

The Crisis in Philosophical Semantics

While concern for the nature of theoretical concepts, so prominent in the recent history of philosophical inquiry, is currently at ebb, this is much less the quiescence of achieved consensus than it is an exhaustion of nerve. To be sure, the positivistic thesis that theoretical terms are cognitively meaningful only where they are equivalent to observational constructs is now dead and past mourning. But its execution and burial has exacted so severe a toll in analytic energies that little heart remains to acknowledge that this essentially negative achievement has left as obscure as ever what the cognitive properties of theoretical expressions in fact are. Which is a pity, for by the late 1950's the empiricist analysis of scientific theory had pushed to the brink of what could have been—and might still become—a revolutionary breakthrough in the philosophy of cognition. However, the dominant style of philosophical argument, persuasive and holistically critical rather than discovery oriented, has severely impeded realization of this prospect. By “persuasive and holistically critical,” I mean dialectic which seeks primarily to recruit allegiance to some favored doctrine while treating any flaw or discomfiture in *prima facie* competing doctrines as sufficient grounds for their total dismissal. This is, however, a singularly inept way to seek insight into complex problems, for by failing to discriminate central issues from secondary details it remains blind to the rational *structure* of the problem. In contrast, the natural sciences have long since learned to appreciate the power of idealized approximations (“models”) which highlight the essentials of phenomena too intricate to be grasped at the outset with errorless accuracy, and the importance of “robust” conclusions which are largely indifferent to the particular details of simplifying assumptions.

No matter how one approaches the analysis of theories, those questions which are central to the nature of theoretical concepts *per se* are so extensively laced through with more general problems of epistemology, on-

tology, and semantics that progress on the former can be achieved only by way of simplified working assumptions about the latter, resulting in an inevitable untenability of any such account in its entirety regardless of how sound its conclusions specifically about the theoretical aspects of language may be. Deeper penetration into the nature of theoretical expressions thus requires not the issuance and rebuttal of position papers but careful, non-doctrinaire problem analyses which attempt first of all to search out just what the various specific issues actually are, and then to see whether any significant conclusions regarding some of these can be found which are essentially independent of the stand one might take on the others. And if occasional simplistic presuppositions or not wholly realistic idealizations are needed to cut through otherwise impenetrable tangles of complexity, the edifying reaction to them is not holistically to spurn the inferences which follow with their aid but to ask just what difference, if any, they actually make for the latter, and how the idealized model can most insightfully be emended to approximate more closely the intricacies of literal reality. In what follows, I shall be concerned not so much with specific conclusions about particular theoretical expressions as with the *structure* of effective inquiry on this matter, and the semantical crisis which thereby emerges as a robust consequence of rejecting positivism.

What philosophical problems do theories present? Most can be regarded, in one sense or another, as an instance of the question *What do theoretical expressions mean?* Regardless of what might specifically be understood by “mean,” here, this formulation contains a critical presupposition and implies a major directive. The presupposition is that there exist linguistic expressions of a “theoretical” sort which are effectively distinguishable from the remaining “nontheoretical” portion of our language, and whose semantical properties are in some ways more problematic than those of the latter. And the implied directive is that our primary objective is to clarify the status of theoretical expressions in these special respects, i.e., those wherein they are more problematic than their nontheoretical counterparts. Consequently, any allegation about the semantics of theoretical expressions of a given logical type which was assumed at the outset to be true in complete generality about all expressions of that type is not here a cogent conclusion; while conversely and more importantly, any flaw or implausibility to be found in a particular account of theoretical meaning need cast no aspersion on that argument's claims distinctively about *theoretical* concepts if this blemish lies in its universal background as-

sumptions. Quite apart from the theory problem, philosophical analysis of cognition still has rocky going on even the simplest aspects of language, and it is essential that we remain sympathetically tolerant of idealized presuppositions about the semantics of nontheoretical expressions if these provide first-approximational leverage on distinctively theory-meaning questions.

We have noted that the "theory problem" presupposes a significant contrast between theoretical and nontheoretical concepts. But does such a difference actually exist? Or put operationally, how do we distinguish terms which are "theoretical" from those which are not. In the heyday of positivism the definition was straightforward enough: A descriptive, i.e., extralogical, term was "theoretical" if it purported to designate something which its user had not directly observed, i.e., if its referent was not in some sense an experiential "given." But now that the doctrine of sense data is in ill repute while observability is increasingly conceded to be a matter of degree rather than a categorical absolute, the old notion of "theoretical" will no longer suffice, especially in the face of current contentions that all so-called observational reports are in reality theory-laden. Just the same, *de facto* scientific practice does authorize an observational-theoretical distinction even if only a relative one. Empirical research in the natural sciences consists of (a) noninferential acquisition of certain beliefs which, though not incorrigible, command a high degree of conviction, and (b) derivation from these of an appropriate degree of confidence in various other propositions for or against which the former serve as evidence. These *inferentially basic* propositions of a science are, by definition, its "datum" beliefs, while the language generated from the terms and syntax of its datum beliefs, including all concepts explicitly definable from these, is its "observation language." However, the propositions upon which the more advanced sciences attempt to pass inferential judgment are generally not in the science's *de facto* observation language inasmuch as they often contain terms which do not occur, nor can they be definitionally reduced to those which do, in any of the science's datum beliefs. Such terms are by definition "theoretical," and any grammatically well-formed phrase or sentence which includes one or more theoretical terms, i.e., any expression which, though not in the observation language, is in the language formed by adding the science's theoretical terms to its observational vocabulary, is a *de facto* theoretical expression for that science.

To be sure, this delimitation of "theoretical" terms by reference to ex-

tant inferential practice has been highly simplified. For one, I have spoken glibly of datum beliefs as though these are clearly and unambiguously recognizable as such, whereas in fact the propositions accepted as a basis for inference in the indicative mood vary considerably from person to person and even from moment to moment within the same person (and not merely in that new observations continue to be made while older ones fade from memory, either), so that the observational-theoretical distinction is at best relative to a particular person at a particular time. Again, we can easily imagine that some terms which count as "theoretical" by the structure-of-inference criterion might be perfectly capable of occurring in a given person's datum beliefs at a given moment even though he chances not to hold any which utilize it just then. Further, there is the nuisance of common-sense observational terms, i.e., those in which everyday perceptual judgments are couched, whose lack of clarity usually disqualifies them for use in technical datum reports even though they *should* be explicitly definable in the technical observation language. For example, we would not wish to count "tall" as a theoretical term when determining whether John is tall from the datum that John is 74 inches in height, for whether or not a person is "tall" *should* be analytically decidable from his quantitative height even though this term's imprecision thwarts our making this inference with complete deductive confidence. Even so, despite such complications, the empirical differences in technical vocabulary between a science's noninferentially believed datum assertions on the one hand and its nondemonstratively inferred conclusions on the other strongly urge that *de facto* language practices at the highest levels of cognitive sophistication do indeed sustain an epistemically significant observational-theoretical distinction, one which can as a first approximation be put as follows:

