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REMARKS CONCERNING THE EPISTEMOLOGY OF SCIENTIFIC EMPIRICISM

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The present paper purports partly to reexamine and partly to summarize several points which occupied and still occupy a central position in more recent discussions among empiricist philosophers. As such discussions are essentially attempts at the clarification of terms, it might also be said that this essay intends to contribute to the analysis of certain very general and highly ambiguous expressions. The words in question are, first and mainly, 'hypothetical' and, more incidentally or by the way of exposition, 'atomic', 'elementaristic', and 'extensional'. In general, it is an attempt to show the impact of some of the ideas developed in the work of Carnap; within a prevailingly logical frame of reference in *The Logical Syntax of Language* and, in a more epistemological setting, in *Testability and Meaning*.[1] In particular, it wants to eliminate some ambiguities which could arise from an oversimplified reading of certain passages in TM, as for instance: "If by verification is meant definitive and final establishment of truth, then no (synthetic) sentence is ever verifiable" (p. 420). If this passage is understood to assert that every synthetic sentence is hypothetical, then it is either false or several meanings of 'hypothetical' are to be distinguished. This distinction, implicit in TM, will upon closer examination prove to be related to the fundamental distinction between statements *within* and statements *about* a linguistic structure.

I

The word 'atomic' occurs in three main meanings or connotations. Their careful distinction and, consequently, the study of their fusions and confusions furnishes a convenient tool for the understanding of certain phases in the history of philosophical ideas. We shall discuss, first the linguistic, second the scientific, third a supposed metaphysical or ontological meaning of the term.

A. Linguistic Atomicity. Syntactically considered, the atoms, elements or building stones of a language are the members of certain classes of symbols; the constants of the various levels and types including those of the lowest level, i.e., the proper names or particulars, in one meaning of that ambiguous term, on the one hand, and the purely calculational symbols such as variables, connectives, parentheses, on the other. Among the constants, a purely syntactical distinction of greatest epistemological importance is that between logical and descriptive expressions.

Example. Assume a language in which 'green' ('gr') and 'square' ('sq') are unde-

[1] *The Logical Syntax of Language.* Harcourt, Brace and Co., 1937; *Testability and Meaning*, Phil. Sci., 3, 1936; 4, 1937, quoted as LSL and TM respectively. Some familiarity with Carnap's work will be presupposed throughout this paper. Use will also be made of the frame of reference developed in the writer's article *An Empiricist Schema of the Psychophysical Problem*, Phil. Sci., 9, 1942, quoted ES.

fined descriptive predicates of the first level, and 'color' ('Col') an undefined descriptive predicate of the second level. The corresponding variables are '$^{(0)}$f' and '$^{((0))}$f' respectively. Assume furthermore the definition: 'grsq(x) = gr(x).sq(x)'. All four predicates are constants; 'grsq' is an instance of a defined descriptive expression. In Carnap's syntactical notation 'gr', 'sq', 'grsq' are $^{1}\mathfrak{pr}_{d}$, 'Col' is a $^{2}\mathfrak{pr}_{d}$.

Expressions which after the elimination of all defined symbols contain only calculational signs are called logical. All other expressions are called descriptive. For instance, '(x) (gr(x) $\supset$ gr(x))' is a descriptive analytical sentence.

It is at least approximately true that any interpretation of a language is determined by the interpretation of its undefined descriptive symbols. This shows the fundamental importance of the distinction between 'logical' and 'descriptive'.

An expression is a string of symbols. The formation rules of the language determine which expressions are sentences. Russell's unramified type rule, for instance, is a formation rule imposed in order to warrant consistency. The transformation rules determine, not necessarily in a decidable manner, the statements which are analytic or contradictory. Thus so-called P-truths, that is laws of nature and individual nonanalytical statements, are excluded from the transformation rules. Since the transformation rules also determine which statements are consequences of any given class of statements, the expression 'consequence' will here always stand for 'logical consequence'. This usage, though not the only legitimate one, is the one most convenient for the argument at hand. Factual or synthetic sentences are sentences which are neither analytic nor contradictory. Only descriptive statements can be factual.

