

## PART V

### PHILOSOPHY AND SYNTAX

#### A. ON THE FORM OF THE SENTENCES BELONGING TO THE LOGIC OF SCIENCE

##### § 72: PHILOSOPHY REPLACED BY THE LOGIC OF SCIENCE

The questions dealt with in any theoretical field—and similarly the corresponding sentences and assertions—can be roughly divided into *object-questions* and *logical questions*. (This differentiation has no claim to exactitude; it only serves as a preliminary to the following non-formal and inexact discussion.) By object-questions are to be understood those that have to do with the objects of the domain under consideration, such as inquiries regarding their properties and relations. The logical questions, on the other hand, do not refer directly to the objects, but to sentences, terms, theories, and so on, which themselves refer to the objects. (Logical questions may be concerned either with the meaning and content of the sentences, terms, etc., or only with the form of these; of this we shall say more later.) In a certain sense, of course, logical questions are also object-questions, since they refer to certain objects—namely, to terms, sentences, and so on—that is to say, to objects of logic. When, however, we are talking of a non-logical, proper object-domain, the differentiation between object-questions and logical questions is quite clear. For instance, in the domain of zoology, the object-questions are concerned with the properties of animals, the relations of animals to one another and to other objects, etc.; the logical questions, on the other hand, are concerned with the sentences of zoology and the logical connections between them, the logical character of the definitions occurring in that science, the logical character of the theories and hypotheses which may be, or have actually been, advanced, and so on.

According to traditional usage, the name 'philosophy' serves as a collective designation for inquiries of very different kinds.

Object-questions as well as logical questions are to be found amongst these inquiries. The object-questions are in part concerned with supposititious objects which are not to be found in the object-domains of the sciences (for instance, the thing-in-itself, the absolute, the transcendental, the objective idea, the ultimate cause of the world, non-being, and such things as values, absolute norms, the categorical imperative, and so on); this is especially the case in that branch of philosophy usually known as metaphysics. On the other hand, the object-questions of philosophy are also concerned with things which likewise occur in the empirical sciences (such as mankind, society, language, history, economics, nature, space and time, causality, etc.); this is especially the case in those branches that are called natural philosophy, the philosophy of history, the philosophy of language, and so on. The logical questions occur principally in logic (including applied logic), and also in the so-called theory of knowledge (or epistemology), where they are, however, for the most part, entangled with psychological questions. The problems of the so-called philosophical foundations of the various sciences (such as physics, biology, psychology, and history) include both object-questions and logical questions.

The logical analysis of philosophical problems shows them to vary greatly in character. As regards those object-questions whose objects do not occur in the exact sciences, critical analysis has revealed that they are pseudo-problems. The supposititious sentences of metaphysics, of the philosophy of values, of ethics (in so far as it is treated as a normative discipline and not as a psychosociological investigation of facts) are pseudo-sentences; they have no logical content, but are only expressions of feeling which in their turn stimulate feelings and volitional tendencies on the part of the hearer. In the other departments of philosophy the psychological questions must first of all be eliminated; these belong to psychology, which is one of the empirical sciences, and are to be handled by it with the aid of its empirical methods. [By this, of course, no veto is put upon the discussion of psychological questions within the domain of logical investigation; everyone is at liberty to combine his questions in the way which seems to him most fruitful. It is only intended as a warning against the disregard of the difference between proper logical (or epistemological)