Heuristic Simplification 1 [HS-1]: If the total vocabulary of a language L is partitioned into two subsets V_T and V_O , the terms in subvocabulary V_T are all "theoretical" with respect to subvocabulary V_O (which is then "observational" with respect to V_T) if (1) none of the terms in V_T are analytically equivalent to any expression constructed wholly from terms in V_O , and (2) the credibility of any sentence¹ S_T in L containing one or more terms in V_T derives entirely from the credibilities of certain sentences containing only terms in V_O by way

¹ Throughout this paper I shall understand 'sentence' in the sense of sign-design-cum-meaning, so that it is legitimate to speak of "sentences" as having cognitive properties such as credibility.

of S_T 's logical structure and logical relations to these sentences. *Heuristic Simplification 1a*: Some extant languages do, in fact, contain theoretical terms in this sense.

For simplicity, *HS-1* construes "logical structure" and "logical relations" to include not merely formal properties which are syntactically explicit but also those which appear under meaning analysis. For example, if "a" is synonymous with "b," "a = b" has the logical form $x = x$ while "P(a)" logically entails "P(b)." Presumably, all logical terms in L —"and," "or," "all," etc.—belong on the observational side of any observational-theoretical partition of L , though we should not ignore altogether the possibility of theoretical logical terms. Inasmuch as we shall make no technical use of *HS-1*, its lack of explicit detail is not here a crippling defect.

It is important to note that *HS-1* views the observational-theoretical distinction as relative, not absolute. Specifically, it leaves open the possibility that an observational subvocabulary V_O may be further partitioned into subsets V'_O and V''_O such that V''_O is theoretical with respect to V'_O . Thus *HS-1* is entirely compatible with the prospect that theoreticity is a matter of degree rather than of kind, and in particular that a language may well be hierarchically stratified in such fashion that the concepts in each stratum are theoretical with respect to the layers below it but observational with respect to those above.

Now consider the basic empiricist intuition about the structure of cognition, which logical positivism carried to a well-intentioned but untenable extreme. Purely for the sake of convenience, I shall speak as though

Heuristic Simplification 2 [HS-2]: A person believes, disbelieves, thinks, hopes, understands, etc., that p only if there is a sentence in his language which asserts that p .

(This is almost certainly not literally true. People, and probably the higher animals, most assuredly have occasional beliefs which cannot be expressed by the linguistic machinery then available to them. But, inasmuch as propositions and concepts, i.e., *meanings*, bereft of words to convey them scandalize many contemporary philosophers, while in principle a person can always enrich his language to express any concept or proposition which he can think, *HS-2* is essentially harmless.) Stripped to fundamentals, the classical empiricist thesis is that all knowledge derives from experience. However, since "knowledge" in the stringently ideal sense

does not literally exist,² this is best put with the help of *HS-2* as a claim that (1) the vocabulary of any person s contains a subset V_O such that all s 's beliefs depend for their various credibilities entirely upon s 's belief in propositions expressible wholly in V_O terms if they are not themselves so expressible, and (2) all descriptive terms in V_O refer to entities with which s has experiential acquaintance. Exactly what is to be understood by 'experiential acquaintance' is hard to say, but here this is no matter; the important point is that empiricism envisions the existence of a *credibility base*, the concepts in which have a "given" status, even if justified belief is not necessarily restricted to what can be expressed by these givens alone. Moreover, the empiricist credibility thesis has a semantical counterpart: *All expressions in a person's language either depend wholly for their meanings upon their usage in relation to expressions whose descriptive terms refer only to entities with which that person is experientially acquainted, or are themselves such expressions.* Again the interpretation of 'experientially acquainted' is much less important than the notion that every language has a *meaning base* from which all its expressions draw their cognitive significance, and that this meaning base consists essentially of concepts found in the language's credibility base. The connection between concept development and knowledge acquisition is so intimate that the empiricist view of meaning is intuitively a corollary of the empiricist credibility thesis. But if this intuition is unconvincing, how do symbols acquire cognitive meaning? Even allowing for a possibility of innate concepts, any term whose meaning is neither innate nor given by an "ostensive" relating of words to experience must be cognitively dependent upon intralinguistic processes wherein an initially arbitrary sign design somehow acquires meaning from its role in linguistic contexts with terms already meaningful—or at least so we must assume until we conceive of some plausible fourth alternative for concept formation. Add to this the further premise that innate concepts either do not exist (this being at best a factual claim since it can be shown not to be logically or nomically necessary) or are in some sense ingredients of nonsensory experience, e.g., given by introspective awareness, and the empiricist semantical thesis results.

Although empiricist epistemology has traditionally emphasized "experience" as the source of knowledge, one could quarrel with this and still accept a liberalized empiricism in which "is an experiential acquaintance

² W. W. Rozeboom, "Why I Know So Much More Than You Do," *American Philosophical Quarterly*, 4 (1967), 281–290.

of" is weakened to "is cognitively primitive for." That is, the structure of credibility and meaning acquisitions envisioned by empiricism is indifferent to what may be the nature of this structure's base. With the cognitive role of "experience" thus split off as a separate issue, the structural core of the empiricist meaning thesis becomes

Technical Idealization 1 [TI-1]: If V_O and V_T are subvocabularies of a language L such that all terms in V_T are theoretical with respect to V_O , then the meanings of terms in V_T depend wholly upon their joint usage with terms in V_O .

While *TI-1* intends "theoretical" to be understood in the sense of *HS-1*, this is not actually essential. The terms in a vocabulary V_T might alternatively be defined as "theoretical" with respect to a vocabulary V_O if (1) all terms in V_T derive their meanings entirely from their usage with terms in V_O even though (2) no V_T -term is analytically equivalent to any expression constructable from terms in V_O . Then *TI-1* is analytically true while the empiricist claim now becomes that the new terms which show up in the conclusions of certain scientific arguments are theoretical in this latter sense. Moreover, if there be several epistemically distinct kinds of theoretical concepts (though *HS-1* describes the only one I know), we need not suppose that *TI-1* applies to all; we can profitably explore the implications of *TI-1* for this kind of theoretical concept while remaining perfectly free to recognize additional senses of "theoretical" which *TI-1* may not fit.

It should be observed that like *HS-1* before it, *TI-1* speaks of theoretical terms only in a relative sense. That is, it is compatible with the prospect that terms which have acquired meaning from their couplings with antecedently established terms may in turn themselves provide a meaning base for a higher level of theoretical conceptualization.