Even these few sketchy remarks are a sufficient preparation to explain the linguistic meaning of the term 'atomic'. Linguistic atomicity is merely a denotational label for various possible criteria of compositional simplicity of statements. To give to such criteria any definite meaning—a meaning, however, which is always relative to the language under consideration—all defined symbols must first be eliminated from the statements to be classified as atomic or nonatomic respectively. This elimination is always possible, therefore the assumption that it has been performed does not imply any restriction in generality (LSL §29). It must be noted, however, that 'definition' is here used in its strictly logical sense, thus excluding the reduction pairs of TM. But since the predicates which are introduced in this latter manner are devices of linguistic convenience rather than indispensable features of a formalized language, this again implies no restriction of generality.

Some possible criteria of linguistic atomicity are: (1) the nonoccurrence or the occurrence of not more than a given number of connectives and(or) unrestricted operators; (2) the non-occurrence of descriptive predicates beyond the first type; (3) the nonoccurrence of descriptive relations, i.e., of descriptive predicates with compound arguments; or finally any combination of these and(or) similar syntactical properties.

Example. Add to the previous illustration the undefined $^{(0,0,0)}\mathfrak{f}_{d}$; 'betw' ('between'). Consider the three statements 'gr(a)', 'betw(a, b, c)', 'Col(gr)'. All three are atomic according to criterion (1), only the first two according to criterion (2), and only the first one according to the combined criteria (2), (3).

Because of the aim in view it does not matter how the classification affects analytic sentences. It would not be necessary at all to classify them, or, for that matter, sentences which contain analytical partial sentences. 'S ⊃ gr(a)', where 'S' is a compositionally very complex analytical sentence, might as well be counted as atomic. To arrange that one could, for instance, first define factual atomic sentences as above and then extend the definition to cover all sentences which are logically equivalent to atomic sentences as first defined.

Most interesting because of its relationship to the analysis of verification in a nonfinite world is the criterion based on the *nonoccurrence of unrestricted operators*. It has been studied in TM and will be adopted here as the definition of linguistic atomicity. Factual atomic sentences we call *basic sentences*. This basicality is a purely syntactical concept of paramount epistemological importance. Sentences as 'Col(gr)', not considered in TM, classify as basic. At this point the reader is likely to experience certain difficulties, particularly if he anticipates that the hypothetical character of atomic sentences, at least in a certain sense of the word 'hypothetical', will be denied presently. As the discussion progresses, this bewilderment should fade.[2]

B. Scientific Atomicity. The constants which, substituted for the term variables, fulfill the primitive sentences (postulates, implicit definitions) of a scientific calculus are thought of as the elements, building stones or atoms of this calculus. If the calculus is interpreted by constructs of the empirical language and thus becomes a scientific theory, the referents of these constants may be referred to as elements or atoms. In the case of a nonphenomenological theory, the referents of these atoms are not empirical constructs but theoretical entities. This is indeed the definition of a nonphenomenological theory, as this term has been used in the methodological discussions at the beginning of the century. One can axiomatize mechanics in a fashion which makes the atoms of the classical kinetic theory atoms in this sense. Obviously such atomicity has nothing to do with linguistic atomicity and is, moreover, contingent upon the momentary state of science and thus subject to change with the development of our factual knowledge. Physical or scientific atomicity is therefore a concept of the methodology of science, not of the analysis of the empirical language. To put the same thing differently: Even if there were such a thing as ontological atomicity, scientific atomicity would not necessarily have any claim to that

[2] Certain terminological clarifications seem indispensable at this point. The predicate 'atomic', as here defined, does not quite coincide with the usage of this term in TM. Furthermore, what is here called 'basic' and 'basicality' has been referred to as 'primitive' and 'primitivity' in ES. This latter change makes for better agreement with the usage of other writers, and eliminates the ambiguity introduced by the connotation of the original term in the phrase 'primitive sentence'. The next paragraph of this essay itself contains an instance of the other meaning of 'primitive'.

