of Word and Object, indicates that his reasons are pragmatic. He claims that "any subjective talk of mental events proceeds necessarily in terms that are acquired and understood through their associations, direct or indirect, with the socially observable behavior of physical objects." So that, if there were a case for mental entities, it would be

> . . . just that the positing of them, like the positing of molecules, has some indirect

> systematic efficacy in the development of theory. But if a certain organization of theory is achieved by thus positing distinctive mental states and events behind physical behavior, surely as much organization could be achieved by positing merely certain correlative physiological states and events instead . . . The bodily states exist anyway; why add the others?[33]

In other words, the only reason for positing mental entities would be to develop a pragmatically better theory, and since this could be achieved just as well by positing further entities of a sort already assumed to exist, there is no need to read more into mentalistic idiom than is acutally there.

However, in other contexts, Quine acknowledges that mentalistic idiom does have its uses. For instance:

> We tend to think of the enlivened traces of an ocular impingement as if it were itself a visual experience similar to what was occasioned by that impingement, only fainter: a visual image . . . This mentalistic angle could have heuristic value for the neurophysiologist, by suggesting that the neurophysiology of the trace may resemble the neurophysiology of the original sensation. This shared mechanism may someday be explained, just as the genes, posited at first as hypothetical bodies, were finally explained by molecular biology. We do well surely to avail ourselves of any such heuristic benefits of the mentalistic idiom, while keeping the dangers of an uncritical mentalism firmly in mind.[34]

What are these dangers? They are, simply, those of treating the mentalistic idiom as if it were talking about mental entities. Mentalistic idiom must instead be taken to be about physical entities:

> Mental entities are unobjectionable if conceived as hypothetical physiological mechanisms and posited with a view strictly to the schematization of physiological phenomena. They should be posited in the hope of their submitting someday to a full physiological explanation in turn.[35]

Here, Quine acknowledges that talk of mental entities <u>is</u> useful to theory; that it does help

simplify one's account of physiological phenomena and does increase the scope and fecundity of current physiological theory. (He acknowledges this, at least, if he uses 'heuristic' in its normal sense). But these are all good pragmatic reasons for accepting mentalism and, therefore, the entities posited by it. In short, there appears to be no justification for Quine's stipulation that we should posit mental entities only with the hope of being able someday to ontologically reduce them to purely physiological mechanisms. Clearly, Quine's repudiation of mental entities is not based on pragmatic grounds. He cannot even appeal to conservatism as such because, as will be discussed later, he admits classes into his ontology. And if abstract entities are acceptable, why are mental ones not?

The above discussion was introduced to gain better understanding of Quine's reasons for rejecting meanings. This understanding would, I have suggested, yield insight into his rather reserved acceptance of molecules as contrasted with his adamant stance against meanings. Meanings were found to be dismissed by Quine either on instrumentalist grounds, or because they purportedly import mentalism into semantics, where he objects strongly to mentalism and the entities posited by it. The attendant examination of his remarks on mentalism showed that Quine stubbornly refuses to accept it literally, in spite of good reasons for doing so. If one disregards his dismissal of mentalism as being based only on prejudice, his rejection of meanings on the grounds of their mentalist overtones may also be so disregarded. This leaves his instrumentalist argument against meanings as the only justification presented for repudiating them.

Quine has, however, one other main reason for rejecting meanings. One reason he often mentions is the difficulty of stating clearly when it is that two sentences are synonymous. This difficulty is what he sometimes refers to as the problem of individuating propositions.[36] He equates propositions with meanings of sentences, and the problem of individuating them is the lack of clarity in any attempt to specify exactly when two propositions are identical. However, he makes it quite clear in Word and Object that this is not the reason for repudiating propositions. The reason is, quite simply, the acceptance of his indeterminacy thesis. If there were such things as propositions, there would be synonymy between languages. Therefore, there would be a question of a 'really' right or wrong

translation,[37] in opposition to what the indeterminacy thesis maintains. So, "the very question of conditions for identity of propositions presents not so much an unsolved problem as a mistaken ideal."[38]

The same point is made in Philosophy of Logic. Likeness of meaning is sameness of proposition, and the latter is sameness of objective information.[39] Now, "if the notion of objective information were itself acceptably clear, there would be no quarrels with propositions."[40] But, the notion of sentences containing objective information cannot hold when we recall that sensory evidence cannot be distributed over individual sentences.[41] This can be seen most readily, Quine suggests, by recalling his indeterminacy thesis. Two theories can equally fit in with all possible observations and yet be incompatible with each other.[42] Clearly, they convey the same empirical information, but still they are incompatible.