I submit that any fruitful dialogue on the nature of theoretical concepts must first of all reach some degree of consensus on the acceptability of *TI-1* as a point of departure. To reject it amounts to denying that there is anything distinctive about the meanings of theoretical terms, or at least that any terms exist which are "theoretical" in a sense under which *TI-1* is true. Such denial was characteristic of logical positivism, and it also seems to lurk within the recently burgeoning doctrine that all terms, "observational" or otherwise, are really theory-dependent³ and hence presum-

³ P. K. Feyerabend, "How to Be a Good Empiricist—A Plea for Tolerance in Matters Epistemological," in B. Baumrin, *Philosophy of Science: The Delaware Seminar*, vol. 2

ably all of a kind. But *TI-1* is entirely compatible with the hypothesis that virtually all terms (or even all without exception, if *HS-2* is dropped) are theoretical with respect to some meaning elements; and to make much of the uncontroversial point that theoretical presuppositions can always be found within the de facto datum beliefs of everyday life and technical science neither discredits the existence of still other theoretical terms whose meanings are in some fashion induced by couplings other than explicit definition with this de facto observation language nor in any way illuminates what is involved in such meaning derivations. In any event, until *TI-1* or something like it is accepted, inquiry into the cognitive status of theoretical terms remains largely a search for what the problem is. In contrast, acceptance of *TI-1* immediately confronts us with a question ordinarily so hedged about with distracting side issues that scarcely anyone has heretofore managed to grasp hold of it, namely, what are the meanings which theoretical expressions acquire from their usage in observation-language contexts?⁴

Undoubtedly one important reason why so few attempts have been made to say what theoretical concepts mean is the high degree of sophisticated foresight required to prepare a metalinguistic framework within which a significant answer to this question can even be expressed, let alone defended. For without careful advance planning, the analysis soon begs the question or succumbs to a horde of controversial irrelevancies. In the next few paragraphs I shall list the major strategies available for such an analysis and briefly note their most serious limitations. These strategies differ first of all in what semantical properties of theoretical expressions they attempt to illuminate, notably, theoretical meanings per se versus the referential consequences thereof, and secondly, in the type of metalinguistic assertion by which they seek to convey this information.

In principle, the most direct way to say what is meant by a given theoretical term t would be to describe its meaning as such, i.e., to say what

(New York: Wiley, 1963); N. R. Hanson, *Patterns of Discovery* (Cambridge: Cambridge University Press, 1958); T. Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1962), especially chapter 10.

⁴ While the philosophic and scientific literature is gorged with discussions of whether theoretical terms are meaningful when not analytically reducible to observational expressions, to my knowledge only Carnap and I have actually tried to say what the semantical properties of such terms may be. R. Carnap, "The Methodological Character of Theoretical Concepts," in H. Feigl and M. Scriven, eds., *Minnesota Studies in the Philosophy of Science*, vol. I (Minneapolis: University of Minnesota Press, 1956); R. Carnap, "On the Use of Hilbert's ϵ -Operator in Scientific Theories," in Y. Bar-Hillel et al., eds., *Essays on the Foundations of Mathematics* (Jerusalem: Magnes Press,

happens in a person's head when he understands *t*. Such an approach would attempt to identify what psychological features of a person's cognitive functioning are the grounds on which expressions containing *t* are about aspects of extralinguistic reality.⁵ However, we still know so little about the psychological nature of meanings in even the most primitive psycholinguistic processes that to offer *this* kind of explanation is far beyond our present scientific capacity.⁶

A second way to characterize the meaning of an expression *t* is by synonymy claims of the form '*t* means *e*' or '*t* is analytically equivalent to *E*' where *E* is an expression whose meaning, *e*, is relatively unproblematic.⁷ This is the most traditional mode of meaning clarification in analytic philosophy; however, in the present instance such assertions can only be trivial or question-begging. For if term *t* in language *L* is theoretical with respect to subvocabulary *V*₀ of *L* while being synonymous with some other expression *E*, then by definition *E* cannot be constructed from terms in *V*₀. Hence either *E* is itself theoretical in *L* with respect to *V*₀ (which may be instructive if *E* is a composite of theoretical terms other than *t*, but only if we can then say what these in turn mean), or *E* must be an expression in some language other than *L*. Now in the latter case, the statement '*t* means the same as *E*' clarifies *t*'s meaning only if we understand *E*, i.e., only if '*t* means *e*' is a metalinguistic assertion at our command in which '*e*' is equivalent in meaning to *E* and hence to *t*. But if '*e*' has the same meaning as *L*-term *t*, then '*e*' will inevitably be theoretical with respect to the metalinguistic translation of *V*₀ and we have merely replaced the question of *t*'s meaning in *L* with the equivalent question of what

1961); W. W. Rozeboom, "Studies in the Empiricist Theory of Scientific Meaning," *Philosophy of Science*, 27 (1960), 359–373; W. W. Rozeboom, "The Factual Content of Theoretical Concepts," in H. Feigl and G. Maxwell, eds., *Minnesota Studies in the Philosophy of Science*, vol. III (Minneapolis: University of Minnesota Press, 1962); W. W. Rozeboom, "Of Selection Operators and Semanticists," *Philosophy of Science*, 31 (1964), 282–285.

⁵ W. W. Rozeboom, "Intentionality and Existence," *Mind*, 71 (1962), 15–32, especially pp. 22ff, and "The Factual Content of Theoretical Concepts," pp. 339ff.

⁶ Although technical psycholinguistics continues to progress, psychology has yet to learn even what differentiates cognitive from noncognitive states of the organism, much less to produce a viable theory of aboutness. Worse, many philosophers seem curiously resistant to recognition that meanings are aspects of what goes on inside people's heads and would hence not appreciate a psychological account of meaning even were a good one available.

⁷ For clarification of the '*x* means *y*' schema, see my "Intentionality and Existence," especially pp. 21ff. Essentially, the difference between the two forms '*t* means *e*' and '*t* is analytically equivalent to *E*' is that the expression '*e*' used in the first case is designated by the expression '*E*' used in the second.

theoretical term '*e*' means in our metalanguage. To put the point more briefly, if we seek to resolve uncertainties about an expression's meaning by proffering a metalinguistic translation of it, we are just playing the quotes-dropping game, '*e*' means *e*, which is like arguing "Oh, get off it, fellows, we all know what '*e*' means."