Terminological conventions, arbitrary as they are in themselves, reflect, at least, the author's bias as to the relative importance of various distinctions. This observation applies particularly to this writer's preference for the restriction of the term 'consequence' to 'logical consequence', which deviates from Carnap's usage and, finally, to the circumstance that he follows Reichenbach in using 'sentence', 'proposition' and 'statement' as synonyms throughout this paper.

status. It is true, though, that a realistic metaphysics of the materialistic type is easily tempted to hypostasize scientific into ontological atomicity.

Introspectionistic analysis also claims to arrive at some kind of perceptual elements. This assertion, if any precise meaning is given to it and if it then turns out to be true, states a strictly scientific fact. The epistemological irrelevance of any such fact has been argued in ES.

C. Ontological Atomicity. The impossibility of any ontological assertion being one of the main tenets of contemporary empiricism, naturally no attempt will be made to attribute any precise meaning to the phrase 'ontological atomicity'. But it is fair to say that the idea of some kind of elements or building stones is a main feature in many of the traditional systems. Realistic atomism has already been mentioned, but the particulars of any sensationalistic philosophy, Hume's simple impressions and ideas as well as Mach's elements fall likewise under this characterization. The following remarks apply the distinction between the connotations of the term in question to several historical situations. They also have some bearing on the main argument.

1. Certain recurring difficulties in Russell's thought become easily understandable after one has recognized them as consequences of a fusion between linguistic atomicity and ontological atomicity in the sensationalistic vein. The quest for the "true" individuals, the question as to the "correct" way of projecting the hierarchy of types into the empirical language, certain roots of the pseudoproblem of the existence of classes, all come under this heading. In this context attention should also be called to the fact that it is only by the way of illustration that types have been assigned to the predicates in our example. Concerning the sense in which the choice of the meaning basis is arbitrary, see also TM and ES.

2. Wittgenstein's doctrine of atomic sentences and states of affairs is an impressive example of the fusion between linguistic atomicity and ontological atomicity in the realistic vein. Behind the terse passages of the Tractatus, one can still hear the subdued whirl of the Democritean atoms. Ramsey's pseudo-argument for the necessary extensionality of our language is not only informal insofar as it speaks about infinite sentences, but it also rests upon the same metaphysical grounds. In particular, it has been pointed out repeatedly that Wittgenstein's so-called logical definition of the probability quotient is not even understandable if deprived of its realistic-atomistic foundation. Without it, the quotient thus defined has no objective meaning whatsoever, that is, no meaning independent of the language chosen. But even if one were to grant such an objectivity, it would not imply that the quotient has the same value as the statistical frequency connected with the probability in question. That this second gap has apparently not even been seen by the proponents of what claims to be an analysis of probability, clearly reveals the rationalistic strands in their thought.

3. Certain critics of traditional sensationalism as well as of the epistemology of contemporary empiricism object to what they consider the atomism or elementarism of these viewpoints. To some of these criticisms a precise meaning

can be given on the basis of our distinctions. Elementarism[3] may be defined as the thesis that there is a complete sense data analysis of the empirical language which contains only a highly restricted class of undefined descriptive predicates, for instance only predicates and relations of the first level or even no relations at all. Put into the customary terminology, the latter condition about amounts to a restriction of the meaning basis to so-called sense qualities. There is little doubt that Humism and Machism are open to such interpretations; the impact of modern logic was needed to overcome this rather serious limitation. Scientific Empiricism, however, holds no elementaristic thesis. In the present stage of its development it asserts no restriction whatsoever as to the manifold of undefined descriptive predicates necessary for an analysis of the empirical language. This recognition, implicit in LSL, seems to me one of the more significant changes in Carnap's thought since *Der Logische Aufbau der Welt*, which contains what has just been called an elementaristic thesis.

