

E. The concept of analyticity in philosophy. I believe that the distinction between analytic and synthetic statements, expressed in whatever terms, is practically indispensable for methodological and philosophical discussions. This is also indicated by the fact that this distinction is made by a large majority of philosophers, including some of those who do not explicitly acknowledge the distinction in these terms or even reject it. As an example, let me refer to a philosopher whose work I esteem very highly, although I cannot agree in all points with his views. This philosopher once undertook to destroy a certain doctrine, propounded by some other philosophers. He did not mean to assert that the doctrine was false; presumably he regarded it as true. But his criticism concerned its particular kind of truth, namely that the truth of the doctrine was of the analytic kind. To be sure, he did not use the word "analytic", which he did not seem to like very much. Instead, he used other expressions which, nonetheless, clearly seem to have essentially the same meaning as "analytic". What he showed was that various attempts to assign an experimental, empirical meaning to this doctrine remained without success. Finally he came to the conclusion that the doctrine, even though not false, is "empty" and "without experimental significance".

16. Herbert G. Bohnert on Definitions and Analyticity

I am in agreement with most points in Bohnert's discussions, in particular, with his arguments against Quine's objections to the concept of analyticity; and I find many of his explanations illuminating. Therefore I shall restrict myself to only a few comments.

I agree with Bohnert's remark (in § II) that today an approach to semiotics by way of a behavioristic sociology, analogous to the approach of the earlier psychologism, poses a threat to the drawing of precise distinctions in logic. Bohnert believes that Quine's requirement of an empirical criterion for synonymy is an example of this kind of sociology. This would be the case if, as Bohnert believes, Quine actually had the intention of founding logic upon empirical concepts. Quine's formulations on this point admit of a variety of interpretations, including, perhaps, Bohnert's as well. In my reply (§ 15) I have given Quine the benefit of the doubt and have suggested a hypothesis about the motivation of Quine's requirement in such a way that I would be able to agree with it. It remains for Quine to make clear which of the interpretations he has in mind.

Bohnert's discussion of what he calls "recipe terms" is clarifying and useful. He is certainly right that in general syntax, and even more in general semantics, some concepts cannot be adequately introduced by exact general definitions for all languages, but only by different recipe definitions for different classes of languages. However, it is possible to

give general exact definitions both for A-truth (analyticity) and for truth (see § 10 I, D and G) provided that other suitable concepts occurring in these general definitions are introduced by recipe definitions.

Bohnert points out correctly (in § III) that the term "definition" must be introduced as a recipe term, newly defined for each language or class of languages by an enumeration of forms. The situation is similar for the term "meaning postulate". Nevertheless, it is possible, as Bohnert indicates, to give general directives, though not in the form of exact rules, for the formulation of a recipe definition of the term "definition", and for setting up a list of meaning postulates.

17. Wilfrid Sellars on Abstract Entities in Semantics

A. The prescriptive component in syntax and semantics. I am not certain whether I have correctly understood how Sellars distinguishes between descriptive and prescriptive components in statements and concepts, as well as between a priori and empirical statements, and how he intends to apply these distinctions in syntax and semantics. Therefore I shall comment only briefly on these points. Above all, I wish to emphasize that not only pure syntax and pure semantics but also descriptive syntax and descriptive semantics, as I understand them and intend to construct them, do not contain any kind of prescriptive components. It is certainly true that, when a mother teaches her child to speak, or when a reviewer criticizes the style of a book, norms of the use of language are applied either explicitly or implicitly, and therefore the metastatements occurring in these contexts often contain prescriptive components. But in syntax and semantics I deliberately leave aside all prescriptive factors. *Descriptive* syntax and semantics deal with certain features of languages investigated empirically. Even here, the statements about these features are descriptive; what Sellars calls "rule-bound words" do not occur.

Sellars' belief that my descriptive syntax and descriptive semantics contained prescriptive conceptual components is perhaps due to the fact that I used the word "rule" both in syntax and in semantics. Perhaps he understood this term in its everyday sense, i.e., as referring to prescriptive rules, prescriptions, prohibitions, or permissions. However, I use the word "rule" in this field only in order to conform to the customary usage in logic. The so-called rules are meant only as partial conditions of a definition; e.g., as I have often said, the rules of formation for a language *L* together form the definition of "sentence in *L*", and all the rules for *L* together form the definition of "*L*". It seems to me that in the development of modern logic it has become ever more evident that logic, and likewise syntactical and semantical analyses of language, are purely theoretical; the use of terms like "rules", "permitted operations", and

"prohibited operations" is here, just as in algebra, merely a psychologically useful way of speaking which should not be understood literally. [When I say that the so-called rules are only definitions, then this could still be misunderstood since some philosophers interpret definitions in a prescriptive sense; Bohnert has clearly criticized this interpretation (in § II of his essay).]