A third, more devious but ultimately more prosperous route to the meanings of theoretical expressions is through their referents or, for theoretical sentences, their truth conditions. For while two expressions may differ in meaning even while sustaining the same extralinguistic connections, the latter are the cognitive payoff of meanings. There are at least three ways to implement this strategy for an expression *E*_T containing theoretical terms. The first is to seek conclusions of the form '*E*_T designates *e*' or, more weakly, when *E*_T is a sentence, of the form '*e* is a necessary and sufficient condition for the truth of *E*_T.' My experience with this approach⁸ shows it to require rather specific working assumptions on controversial points of ontology which are best avoided wherever possible. Also essential are some semantical principles relating language to reality in virtue of which it becomes possible to arrive at conclusions of this sort. In particular, we need to know the referents or truth conditions of the observational expressions from which *E*_T draws its meaning. The Carnap-Tarski quotes-dropping gambit—i.e., '*e*' designates *e*, and *s* is a necessary and sufficient condition for the truth of sentence '*s*'—furnishes an appropriate if perhaps idealized semantics for the observation language, but of course we cannot treat theoretical expressions this way without begging the question. A further complication is that there may not be any entity designated by expression *E*_T even though its meaning is in no way inferior to that of observational expressions of the same logical type (cf. 'Pegasus'; 'Adam and Eve'; 'Phlogiston'; and the like). Nonexistent referents do not disastrously cripple the usefulness of this approach, however, for we can still derive subjective conclusions of the form 'If *e* were to exist it would be designated by *E*_T.' While prima facie similar to the futile *E*_T-has-the-same-meaning-as-*e* approach, subjunctive assertions of reference differ from synonymy claims in being able to exploit the possibility that two expressions may necessarily, not just contingently, have common designata even though their meanings differ.

Alternatively, we can look for conclusions of the form '*E*_T designates the referent of *X*' (or, when *E*_T is a sentence, '*E*_T and *X* have the same

⁸ See my "The Factual Content of Theoretical Concepts."

truth conditions'), where X , which is not necessarily in the same language as E_T , is an expression whose semantical properties are better understood by us than are those of E_T . This strategy is somewhat less beset by ontological problems than is the E_T -designates- e approach, but it requires a theory of semantical relations between the language L containing E_T and the language L^* wherein we hope to find E_T 's referential counterpart X . (The possibility that L^* is a different language from L must be allowed because we cannot assume that an expression with the same referent as E_T is always constructable from the vocabulary relative to which E_T is theoretical without positivistically presupposing at the outset that theoretical concepts never expand a language's referential scope.) In particular, while it is probably safe as a first approximation to stipulate that observational expressions in L are synonymously translatable into L^* , we cannot assume this about L 's theoretical terms without trivializing the argument—whence it importantly follows that this approach must provide for referential and truth-conditional equivalences between expressions which are not identical in meaning. Side issues about translatability and other complications of interlinguistic semantics can here be minimized by letting L^* be an observational enrichment of L , i.e., L^* is generated from L by adding more observational terms to the latter, but then we must guard against the possibility that theoretical terms may undergo shifts in meaning as the language containing them expands. And regardless of what language L^* we choose to scan for a referential counterpart to E_T , we must be prepared to find that it may contain no such expression unless L^* is strongly idealized.

Finally, the referents of theoretical expressions can be specified by citing the conditions which such a referent must satisfy, i.e., by arriving at conclusions of form ' E_T designates entity e iff e satisfies conditions C ' or, interlinguistically, 'Expressions E_T and X have a common referent iff X has property P .' In view of *IC-1*, below, this approach has perhaps the brightest prospect of all, but how far it can avoid the technical problems inherent in the others is uncertain.

Let us now return to *TI-1* and sharpen its cutting edge. What is it for theoretical terms in V_T to have a "joint usage with terms in V_O "? In general, there seem to be four major ways in which linguistic expressions, theoretical or otherwise, can be "used": (1) They can be grammatically concatenated into more complex expressions. (2) Some can be used to designate extralinguistic entities. (3) Some can be used for description

and predication. And (4) some can be used to convey the objects of "propositional attitudes" or "mental acts" such as believing, doubting, desiring, asserting. Most if not all other uses of language, including such interpersonal functions as informing, questioning, commanding, are derivative from these. And since use (1) is but ancillary to uses (2)–(4) while (3) can be subsumed under (4), we may say that the "usage" of theoretical terms in V_T with terms in V_O consists essentially of employing grammatically appropriate expressions constructed jointly from vocabularies V_O and V_T for making reference and expressing the objects of mental acts. Even if this inventory of language uses seems absurdly oversimplified, precisely how linguistic expressions are used is not critical just now; the important point is that the usage of V_T -terms through which the latter acquire meaning is by way of compound expressions in which they are conjoined with terms of V_O . And if so, what distinguishes a particular usage for V_T -terms in virtue of which these acquire one array of meanings rather than some other which an alternative usage might have given them? This must reside in what particular expressions are used in these ways, so that *TI-1* may be clarified as

Technical Idealization 2 [TI-2]: If V_O and V_T are subvocabularies of a language L such that all terms in V_T are theoretical with respect to V_O , then L contains an ordered set E of criterion expressions, i.e., those through whose "usage" the V_T -terms draw their meanings, such that for any semantic relationship R_s and L -expression E_T containing one or more terms in V_T , there exists a criterion relationship R_c such that whether or not E_T stands in relation R_s to an entity e is determined by whether or not e stands in relation R_c to E . This holds for interlinguistic semantical relations as well as relations of language to extralinguistic reality.

The set E is here described as "ordered" to allow for the possibility that the various expressions in E may differ in their "usage" and hence not participate symmetrically in the determination of a given theoretical expression's R_s -relata. For example, if E consists of three sentences (S_1 , S_2 , S_3), the theoretical meanings which are generated by jointly believing S_1 , doubting S_2 , and hoping S_3 are not necessarily the same as those generated by jointly believing S_3 , doubting S_1 , and hoping S_2 . It should be noted that whereas all previous logical-empiricist writings, including my own, have assumed the meanings of theoretical terms to accrue only from accepted, i.e., believed, theoretical postulates, *TI-2* and its consequences below are entirely open with respect to what propositional attitudes are involved in

the concept-definitive uses of theoretical sentences, nor do they require that the set \mathbf{E} of criterion expressions comprise only complete sentences. How much need there may be for this increased generality is problematic, but it helps allay suspicion that idealizing the de facto treatment of scientific theories as an acceptance-nonacceptance dichotomy may be far too simplistic to have useful issue.