But let it be clearly understood that I do not consider the opposite thesis as established, this in spite of the examples chosen in this essay. As far as I know, this most intriguing question is still an open issue and clarification will have to come from logical model reconstructions rather than from further epistemological analysis. The point to be made here is merely that the present framework of Scientific Empiricism is broad enough to encompass whatever the result of such investigations will turn out to be. It seems noteworthy that this situation opens a rather wide area of possible agreement with the students of Husserl. On the other hand, the discussion of the necessary constituents of the meaning basis should not lead to the re-intrusion of purely psychological thought into epistemological analysis. This latter tendency is clearly noticeable in Bertrand Russell's last book, *An Inquiry into Meaning and Truth.*

II

Many questions in the theory of knowledge revolve around the status and the properties of the basic sentences; hardly any can be answered without at least some reference to them. It is safe to say that after the rôle and nature of linguistic analysis has been recognized, the study of the basic sentences is the next important task of an empiricist epistemology. The following three instances illustrate this point. First, as has already been mentioned, the interpretation of any language is determined by the interpretation of certain basic sentences, namely the full sentences of all undefined descriptive predicates. Second, the analysis of all factual statements in terms of the basis constitutes the bulk of the study of testability and factual cognitive meaning. Third, the question how the basis is *given* or known to us has proven to be one

[3] There are, to be sure, several other possible interpretations of the terms 'atomistic' and 'elementaristic' as they loosely and ambiguously occur in emergentist, holistic, and Gestaltist writings. But these have no bearing on the argument at hand and are, moreover, either patently speculative or revolve around rather obvious confusions and misunderstandings.

The meaning of the phrase "complete sense data analysis of the empirical language" is discussed in ES.

of the most dangerous stumbling stones. It appears to be particularly hard to disentangle at this point the syntactical and semantical components from the merely genetic and psychological ones. Several recent discussions about the possible falsehood or merely hypothetical truth of so-called protocol statements, about the phenomenological protocol in general and about the relation of psychology to logic bear witness to this difficulty.[4] To this last group of questions our attention must now turn.

A. The first point to be made is as obvious as it is important. From the standpoint of syntactical and semantical analysis, the question as to the specific truth value of any factual sentence never as much as arises.[5] Whenever one operates with the truth value of a sentence or of a class of sentences in epistemology, these values are *given* to us. Here the expression 'given' does not carry any philosophical connotations whatsoever. It is used exactly in the same sense in which the mathematician speaks about the given data of a problem. Only technical differences can therefore exist between the various ways in which the truth values of factual statements are given in this sense. To determine how the truth value of one proposition is affected by the truth values of others, one might start from a finite or from an infinite class of basic statements and their truth values. Any of these *given* classes may or may not exhaust the substitution instances for the arguments of the predicates occurring in them; one might be given a class of universal statements or P-laws; or one might finally study the consequences of either finite or infinite classes of either type.

Example. Assume in a language three color predicates, 'P_1', 'P_2', 'P_3', as undefined ${}^{(0)}\mathfrak{f}_d$, 'Col' as an undefined ${}^{((0))}\mathfrak{f}_d$, and 'zw' as an undefined ${}^{(0,0,0)}\mathfrak{f}_d$, so that

$$\mathrm{Zw}(X, Y, Z) = (x)(y)(z)\{\mathrm{Col}(X).\mathrm{Col}(Y).\mathrm{Col}(Z).\backsim (X = Y).\backsim (X = Z).\backsim (Y = Z).\ X(x).Y(y).Z(z) \supset \mathrm{zw}\ (x, y, z)\}$$

becomes a defined ${}^{((0),(0),(0))}\mathfrak{f}_d$, which expresses the betweenness relation of the spectral order. It is worth while noticing that by virtue of this definition the sentence

$$\mathrm{Zw}(P_1, P_2, P_3)$$

contains unrestricted operators and is a P-law. This P-law, to be sure, is different from the further set of P-laws which state that 'zw' and 'Zw' fulfill the postulates of betweenness (see also III A. below).

Consider now the following array of data:

1. Classes of basic sentences:

$$\{P_1(a_1),\ \backsim P_1(a_2),\ P_1(a_3), \ldots\}$$

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[4] R. B. Braithwaite, B. Russell, F. Waismann, Symposium: *The Relevance of Psychology to Logic.* Aristot. Soc., Suppl. Vol. 17, 1938.