B. Sellars' psychological nominalism. Sellars critically examines the conception that statements like "John perceives this table" and "John is aware of (thinks of, apprehends) the number 13" describe two different but nevertheless similar cases of the *same relation* of awareness between a person (or a mind) and a concrete or abstract object. I agree with Sellars in rejecting this Platonistic conception, as it is represented, e.g., in Sellars' quotation from Alonzo Church. Sellars uses the label "psychological nominalism" for his own position. I have some doubts about the suitability of this term because it might be misunderstood as a rejection of the use of abstract entities, e.g., numbers, in psychology. If I have understood Sellars correctly, this is not what he means. At any rate, I would not agree with such a rejection because it would exclude the application of quantitative magnitudes in psychology.

I would not reject, as Sellars seems to do, all factual or descriptive relations between material objects and abstract entities, at least not if "relation" is understood in the wide sense which is customary in modern logic. In the latter sense, any sentence of arbitrary form containing the names of two entities *a* and *b* (of arbitrary, possibly different, logical types or semantical categories) may be said to state that a certain relation holds between *a* and *b*. [For example, the sentence "John has a car with four doors" says that a certain relation holds between John and the number four, namely the relation $(\lambda x, n)(x \text{ has a car with } n \text{ doors})$.] Relations between material objects and numbers occur in science whenever measurable magnitudes are applied. If we define:

(1) $M(x, u) =_{Df}$ the material body *x* has the mass (in grams) *u*,
then the physical concept *M* is a relation between bodies and numbers. This relation is descriptive or factual in the sense that the predicate "*M*" is a descriptive (i.e., non-logical) constant, and a full sentence, e.g., "*M(a, 5)*" is a factual sentence.

I am not certain whether what I have just said contradicts Sellars' view because it is not quite clear to me what he means by a "factual relation". It may be that he understands this term in a very special sense, perhaps in the sense of "causal relation" or in the somewhat wider sense of "relation based on causal connections". It is true that the word "relation" is usually understood in this sense in everyday language, but it seems to me that this does not hold for the technical language of philosophy. Relations of the causal type can indeed hold only among physical

objects (or states or processes), not between a physical object and an abstract entity. It seems typical of Platonism, which both Sellars and I reject, that it speaks of relations of this causal type (called "commerce" or "intercourse" or the like) as holding between physical objects (or persons or minds) and abstract entities. My reason for regarding the two sentences "John observes the table" and "John observes (is aware of) the number 13" as not being analogous is just this: the first sentence states a causal relation between the table and John (mediated by light rays, the retina, etc., as Church indicates) but the second does not. Only spatio-temporal objects, not numbers, can have a causal effect on John. On the other hand, it seems to me that some psychological concepts may be regarded or reconstructed as relations (in the wide sense of the logical terminology, not in the causal sense) between a person and an abstract entity; e.g., believing may be taken as a relation between a person and a proposition (as is done by Church, comp. §9 VII), and thinking-of as a relation between a person and a concept (intension or sense) and the like. In particular, there seems to be no objection to the use of relations of this kind in a theoretical language (comp. my remarks on semantical concepts in a theoretical language in §10 V).

C. Designation. Let us consider the following sentence in the descriptive semantics of the German language (Sellars' (26)):

(2) (In German) the word "*blau*" designates Blue.

This sentence says that a certain factual (but not causal) relation holds between the word design "*blau*" in German and the property Blue. In pragmatics, the relation of designation is a psychological concept, analogous to the psychological concepts of believing and thinking-of mentioned earlier, and presumably definable on the basis of these and similar psychological concepts. The sentence (2) of descriptive semantics is based on the following sentence of pragmatics:

(3) In the German language community, the German word "*blau*" is mostly used as designating Blue.

The relation of designation in the case just mentioned, either in descriptive semantics or in pragmatics, is not of a Platonistic nature, since it is not meant here as a causal relation. To me the concept seems entirely unobjectionable.

D. Pure and descriptive semantics. Suppose we construct in pure semantics a language system *G* which in a certain way corresponds to a selected part of the German language. First, the relation "directly-designates-in-*G*" or "*DDes_G*" (comp. §10 I C) is defined by an enumeration of pairs, each pair consisting of a predicate in *G* and a property. Motivated by the empirically found result (2), we may, for instance, include the following pair:

(4) "blau", Blue.