> This reflection should scotch any general notion of propositions as empirical meanings of sentences.[43]

Similarly, his indeterminacy thesis is again used to support his rejection of sameness of meaning in "Speaking of Objects".[44]

So, Quine gives two main justifications for rejecting meanings: the instrumentalist argument in "Ontological Relativity" and his indeterminacy thesis.

His instrumentalist argument against meanings was seen to be applicable equally against molecules. But, if he is in fact an instrumentalist with respect to molecules, his claim that molecules are real must be interpreted instrumentalistically to be saying no more than that the term 'molecule' plays a useful part in physical theory. This, however, reflects on Quine's notion of truth which was taken above to assume correspondences between a true theory and the real world. If molecules are not, in fact, real for Quine, he cannot aver to the literal truth of molecular theory in a Tarskian sense of truth, not even reservedly.

As I will now show, the use of his indeterminacy thesis to make ontological decisions also reflects adversely on Quine's claim of the truth of a theory. The entities assumed by it, viz., classes, are ones which Quine willingly adopts into his ontology.

Paraphrasing what he says in section 55 of Word and Object,[45] classes are abstract entities which he finds extremely useful in many ways. He reiterates all the

benefits shown earlier by him to stem from the admission of classes into one's ontology. They can be used instead of attributes and relations, in certain contexts. Further, they are preferable to the latter in that identity of classes (unlike that of attributes) is straightforward.[46] They help us get by with quantifiers as the sole variable-binding operators, and so are very important to the treatment of a theory as a first order predicate theory.[47] They can do the work of ordered pairs.[48] They can do the work of natural numbers as well that of the richer sorts of numbers, whether rational, real or complex.[49] In fact,

> . . . the abstract objects that it is useful to admit to the universe of discourse at all seem to be adequately explicable in terms of a universe comprising just physical objects and all classes of the objects in the universe (hence classes of physical objects, classes of such classes, etc.). At any rate I can think of no persuasive exceptions.[50]

Clearly, the pragmatic benefits of accepting classes into one's ontology are decisive in Quine's adoption of these entities. However, as he points out, an uncritical acceptance of them leads to infinitely many paradoxes.[51] Two such paradoxes are Russell's class membership and Grelling's heterological ones. There are different ways of dealing with these paradoxes, though no one way of dealing with them all. Consequently, the many different resolutions of the different paradoxes of class theory yield "a multitude of mutually alternative, mutually incompatible systems of class theory . . . each with only the most bleakly pragmatic claims to attention."[52] Choice between these different class theories is governed by the needs of the moment. As these needs change, one's choice of class theory correspondingly changes. Pragmatic considerations now devolve around the question of how good a theory is, as a tool or an instrument for fulfilling some particular need of the moment. There is no one theory which is overall better than the others. Consequently, a belief in science as an evolving, unitary world view is misguided. Instead, a more appropriate picture of science is that of it being a multiplicity of working theories.[53] Quine gives an account of what he means by this, after having outlined ways of dealing with ideal objects, infinitesimals and

the laws of Newtonian physics which all conflict with other accepted theories:

> . . . Knowledge normally develops in a multiplicity of theories, each with its limited utility and each, unless it harbors more danger than utility, with its internal consistency. These theories overlap very considerably, in their so-called logical laws and in much else, but that they add up to an integrated and consistent whole is only a worthy ideal and happily not a prerequistie of scientific progress. The continuing utility of the mechanics of ideal objects and of Newtonian mechanics is ample reason for treasuring and teaching these theories, whatever their conflicts with more august ones . . . .[54]