[5] A certain analogy to this situation can be found in pure syntax. The definiteness or decidability of a syntactical property must be distinguished from the property itself, from other properties of it and of the calculus as a whole. The system of the Principia Mathematica, for instance, justified certain special provisions for impredicative statements by what was then conceived as some kind of undecidability or, loosely speaking, some sort of impossibility to determine their truth value. Even if this reason had stood up to later criticism (LSL §44), the provision would have been in a certain sense unnecessary and not to be lumped with the (unramified) type rule which secures consistency.

$\{P_2(b_1),\ P_2(b_2),\ P_2(b_3),\ldots\}$
$\{P_3(c_1),\ \backsim P_3(a_1)\}$
$\{\mathrm{Col}\ (P_1),\ \mathrm{Col}\ (P_2),\ \mathrm{Col}\ (P_3)\}$

2. Six P-laws of the first type:

$$(x)\quad (P_i(x) \supset \sim P_k(x)), \qquad i \neq k,$$

3. A P-law of the second type:

$$Zw(P_1,P_2,P_3).$$

There is no reason why any such set, provided only it is not contradictory, should not be given as a starting point for linguistic elaboration, i.e., for the study of its consequences and its relations to similar sets; nor are the sentences of such a set necessarily all mutually independent. Again it must be stressed that the illustration does not pretend to be a fragment of an actually existing formalization of the empirical language. Let us, however, for the sake of the argument, assume that such is the case. It is true, then, that *psychologically* any single basic statement, say, '$\mathrm{Col}(P_1)$' is apt to carry a reference to any of the P-laws concerning colors and, most probably, to several other classes of P-laws as well. Probably it is also true that we would not even *understand* any such basic statement without understanding some others and at least some of the pertinent P-laws. This is, after all, the very obvious factual core of Wittgenstein's structural or universalistic doctrine of meaning. It is much more important to realize that such psychological facts, however they might be, have no graspable linguistic counterpart but possibly in a study of what one might call degrees of freedom left after a partial coordination between the factual statements of object language and semantical metalanguage. The lack of this counterpart is a crucial point which relegates a whole group of questions to the field of psychology (pragmatics). The pertinent psychological problem is: How do we come to understand a descriptive language?

B. Naturally this latter question lies not only beyond the competence of this writer but also beyond the scope of the present argument. A few remarks, however, shall be ventured. The problem at hand is that which faces an anthropologist who sets out to construct a dictionary of a native dialect whose syntax he knows without understanding it. In his field work he will have to use contextual gestures like 'this' and 'that', assertive gestures for truth and falsehood, and the method of independent variation. This is what is meant by independent variation: If the pointing gesture towards, say, a big brown wooden object elicits a certain verbal response, the anthropologist must keep on pointing towards, say, a big red wooden object, a small brown wooden object, and so on, until the referents of the various responses are ascertained. To give another illustration for the meaning of independent variation: the inhabitant of a world, otherwise like ours, in which pitch and loudness of all occurring tones are in a constant, say linear, relation, could not learn to discriminate phenomenologically between our pitch and loudness predicates.[6] It is significant that

[6] To forestall a possible misunderstanding: Independent variation of the various attributes of a sensory dimension must not be confused with their independence as defined by Boring. See E. G. Boring, *The Relation of the Attributes of Sensation to the Dimensions of the Stimulus*. Phil. Sci., 2, 1935.

this method of independent variation exhibits features of both the alternative ideas which, I presume, metaphysicians have in mind when they discuss the dichotomy 'extensional-intensional'. As a matter of fact, this short psychological excursion has been inserted for the very purpose of the last remark. It leads to the final point of this section.