On the basis of direct designation, the term "designates-in- G " or " Des_G " can be defined (cf. § 10 I C). By virtue of these definitions, the following holds as an analytic theorem in the pure semantics of language G :

(5) The word "blau" designates-in- G Blue.

Sellars is right that there is a radical difference between the meaning of the term "designates-in- G " in pure semantics and that of the term "designates" in pragmatics and descriptive semantics; this is evident from the nature of their definitions. The two terms have at best the same extension, provided the rules for G are chosen in a suitable way; this fact can be expressed by an if-and-only-if-sentence (Sellars' (28) and (39)). It should be noted, however, that this situation does not indicate a defect of the concept of designation in pure semantics. As Sellars aptly expresses it, pure semantics is nothing but a combinatorics of sign designs and extra-linguistical entities. It is therefore possible to define in this field a relation of designation just like the pragmatical, psychological concept of designation; only a corresponding concept can be defined.

The nature of this correspondence may be illustrated by the following example. Let us assume that, on the basis of the definition of "designates-in- G " which is given by the rules for the language G , the following is an analytic sentence of the pure semantics of G :

(6) "Der Mond ist blau" designates-in- G the proposition that the moon is blue.

Let us further assume that the predicate "true-in- G " is defined in a suitable way (comp. §10 I D). Then the following is likewise an analytic theorem:

(7) The sentence "der Mond ist blau" is true-in- G if and only if the moon is blue.

The correspondence between the pure semantics of the language system G and the descriptive semantics of any language L can now be characterized as follows (where L is a language in the ordinary sense, and the relation of designation or meaning is likewise understood in the ordinary sense):

(8) If in any language L the relation of designation holds in those pairs which are enumerated in the definition of "directly-designates-in- G ", and if in L the relation of designation satisfies the general conditions stated in the rules for "designates-in- G ", then the relation of designation in L holds in all cases in which "designates-in- G " holds, and a truth-condition for any sentence in G is a truth-condition for the same sentence in L .

Therefore, in particular, the following holds by virtue of (6) and (7) respectively:

(9) If L satisfies the conditions stated in (8), then

- (a) the sentence "Der Mond ist blau" in L designates (means, expresses) the proposition that the moon is blue;
- (b) the sentence "Der Mond ist blau" in L is true (in the ordinary sense) if and only if the moon is blue.

In this way, pure semantics represents the logical connections among various facts involving the relation of designation in any language, and the connections between these facts, on the one hand, and truth-conditions for the sentences of the same language on the other. But in pure semantics we cannot give an analysis of the concept of designation in its ordinary sense because for this purpose psychological concepts are required. The situation is analogous to the relation between pure geometry and physical geometry (where pure geometry is understood as represented, not by an uninterpreted axiom system, but rather by a purely logical theory concerning a certain structure). In pure geometry, we cannot analyze the physico-spatial concepts, because concepts of physics or of the observation language would be needed for this purpose; but pure geometry can mirror the logical connections holding between physico-geometrical concepts or propositions.

18. E. W. Beth on Constructed Language Systems

Beth emphasizes correctly that, from the beginning, an important aim in my thinking about the foundations of mathematics was the reconciliation of certain philosophical controversies, namely, the controversy between logicism and Cantorism and, still more important, the controversy between logicism and formalism. My view on the latter controversy has had little influence, perhaps because my two main papers on this problem ([1930-5] and [1931-4]) were in German and have so far not been translated into English, while my later comments on the problem of the foundations of mathematics are only brief indications ([1934-6] §84; [1939-1] §20). It seems to me that even today the logicist conception is far too little known.²⁴ I welcome Beth's emphasis on the

²⁴Even the book by Raymond L. Wilder, *Introduction to the Foundations of Mathematics* (1952), which I regard as the best book on the problems of the foundations of mathematics available at the present time, gives only an inadequate exposition of the basic ideas of logicism. Frege's main work (*Die Grundgesetze der Arithmetik*, 2 vols. (1893 and 1903)), is not mentioned at all. And the first, most important step in Frege's reduction of mathematics to logic, viz., the definition of the natural numbers 0, 1, 2, etc. in terms of logic, is not represented. Frege's definition of the general concept of the cardinal number of a class is given (p. 99), but the fact, essential for the point of view of logicism, that this definition uses only concepts of logic, is not mentioned. (Added note, 1962): In the mean time two books have appeared, which give excellent, thorough discussions of the problems of the foundations of mathematics: A. A. Fraenkel and Y. Bar-Hillel, *Foundations of Set Theory* (Amsterdam, 1958); E. W. Beth, *The Foundations of Mathematics* (Amsterdam, 1959).