But if pragmatic considerations indicate the acceptance of different theories which are inconsistent with each other, these considerations cannot be treated as evidence for the truth of all those theories, at least not in the sense of corresponding to the real world. If truth is defined in terms of satisfaction by sequences of objects in the domain of discourse, and the domain of discourse is the real world, mutually alternative and incompatible theories cannot all be true, whatever their respective pragmatic benefits. Truth may still be a factor, if the domain of discourse is not the same for the different theories; each theory can then be true with respect to its own domain of discourse. But the metatheory itself, in which the truth predicate is applied to the different theories, will have to assume a multitude of mutually alternative domains of discourse in order to assess the different theories. In order to remain internally consistent, the metatheory has to treat these domains as containing fictions, and not posits which may or may not be real. For example, one might be choosing between two class theories for some purpose, settling for the one which best meets the needs of the moment. One of these theories might posit (the null set) while the other does not. Pragmatic considerations might, on this occasion, indicate the acceptance of while, at other times, they will indicate its rejection. From this point of view, pragmatic considerations are indifferent to the question of whether really exists--it exists according to one theory and does not exist according to the other. The metatheory in which considerations are

being made must treat both these claims equally, and the only way to this is to treat the existential claims trivially.

Truth, on this account, has become trivialized. No longer is there only one domain of discourse, viz., the real world, whose objects either satisfy the sentences of a theory or not. Instead, there are a multitude of domains of discourse, corresponding to the different theories held, where the objects of one domain are not present in another, and where the sum of all these domains does not constitute the world as it really is. Given this, what does Quine mean by his postualtion of a universe comprised only of physical objects, all classes of such objects, all classes of these classes, etc.? The classes here are clearly not the classes posited by any of the mutually alternative and incompatible class theories, since these have domains of discourse different from each other. These class theories with their conflicting ontologies have all arisen from attempts to deal with the paradoxes of class theory as originally conceived. This class theory certainly cannot be held to be true, even in a trivial sense. It is inconsistent. Its posited entities cannot be the ones Quine has in mind. Since there are no other class theories, where do the classes in question come from? If they are the posits of an as yet unformulated theory, is Quine dealing with possible objects? This cannot be right, since he repudiates possible objects. Does he have in mind some ideal class theory, which real class theories do not match up to? No, because he repudiates ideal objects. Perhaps, he is simply claiming that the term 'class' is indispensable to physical theory; that he utilizes the assumption of whatever entities the term posits whenever he needs to. This last interpretation seems the only viable one.

Quine's attitude towards molecular theory has finally been clarified. An examination of his rejection of meanings revealed earlier an instrumentalist attitude which was equally applicable to molecules. The preceding discussion of his acceptance of classes has now substantiated that finding. For it is now quite clear that Quine treats theories, and their posited entities, as tools for fulfilling certain aims. Class theories which are mutually incompatible are equally acceptable. No one theory is more correct than the others. The choice between them depends on the pragmatic needs of the moment. It revolves around the question of which one

best serves as a tool or instrument for fulfilling these needs. Molecular theory is not treated any differently from the class theories apart from being used persistently instead of only sometimes. In the case of class theories, different classes are temporarily assumed to be real in that different theories are temporarily accepted, according to the needs of the moment. In the case of molecular theory, there is at present no alternative, equally good theory to do the work molecular theory can do and so molecular theory is accepted according to the needs of many moments.

Given this establishment of instrumentalism in Quine's philosophy, the purpose of this paper has been fulfilled. His position with respect to instrumentalism has been elucidated. It is aptly summarized in these words of his:

> Suppose . . . two rival systems of the world, equally sustained by all experience, equally simple, and irreconciable by reconstrual of predicates. Suppose further that we can appreciate their empirical equivalence. Must we still embrace one theory and oppose the other, in an irreducible existentialist act of irrational committment? . . . we would do well to settle for a frank dualism. Oscillation between rival theories is standard scientific procedure anyway, for it is thus that one explores and assesses alternative hypotheses. Where there is forever no basis for choosing, then, we may simply rest with both systems and discourse freely in both, using distinctive signs to indicate which game we are playing.[55]

The most telling aspect of these words of Quine is that their instrumentalist overtones are not limited to specific theories such as molecular theory or class theory, but are general in scope. Whatever our theory of the world may be, according to Quine, its infinite number of observational predictions cannot be captured in any finite sentence which is equivalent merely to their infinite conjunction.