C. The epistemological status of the words 'extensional-intensional' is still argued by some empiricists. Is there, within the framework of Scientific Empiricism, any issue which could be subsumed under these terms? Within syntax, the nature of the so-called extensionality thesis has been clarified (LSL §67–71) and it is tempting to summarize the result in the following manner: Whether or not a formalization of the empirical language can be achieved by a hierarchy of extensional languages is a question of fact. As we take from the analysis of mathematics and of the so-called logic of modality, the answer to this question is most probably affirmative. If we are actually faced here with a most general and fundamental factual feature, then it is indeed the task of epistemology to point it out as such. What arouses suspicion, however, is the hypothetical character of the alleged fact. The factual features to which the theory of knowledge calls attention are usually not hypothetical in this sense. And it might indeed be possible to show in a purely semantical manner, i.e., independent of any empirical interpretation of the basis, that any descriptive intensional language is "interpretationally equivalent" to a hierarchy of extensional languages. If such is the case, then the extensionality thesis has no factual core and the traditional argument centering around the words 'extensional-intensional' is of no epistemological significance. The remarks in the first two parts of this section are intended to support this contention. In particular: Besides their obvious meaning with respect to definitions within a language, the related terms 'connotation-denotation' have but one precise nonpsychological meaning: they may be taken to refer to the two different ways of giving basic sentences for the study of truth value relations, viz., either by P-laws or as classes.

III

The points so far made provide the background for a discussion of the term 'hypothetical'. A survey of its various possible meanings brings to a close the argument of this paper.

A. Hypothetical Statements within a Language. Consider, within a descriptive language, the class of all factual statements which are either basic or logical consequences of a finite noncontradictory class of basic statements. This class contains not only all compounds of the full sentences of the undefined predicates obtainable by the connectives of the sentential calculus and where the arguments are not defined by means of unrestricted operators, but also certain sentences with operators. This is due to the two formulae '$f(a) \supset (\exists x)f(x)$' and '$\sim f(a) \supset \sim(x)f(x)$'. All the factual sentences of the language which do not belong to the class just defined are here called P-laws of the language, thus providing the definition for a term already used. They correspond to

Carnap's incompletely reducible sentences and express the possible hypotheses of the users of the language. The consequence relations which do or do not obtain between them and the basic sentences of the language cover completely the first main meaning of the terms 'hypothesis' and 'hypothetical'. Now we can conveniently distinguish between

(a) statements as, in our example, 'gr(a)', which apparently are sometimes called hypothetical for the sole reason that *their predicates occur in P-laws*, so that other propositions, which in turn might or might not be P-laws, as '$\sim$ red(a)', can be drawn as consequences from them *in conjunction with those P-laws;* and

(b) properly hypothetical statements or P-laws as '$Zw(P_1, P_2, P_3)$' or the sentence of a sense data language which corresponds to 'this is a stone'. The latter is, very roughly and illustratively speaking, a conjunction of basic statements with P-laws which do not contain proper names.

Consider, furthermore, the two sentences '$Zw(P_1, P_2, P_3)$' and '$(X)(Y)(Z)(U)(Zw(X, Y, Z) \cdot Zw(Y, Z, U) \supset Zw(X, Z, U))$'. Both sentences are P-laws; the second expresses that 'Zw' has one of the properties of betweenness. It is a consequence of the first one in conjunction with the P-laws which express that 'zw' has the properties of betweenness. If these premises were not, in matter of fact, true, the second sentence would never be formulated. This state of affairs can conveniently be spoken of as the hierarchical pattern of the P-laws. Other terminologies describe it by speaking about strata of experience. The whole thing amounts to this: If one is once permitted to use the expression 'hypothetical' loosely, then he can say that the hypotheticality of a statement depends both upon the P-laws in which its terms occur and the P-laws which the application of these terms presupposes. The point is, that it is sometimes important to distinguish between these two possible sources of what is inaccurately thought of as the hypotheticality of the proposition itself. The resulting clarification is closely related to that contained in the thesis that "a basic sentence is a sentence from which nothing follows" and that therefore a basic sentence cannot, by itself, "contribute to the confirmation" of any other basic sentence which is not logically equivalent either to itself or to its negation. This also shows in which sense basic sentences can not be said to be hypothetical. Clearly, the hypotheticality in question is relative to the meaning basis chosen. For a precise formulation, a further refinement is here needed. One has to make the rather obvious distinction between basic sentences which contain sentential connectives and those which do not. It would, however, be erroneous to attribute any epistemological significance to this point.