Now consider the import of saying that theoretical terms acquire their meanings from their context of usage. One implication of this is surely that with other psycholinguistic factors held constant, whether or not an entity e satisfies the R_c -relatedness-to- \mathbf{E} criterion for being an R_s -relatum of E_T remains unaffected if the theoretical terms which are given meaning by this context are distinctively replaced, i.e., a one-one interchange, by any other heretofore meaningless sign designs.⁹ That is, the V_T -terms in \mathbf{E} bring no meaning to this context other than their purely syntactic properties of sameness and difference, so that in respect to whether or not e is R_c -related to \mathbf{E} , the V_T -terms in \mathbf{E} are dummies which can just as well be distinctively replaced by logical variables or other semantically empty syntactic place-holders without affecting this relationship. Hence,

Idealized Conclusion 1 [IC-1]: If V_O and V_T are subvocabularies of a language L such that all terms in V_T are theoretical with respect to V_O , then L contains an ordered set \mathbf{E}_O of expression schemata containing only terms in V_O such that for any semantic relationship R_s and L -expression E_T containing one or more terms in V_T , there exists a criterion relationship R_c such that whether or not E_T stands in relation R_s to an entity e is determined by whether or not e is R_c -related to \mathbf{E}_O .

IC-1 has two extremely important implications. One precipitates the semantical crisis alluded to previously, and will be discussed later. The other concerns the metalinguistic resources required to identify the extralinguistic entities which theoretical expressions are *about*. Having no grounds on which to suspect otherwise, we may assume that the meaning imparted to a theoretical term by its usage in observation-language contexts depends only upon the *semantical* character of the latter. Consequently, the criterion relation R_c , whose coupling of an entity e to set \mathbf{E}_O

⁹ This assumes, of course, that any grammatical structure which in the vernacular would be combined with theoretical root terms to form lexicographic words would remain unaltered by this exchange. Thus 'Blishes gorp darbishly' may be transformed by replacement of theoretical terms into, for example, 'Cleeves brum tarkishly' but not into 'Cleevish brums tark.'

of observational expression schemata determines whether e is R_s -related to theoretical expression E_T , must itself be a semantical relation of some sort. If so, *IC-1* implies that a metalanguage sufficiently rich in semantical concepts further needs to cite only expression schemata constructable from the observational vocabulary V_O of language L (or to have the use of metalinguistic translations thereof) in order to describe those conditions which are necessary and sufficient for an entity's standing in a given semantical relation to any particular L -expression which is theoretical with respect to V_O . Or, to make the same point at the object-language level, a *theoretical expression E_T designates or is otherwise semantically related to an entity e if and only if e is semantically related in some to-be-determined way to certain expressions containing only terms in the vocabulary relative to which E_T is theoretical*. Thus an observational vocabulary suffices to characterize the referents of terms which are theoretical with respect to it even when it is unable to designate them.

Further unfolding of *IC-1*'s implications requires considerable assistance from supplementary hypotheses, especially about the specific observational contexts by which particular theoretical expressions are introduced. Even so, we can push the argument a little farther through a few mild assumptions about semantical criterion relations. The class of "semantical" relationships can roughly be delimited as follows:

Definition: A relation R holding between a linguistic expression E and another entity e is *semantical* iff E 's standing in R to e depends only upon E 's meaning and logical structure,¹⁰ i.e., iff every other expression E' , whether in the same language as E or not, which has the same meaning and logical structure as E is also R -related to e .

However, this definition is woefully insufficient to itemize what, specifically, are the various instances which fall under it. While it is altogether possible that there exist basic semantical relations of which we are still ignorant, those meaning-mediated couplings of language to extralinguistic reality which are reasonably well recognized today are the following:

- (1) An expression E may designate (refer to, name, signify, symbolize, represent) an entity e . In particular, this possibility arises when E is a noun or noun phrase while e is a (possibly abstract) particular; when E is a predicate while e is a property, class, or re-

¹⁰ The conjunction "meaning and logical structure" is probably redundant, inasmuch as it can plausibly be argued that the logical structure of a complex expression is an aspect of its meaning.

lation;¹¹ or—though this is more controversial—when E is a sentence or gerundized sentential phrase (e.g., ‘John’s winning of the contest’) while e is a fact, event, or state of affairs.

- (2) When E is a predicate for which a name of e is a grammatically acceptable argument, E may denote (describe, apply to, be satisfied by) e .
- (3) When e is a property or class, E may refer to an entity which possesses or belongs to e . This is essentially the inverse of denotation.
- (4) When E is a sentence while e is a fact, event, or state of affairs, e may be a *truth condition* of E , i.e., be necessary for E to be true; e may *verify* E , i.e., be sufficient for its truth; or e may *refute* E , i.e., be sufficient for its falsity.

Pending new metalinguistic wisdom, let us assume that these are all the non-interlinguistic types of semantical relations there are, or, more precisely, that any semantical relation between a set E of linguistic expressions and an extralinguistic entity e is a logical construction out of relations of types (1)–(4). Now, an expression E designates an entity e iff e satisfies the predicate ‘ $_ = E$.’ (More exactly, ‘ $_ = E$ ’ is the predicate in L formed by concatenation of ‘ $=$ ’ and E , and similarly for subsequent equivocations in this paragraph between mention and use of E .) Likewise, when e is a property or class, E ’s referent possesses or belongs to e iff e satisfies the higher-level predicate ‘ $_ (E)$ ’ or ‘ E is a(n) $_$ ’ or ‘ $E \epsilon _$.’ Semantical relations of types (1) and (3) may thus for technical convenience be subsumed under denotation, and the question then arises whether any semantical relation between a linguistic expression E and an extralinguistic entity e which is not a state of affairs can be constructed out of basic relations of types (1)–(4) in a way not equivalent to some instance of type (2). (States of affairs are here excluded because it is not at all obvious how type (4) relations might be reduced to denotation.) While rigorous treatment of this question would be excessively tedious here, inspection of representative examples strongly urges that its answer

¹¹ While it is perhaps moot whether ‘designation’ is the best word for the aboutness relation which holds between a predicate ‘ P ’ and the property P which it ascribes to its arguments, recognition of this relation is indispensable to the semantical theory of any reasonably complex language, especially if the latter permits quantification over predicate terms, and I see no reason why it should not be classed under “designation” even if it is conceivably a different variety of reference from that holding between a proper name and a zero-level particular. The reader who wishes to protest that properties are the meanings of predicates rather than what predicates refer to by means of their meanings should first consider my argument to the contrary on pp. 27–30 of my “Intentionality and Existence.”

is negative. Clearly this is so for any construction based only on relations of types (1)–(3), such as