> Any finite formulation that will imply them is going to have to imply also some trumped-up matter, or stuffing, <u>whose only service is to round out the formulation</u>.[56]

One only need recall the words of J.J.C. Smart cited earlier to accept my conclusion that Quine is very much an instrumentalist with respect to scientific theories and the entities posited by them.

NOTES

[1]W.V.O. Quine, From a Logical Point of View (New York and Evanston: Harper and Row, 1963), pp. 65-79.

[2]Ibid., p. 78-79.

[3]Ibid., p. 79.

[4]'Empirically', to cater for those instrumentalists who accept logical and analytical truths.

[5]J.C.C. Smart, Philosophy and Scientific Realism (London: Routledge and Kegan Paul, 1963), p. 16.

[6]W.V.O. Quine, Word and Object (Cambridge, Mass.: M.I.T. Press, 1960), p. 22.

[7]W.V.O. Quine, From a Logical Point of View (New York and Evanston: Harper and Row, 1963), pp. 1-19.

[8]Ibid., pp. 16-17.

[9]W.V.O. Quine, Ontological Relativity and Other Essays (New York and London: Columbia University Press, 1967), pp. 91-113.

[10]Ibid., p. 106.

[11]Ibid., p. 110-112.

[12]Word and Object, pp. 157ff.

[13]Ibid., p. 186.

[14]Ibid., p. 163.

[15]From a Logical Point of View, p. 103.

[16]Word and Object, p. 192n.,232-242.

[17]From a Logical Point of View, p. 103.

[18]W.V.O. Quine, The Ways of Paradox and Other Essays (New York: Random House, 1970), pp. 233-41.

[19]Ibid., p. 234.

[20]Ibid., pp. 238-39.

[21]Word and Object, p. 250.

[22]See chapter 3 of W.V.O. Quine, Philosophy of Logic (New Jersey: Prentice-Hall, 1970) for the full details. I give only as much detail as is necessary for understanding the realist overtones of the theory.

[23]The Ways of Paradox and Other Essays, p. 234.

[24]W.V.O. Quine, The Roofs of Reference (LaSalle, Illinois: Open Court, 1973), p. 137.

[25]Word and Object, section 33.

[26]The Ways of Paradox and Other Essays, p. 71

[27]Word and Object, p. 159.

[28]See The Ways of Paradox and Other Essays, pp. 204-05 for the three conditions of success.

[29]Ontological Relativity and Other Essays, pp. 26-68.

[30]Ibid., p. 26.

[31]Ibid., p. 27.

[32]Ibid., p. 27.

[33]Word and Object, p. 264.

[34]The Roots of Reference, p. 27.

[35]Ibid., pp. 33-34.

[36]Cf., Philosophy of Logic, chapter 1.

[37]Word and Object, pp. 205-06.

[38]Ibid., p. 206.

[39]Philosophy of Logic, p. 3.

[40]Ibid., p. 3.

[41]Ibid., p. 5.

[42]Ibid., p. 6.

[43]Ibid., p. 7.

[44]Ontological Relativity and Other Essays, pp. 19-20.

[45]Word and Object, section 55.

[46]Ibid., pp. 209-10.

[47]Ibid., p. 237.

[48]Ibid., p. 263.

[49]Ibid., p. 266.

[50]Ibid., p. 267.

[51]Ibid., p. 266.

[52]Ibid., p. 268.

[53]Ibid., p. 270.

[54]Ibid., p. 251.

[55]W.V.O. Quine, "On Empirically Equivalent Systems of the World," Erkenntnis 9 (1975), p. 328.

[56]Ibid., p. 324 (my emphasis).