A further, rather crude illustration might be helpful. Assume 'this is a stone' to be a basic sentence of a physicalistic language, and compare it with the P-law which expresses the same state of affairs in a sense data language. Of these two sentences the physicalistic one might actually assert less, for as the sentence is, by assumption, on the basis, the P-laws which express that stones do not speak nor think must be P-laws in which the undefined predicate 'stone'

occurs, while the same laws might very well occur in the corresponding, very complex hypothetical sentence of the sense data analysis.

It should finally be mentioned that the definitions which actually occur in an empirical language also fall into a hierarchy which is not independent of the hierarchy of P-laws. This interrelation restricts practically the so-called arbitrariness of definitions. Overemphasis put on this arbitrariness is an after effect of conventionalistic doctrines.

B. Hypothetical Statements about a Language. If the basic sentences of any language are not hypothetical in the sense just defined, what then is meant by the assertion that all factual statements are hypothetical? At least the following three interpretations of this thesis are possible. The first two are here included for completeness' sake; the last one is believed to cover the second important connotation of the term.

1. The thesis might be taken to refer to the factual continuity of variation which makes it sometimes doubtful whether or not two objects have still the same color or are already different in this respect, whether a certain object is still yellow or already green, and so on. Definitions can sometimes restrict but not completely eliminate this unavoidable vagueness which has something to do with our discrimination thresholds and the approximate continuity of many dimensions. However, this threshold doubt, characteristic as it is for factual statements, has nothing in common with the doubtfulness of hypothetical statements. It is therefore better not referred to by the expression 'hypothetical'. Threshold doubt is ultimately resolved by finding out which of the competing sentences yields, by means of the accepted P-laws, better agreement with other equally or less doubtful propositions.[7] The opposite of this vagueness will presently be spoken of as distinctness.

2. The thesis might be understood to assert that to each analysis of the empirical language there exists another one so that the basic sentences of the first correspond already to P-laws of the second. With respect to the relationship between physicalistic and sense data analysis, this meaning covers indeed a good deal of the philosophical uses of the term 'hypothetical'. As a general thesis this interpretation is hardly of any interest.

3. Success or failure of the application of a descriptive language depends on several factors. Among these the most important ones are, (1) the distinctness of the referents of predicates, (2) the possibility of finding reliable P-laws, where reliability is a property of the hypotheses formulated within the language and with respect to the verification basis which it affords, (3) the degree of technical complexity of these P-laws, their quantifiability, etc. The extent to which any descriptive language fulfills these criteria is of course a question of

[7] We are not here concerned with the confusion between 'this is green' as a sentence of the meaning basis or, for that matter, of the phenomenological protocol and the apparently contradicting statement 'at that time at that place nothing green', which in the same language is a highly derived structure obtained by P-laws from information including the doctor's report about hallucinatory afflictions. The apparent paradox can be obtained no matter what meaning basis one chooses. See also the symposium quoted in footnote (4).

fact and always subject to alteration by future experience. Apparently this pragmatic feature is meant by the assertion that all factual statements are merely hypothetical. But then it must be pointed out that this assertion amounts, loosely speaking, to a pragmatic hypothesis or induction about the language with reference to its future application. It might be better to avoid completely the term 'hypothetical' in this context. The factual feature in question is more appropriately expressed by such locutions as 'pragmatic criteria' or 'pragmatic decisions', expressions which are already used in TM for the description of linguistic choices. If such usage is adhered to, 'hypothesis' and 'hypothetical' can be unambiguously used in their classical connotation, indicating the mere confirmability of inductive generalization from a finite basis.

C. A further every day usage of the term 'hypothetical' offers no difficulties whatsoever. This is the sense in which '$(\exists x)\ f(x)$' and '$\sim(x)f(x)$' are hypothetical as long as instance or counterinstance have not yet been exhibited. That I left my watch home or that it will rain tomorrow are hypotheses in this sense. The point is, that with respect to the verification basis which they silently presuppose these sentences are completely confirmable.

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