- (i) E either designates or denotes e ; i.e., $\text{Des}(E, e) \vee \text{Den}(E, e)$
- (ii) Predicate E designates the conjunction of e and another property; i.e., $(\exists \phi) \text{Des}(E, \phi \cdot e)$
- (iii) E denotes a property of e ; i.e., $(\exists \phi) [\text{Den}(E, \phi) \cdot \phi(e)]$
- (iv) Sentence E designates a state of affairs of which e is a component; i.e., $(\exists s, \phi) [\text{Des}(E, s) \cdot s = \phi(e)]$, or $(\exists \phi) \text{Des}(E, \phi(e))$

for in every such case there is a straightforward way to replace the semantical verb and reference to expression E by use of E in a corresponding syntactic context so as to yield a predicate E^* , containing only E and logical terms, such that an entity e satisfies (i.e., is denoted by) E^* iff e stands in the original semantic relationship to E . Thus (i)–(iv) are respectively equivalent to

- (i*) e either is or has E ; i.e., $(E = e) \vee E(e)$
- (ii*) E is the conjunction of e and another property; i.e., $(\exists \phi) (E = \phi \cdot e)$
- (iii*) e has a property which possesses E ; i.e., $(\exists \phi) [E(\phi) \cdot \phi(e)]$
- (iv*) E is a state of affairs of which e is a component; i.e., $(\exists \phi) [E = \phi(e)]$,

where symbol ‘ E ’ in (i*)–(iv*) indicates a usage-occurrence of the same linguistic expression designated by ‘ E ’ in (i)–(iv). Not so evident, unfortunately, is what can be said of constructions such as

- (v) e is a component of a state of affairs which verifies sentence E ; i.e., $(\exists s, \phi) [s = \phi(e) \cdot \text{Ver}(s, E)]$, or $(\exists \phi) \text{Ver}(\phi(e), E)$

which incorporate a relation of type (4) by quantifying over the fact variable. So far as I can tell, however, the type (4) ingredients in any such construction always occur trivially. Thus if sentence E has any verifier, s , at all, then for any entity e there exists a verifier of E in which e is a component, namely, the conjunctive state of affairs $s \cdot (e = e)$; hence e satisfies (v) iff it satisfies

- (v*) E is the case and $e = e$; i.e., $E \cdot (e = e)$,

wherein ‘ E ’ indicates an assertion-occurrence of the sentence designated by ‘ E ’ in (v). For now, therefore, it is reasonable to suppose that semantical relations between linguistic expressions and extralinguistic entities other than states of affairs which can be constructed from basic types (1)–(4) can be equivalently constructed from types (1)–(3) alone. If so, we may then provisionally state

Technical Idealization 3a [TI-3a]: If language L has normal syntactical resources, including the standard logical connectives and operators, then for any L -expression E and semantical relation R_e there exists a predicate E^* in L , containing at most terms in E and additional logical terms, such that for any extralinguistic entity e which is not a state of affairs, e stands in relation R_e to E iff E^* denotes, i.e., is satisfied by, e .

Now consider how an extralinguistic entity e might be semantically related to an ordered set, \mathbf{E} , of linguistic expressions. The only possibilities I can conceive of for this are logical constructions out of e 's semantical relations to particular expressions in \mathbf{E} , such as

- (vi) e stands in relation R_s to the first element of \mathbf{E} , and either stands in relation R_s' to the second element of \mathbf{E} or does not stand in relation R_s'' to the last.
- (vii) e stands in relation R_s to at least one of the elements in \mathbf{E} .

According to *TI-3a*, we may assume that \mathbf{E} is an ordered set of predicates and that whether or not an entity e stands in the given relation to \mathbf{E} is a logical construction out of whether or not e is denoted by the various predicates in \mathbf{E} —or more precisely, that if this is not true at first it can be made so by certain modifications of the expressions in \mathbf{E} without introducing any new extralogical terms. But so long as \mathbf{E} contains only a finite number of predicates, any logical construction out of an entity's satisfying or not satisfying the various predicates in \mathbf{E} is equivalent to its satisfying a single predicate correspondingly constructed out of the \mathbf{E} -predicates. Thus if \mathbf{E} is the ordered set P_1, P_2, P_3, P_4 while all the semantical relations in (vi) and (vii) are "is denoted by," (vi) and (vii) are respectively equivalent (with the same shift from mention to use as in previous examples) to

- (vi*) $P_1(e) \cdot [P_2(e) \vee \sim P_4(e)]$
- (vii*) $P_1(e) \vee P_2(e) \vee P_3(e) \vee P_4(e)$.

Once again, then, having no good reason to suspect otherwise, we may extend *TI-3a* to

Technical Idealization 3b [TI-3b]: If language L has normal syntactic resources, then for any finite ordered set \mathbf{E} of expressions in L and any semantical relation R_s , there exists a predicate E^* in L containing at most logical terms in addition to terms in \mathbf{E} , such that for any extralinguistic entity e which is not a state of affairs, e stands in relation R_s to \mathbf{E} iff E^* denotes e .

How likely it is that future semantical theory will discover need for significant emendations to *TI-3* I am unable to say. But no one can profitably

spurn its adoption as a working assumption until he can offer a convincing alternative at a comparable level of technical power. Meanwhile, *TI-3* provides a workable reduction for the open-ended intuitive notion of "semantic relation," has strong arguments in its support, and in no way depends for its plausibility on any special presuppositions about the nature of theoretical terms.

Given *TI-3*, *IC-1* leads directly to a profound technical conclusion regarding the semantical properties of theoretical expressions. Since the "usage" which imparts meaning to language L 's theoretical terms presumably comprises only a finite number of psycholinguistic events, each of which can involve only a finite number of words, the criterion set E_0 of observational expressions cited in *IC-1* must be finite. Consequently, assuming that any expression schema formed by replacing theoretical terms in an L -expression with logical variables also counts as an "expression" in L , we have from *IC-1* and *TI-3b* that

Idealized Conclusion 2 [IC-2]: For a language L with normal syntactical resources, if E_T is an L -expression containing terms which are theoretical with respect to L 's subvocabulary V_0 , then for any semantical relation R_s there exists an L -predicate E^*_0 , containing nonlogical terms only from V_0 , such that for any extralinguistic entity e which is not a state of affairs, E_T stands in relation R_s to e iff e satisfies E^*_0 .

In particular, it is a corollary of *IC-2* that for any theoretical term t , there exists an observational criterion predicate P_0 such that for any extralinguistic entity e other than a state of affairs, t designates e iff e is denoted by P_0 .

What is perhaps most basic of all a scientific theory's semantical challenges, namely, explicating the truth conditions of theoretical sentences,¹² is badly confounded by our present lack of any clear consensus over the extralinguistic sources of truth value and how the truth-determinative relationship is constituted out of a sentence's logical structure and the referential properties of its component terms. Without qualms or apologies, I shall here assume that what make sentences true or false are *facts*, *events* (a special kind of fact), or *states of affairs*, and that for metalinguistic purposes, states of affairs (facts, events) are represented (designated, signified, referred to) by linguistic expressions with the logical structure of a proposition. However, this still leaves obscure the semantical principles

¹² See pp. 302ff of my "The Factual Content of Theoretical Concepts."

by which states of affairs determine truth values. In particular, any reasoned thesis about the factual commitments of theoretical sentences must start with some assumptions about what it is for the state of affairs represented by a sentence S to be a *sufficient condition* for the truth of another sentence T . This notion of “sufficient condition” is considerably more problematic than most philosophers of language appear to realize. Certainly we mean by it much more than just the truth-functional implication $S \supset T$, since otherwise the fact signified by any true sentence would be a sufficient condition for the truth of any other which happens to be true. Yet the other alternative which comes most readily to mind, that S must formally or at least analytically entail T if the truth of S is to suffice for the truth of T , is far too strong, for S may be about a state of affairs which verifies T even when this cannot be deduced solely from the formal structure and/or meaning of S and T . For example, if a and b are different concepts with the same referent, so that $a = b$ is true factually though not analytically, then for any predicate P , sentence $P(a)$ represents the very same state of affairs as does $P(b)$ and the truth of $P(a)$ thus necessitates the truth of $P(b)$ even though the latter is not a logical consequence of the former. More generally, if sentences S and S' signify the same state of affairs in nonsynonymous terms—and the possibility that this can occur must be admitted by any semantical theory which does not confuse meaning with reference—the truth of S is a sufficient condition for the truth of any analytic consequence T of S' even though T does not follow analytically from S . Unflinching recognition of this point is essential to the semantics of theoretical expressions, for not until we are able to identify sufficient conditions for the truth of a sentence *without* resorting to other sentences which analytically entail it can we specify the truth conditions of theoretical sentences without falling back upon metalinguistic concepts which are essentially synonymous with the theoretical expressions whose referents are in doubt.

On a loose, intuitive level, the truth of sentence S is a “sufficient condition” for the truth of sentence T iff, given adequate information about the semantical relations among the terms in S and T , we can see that the truth of S necessitates that T be true as well. Technical explication of this notion, however, must reckon with heretofore unsuspected complications regarding the nature of reference and will not be attempted here inasmuch as present purposes require only the intuitively evident principle that if the truth of a sentence S entails that there exists some state of affairs which

is a sufficient condition for the truth of sentence T , then the truth of S is itself a sufficient condition for the truth of T . That is,

Technical Idealization 4a [TI-4a]: State of affairs s verifies sentence T , i.e., s is a sufficient condition for the truth of T , iff the truth of sentence ' s ' is a sufficient condition for the truth of T .

Technical Idealization 4b [TI-4b]: If state of affairs s is a sufficient condition for there to exist a state of affairs which verifies sentence T , then s also verifies T .

Suppose, now, that S_T is a language- L sentence containing one or more terms which are theoretical with respect to L 's observational vocabulary V_O , while s is some state of affairs which verifies S_T . In a sufficiently adequate metalanguage, s can be signified by a sentence formalized as ' $F(e_1, \dots, e_n)$ ' in which ' F ' abbreviates a sentence schema containing only logical terms while each ' e_i ' is a nonpropositional descriptive term or phrase which designates a component e_i of s which is not itself a state of affairs.¹³ Assuming that these expressions are actually at our metalinguistic command, our premise is then that state of affairs $F(e_1, \dots, e_n)$ verifies theoretical L -sentence S_T . Now consider any other state of affairs $F(e'_1, \dots, e'_n)$ with the same logical structure F as $F(e_1, \dots, e_n)$. Is or is not $F(e'_1, \dots, e'_n)$ also a verifier of S_T ? If it is not, then by *IC-1* there must be some semantical relation in which $F(e_1, \dots, e_n)$ but not $F(e'_1, \dots, e'_n)$ stands to the criterion set E_O of observational expressions; whence, inasmuch as these two states of affairs differ only in that $e'_i \neq e_i$ for at least one value of index i , there must be some semantic relation R_s to E_O which is satisfied by component n -tuple (e_1, \dots, e_n) but not by e'_1, \dots, e'_n . According to *IC-2*, this relation R_s is equivalent to denotation by some predicate which is either in E_O to begin with or can be defined as a logical construction out of terms in E_O . Thus one state of affairs with logical structure F can be a verifier of theoretical sentence S_T , while others with this same structure are not, only if there exists some observational predicate P in L such that for any n -tuple (e_1, \dots, e_n) , state of affairs $F(e_1, \dots, e_n)$ verifies S_T iff (e_1, \dots, e_n) satisfies P . But then the existence of an n -tuple which satisfies both P and ' F ' suffices for the existence of a state of affairs which verifies S_T and is hence, by *TI-4b*, itself a verifier of S_T . So long as L includes the needed logical grammar, more-

¹³ While it is unnecessary to assume that entities e_1, \dots, e_n are “logical atoms” in the Russell-Wittgensteinian sense, I do here stipulate that if sentence ' $F(e_1, \dots, e_n)$ ' is molecular, ' F ' pulls out enough of the sentence's logical structure to ensure that none of the e_i are themselves states of affairs.

over, this existential state of affairs can be signified by an L -sentence containing only logical terms in addition to the V_0 -constructable predicate P , namely, the language- L equivalent of $(\exists x_1, \dots, x_n)[p(x_1, \dots, x_n) \cdot F(x_1, \dots, x_n)]$, where 'p' is the metalinguistic translation of P . Hence,

Idealized Conclusion 3 [IC-3]: For a language L with normal syntactical resources, if S_T is an L -sentence containing terms which are theoretical with respect to L 's subvocabulary V_0 , there exists in L a sentence S_0 , containing extralogical terms only from V_0 , such that the truth of S_0 is a sufficient condition for the truth of S_T .

It requires only the most modest extension of this argument to conclude that the truth conditions of a theoretical sentence S_T can be expressed wholly in terms of the observational vocabulary relative to which S_T is theoretical. Contrary to first impression, this is not a return to positivism, for we need not—must not—unthinkingly presume that two propositions which have the same truth conditions necessarily signify (refer to, represent, are about) the same state of affairs. What is signified by a sentence $Q(t)$ in which Q is an observational predicate and t a theoretical term is surely some state of affairs $q(e)$ whose components q and e are designated by Q and t , respectively. But by *TI-2*, $Q(t)$ can discriminate $q(e)$ from another state of affairs $q(e')$ only if e but not e' possesses those observational properties which the usage of t requires of an entity designated by it (cf. *IC-2*). If e and e' are alike in all relevant observational respects, then $Q(t)$ must stand in the very same semantical relation to $q(e)$ as it does to $q(e')$. That is,

Idealized Conclusion 4 [IC-4]: For a language L with normal syntactical resources, if $Q(t_1, \dots, t_n)$ is an L -sentence in which t_1, \dots, t_n are terms which are theoretical with respect to L 's observational vocabulary V_0 , while Q is a predicate containing only terms in V_0 , then there exists a V_0 -constructable predicate P such that $Q(t_1, \dots, t_n)$ signifies (represents, refers to, is about) a state of affairs $q(e_1, \dots, e_n)$ iff Q designates q while n -tuple (e_1, \dots, e_n) satisfies observational predicate P .

It can then be argued that a necessary and sufficient condition for the truth of $Q(t_1, \dots, t_n)$ is expressed by observation sentence $(\exists x_1, \dots, x_n)[P(x_1, \dots, x_n) \cdot Q(x_1, \dots, x_n)]$. However, the existence of joint satisfiers of P and Q is not what theoretical sentence $Q(t_1, \dots, t_n)$ is about; rather, the latter signifies certain states of affairs wherein the property designated by Q holds for an n -tuple of entities (e_1, \dots, e_n) respectively designated by theoretical terms t_1, \dots, t_n . And since these e_i are

not, in general, designatable by observational expressions in L , neither can the states of affairs signified by $Q(t_1, \dots, t_n)$ generally be signified by observation sentences. Although the present argument for *Idealized Conclusions 1-4* is admittedly informal, its basic structure should be sufficiently visible to make clear that a more rigorously deductive version requires only some support from technical postulates such as *TI-3, 4* on semantical and ontological matters essentially independent of the distinctive problems of theory meaning. Once *TI-2* is accepted, these conclusions or something very like them are extraordinarily robust under alternative choices for the supplementary assumptions.

It will be observed that *IC-2* and *IC-4* do not inherently prevent a given theoretical expression from standing in the designation relationship to more than one extralinguistic entity. That is, *theoretical expressions do not, in general, have unique referents*. It is, to be sure, always possible that only one object happens to satisfy the criterion for being referred to by a given theoretical expression E_T , but this is in no way intrinsic in the meaning E_T acquires from its usage.¹⁴ THE IMPORTANCE OF THIS CONCLUSION CANNOT BE OVERESTIMATED. Note that the basic argument for nonuniqueness of theoretical reference resides directly in *TI-2* rather than in the supplementary assumptions invoked to reach *IC-2* and *IC-4*. For irrespective of what particular semantical ties to the observation language determine the semantical relata of theoretical expressions, the only such relation which past semantical theory has believed to be inherently many-one is designation. But if the referents of theoretical terms were always designated by the latter's observational criterion expressions, theoretical concept formation could not enlarge a language's referential scope. We must now face up to the realization that unless positivism is correct after all, designation too is in principle a many-many relationship, at least for theoretical expressions. And if it is true that most de facto concepts are theoretical to some degree, we must accordingly expect that multiple designation is not the exception but the rule.

That a descriptive term on any type level may simultaneously refer to more than one entity of that same type, so that, for example, a given predicate may designate a variety of properties over and above its denoting of the various particulars which exemplify these properties, is a breathtakingly new prospect which, to my knowledge, the philosophy of language has

¹⁴That is, unless E_T 's usage gives it the properties of a definite description whose meaning forbids it to designate at all if it fails to designate uniquely.

never before considered. The only suggestion of a traditional counterpart lies in the doctrine of "common names," which construes certain predicate-forming nouns (namely, those which can replace 'x' in 'is a(n) x,' such as 'dog,' 'man,' 'hammer') as names shared by a plurality of particulars. But while it could conceivably turn out that "common names" are indeed genuine exemplars of multiple designation, the ease with which their usage can be assimilated to ordinary predication—for common names never occur as grammatical subjects,¹⁵ and 'is a(n) x' seems entirely equivalent to 'belongs to x-kind' wherein 'x-kind' names a class of objects—makes it more reasonable to regard the prima facie multiple reference of common names as no more than a variant of the multiple *denotation* of things by the predicates they satisfy.¹⁶ What must now be done is to re-think the entirety of technical semantics, not just the semantics of theoretical terms, to devise an account of language in which for no term or phrase, regardless of logical type, is it legitimate to speak metalinguistically of the entity to which it refers. The amount of classical semantics which will remain entirely untouched by this reworking of foundations is probably smaller than first impression would expect, for not until one seriously begins to probe the ramifications of multiple designation does the havoc this wreaks upon orthodox truth theory and traditional logic become apparent. But distasteful or frightening as this prospect may be, the sanctity of classical semantics cannot be preserved merely by ignoring the case for multiple designation or dismissing the notion as one man's personal perversity, any more than it would have salvaged classical mathematics to treat the logical paradoxes as amusing but idle curiosities.

History shows that most intellectual disciplines undergo periodic crises in the coherence or applicability of their tenets, often resolved only at the price of revolutionary alterations in their foundations. The philosophy of

¹⁵ Except for rare cases in which the common name strongly appears to designate a class, as in 'Man is a rational animal,' which presumably intends to make a statement about mankind. That this is an anomalous usage may be appreciated by considering the oddity of, for example, 'Dog is a four-legged mammal' and 'Hammer is a tool for pounding.'

¹⁶ Recent technical developments of the common-name concept (V. Sinisi, "'e' and Common Names," *Philosophy of Science*, 32 (1965), 281–286) are easily translated into more conventional semantics whereby the "common names" are seen to be the isomorphic counterpart of orthodox predicates while the common-naming relationship stands revealed as a form of denotation. The logic of genuine multiple designation—in which, for example, a sentence $P(a)$ is, presumably, true if there exists a property designated by P which is possessed by some designatum of a , so that $P(a)$ and $Q(a)$ can each be true separately even while their conjunction is false—is altogether different from the logic of common names (cf. a review of the latter in Sinisi).

language has now entered upon such a phase, and the sole intent of this paper is to make evident the reality of this crisis, for which cause all pretense at technical precision and deductive rigor has been forsaken. It is no desire of mine that we should be obliged to create a new semantics and a reworked logic from which all presumptions of unique reference have been expunged, but neither can I justify a docile retreat to our only other viable alternative, namely, concession that cognitive access to the external world is positivistically bounded by the referential capacity of observational concepts. I shall gratefully accept chastisement by any critic who can point out where my reasoning on this matter has gone astray and whose proffers a convincing argument that the process by which theoretical terms acquire meaning does indeed single out unique referents for them. But until such reassurances have actually been accomplished, refusal to take the non-uniqueness of theoretical reference seriously is the most disastrous sort of if-I-don't-look-it-can't-hurt-me foolishness.