questions and psychological ones. Very often the formulation of a question does not make it clear whether it is intended as a psychological or a logical one, and in this way a great deal of confusion arises.] The remaining questions, that is, in ordinary terminology, questions of logic, of the theory of knowledge (or epistemology), of natural philosophy, of the philosophy of history, etc., are sometimes designated by those who regard metaphysics as unscientific as questions of scientific philosophy. As usually formulated, these questions are in part logical questions, but in part also object-questions which refer to the objects of the special sciences. Philosophical questions, however, according to the view of philosophers, are supposed to examine such objects as are also investigated by the special sciences from quite a different standpoint, namely, from the purely philosophical one. As opposed to this, we shall here maintain that all these remaining philosophical questions are logical questions. Even the supposititious object-questions are logical questions in a misleading guise. The supposed peculiarly philosophical point of view from which the objects of science are to be investigated proves to be illusory, just as, previously, the supposed peculiarly philosophical realm of objects proper to metaphysics disappeared under analysis. Apart from the questions of the individual sciences, only the questions of the logical analysis of science, of its sentences, terms, concepts, theories, etc., are left as genuine scientific questions. We shall call this complex of questions the *logic of science*. [We shall not here employ the expression 'theory of science'; if it is to be used at all, it is more appropriate to the wider domain of questions which, in addition to the logic of science, includes also the empirical investigation of scientific activity, such as historical, sociological, and, above all, psychological inquiries.]

According to this view, then, once philosophy is purified of all unscientific elements, only the logic of science remains. In the majority of philosophical investigations, however, a sharp division into scientific and unscientific elements is quite impossible. For this reason we prefer to say: *the logic of science takes the place of the inextricable tangle of problems which is known as philosophy*. Whether, on this view, it is desirable to apply the term 'philosophy' or 'scientific philosophy' to this remainder, is a question of expedience which cannot be decided here. It must be taken into

consideration that the word 'philosophy' is already heavily burdened, and that it is largely applied (particularly in the German language) to speculative metaphysical discussions. The designation 'theory of knowledge' (or 'epistemology') is a more neutral one, but even this appears not to be quite unobjectionable, since it misleadingly suggests a resemblance between the problems of our logic of science and the problems of traditional epistemology; the latter, however, are always permeated by pseudo-concepts and pseudo-questions, and frequently in such a way that their disentanglement is impossible.

The view that, as soon as claims to scientific qualifications are made, all that remains of philosophy is the logic of science, cannot be established here and will not be assumed in what follows. In this part of the book we propose to examine the character of the sentences of the logic of science, and to show that they are syntactical sentences. For anyone who shares with us the anti-metaphysical standpoint it will thereby be shown that all philosophical problems which have any meaning belong to syntax. The following investigations concerning the logic of science as syntax are not, however, dependent upon an adherence to this view; those who do not subscribe to it can formulate our results simply as a statement that the problems of that part of philosophy which is neither metaphysical nor concerned with values and norms are syntactical.

Anti-metaphysical views have often been put forward in the past, especially by Hume and the Positivists. The more exact thesis that philosophy can be nothing other than a logical analysis of scientific concepts and sentences (in other words, what we shall call the logic of science) is represented in particular by Wittgenstein and the Vienna Circle, and has been both established in detail and investigated in all its consequences by them; see Schlick [*Metaphysik*], [*Wende*], [*Positivismus*]; Frank [*Kausalgesetz*]; Hahn [*Wiss. Weltauff.*]; Neurath [*Wiss. Weltauff.*], [*Wege*]; Carnap [*Metaphysik*]; further bibliographical references are given by Neurath [*Wiss. Weltauff.*] and in *Erkenntnis*, I, 315 ff. Neurath is definitely opposed to the continued use of the expressions 'philosophy', 'scientific philosophy', 'natural philosophy', 'theory of knowledge', etc.

The term 'logic of science' will be understood by us in a very wide sense, namely, as meaning the domain of all the questions which are usually designated as pure and applied logic, as the logical analysis of the special sciences or of science as a whole, as epistemology, as

problems of foundations, and the like (in so far as these questions are free from metaphysics and from all reference to norms, values, transcendentals, etc.). To give a concrete illustration we assign the following investigations (with very few exceptions) to the logic of science: the works of Russell, Hilbert, Brouwer, and their pupils, the works of the Warsaw logicians, of the Harvard logicians, of Reichenbach's Circle, of the Vienna Circle centring around Schlick, the majority of the works cited in the bibliography of this book (and others by the same authors), the articles in the journals *Erkenntnis* and *Philosophy of Science*, the books in the collections "Schriften zur wissenschaftlichen Weltauffassung" (edited by Schlick and Frank), "Einheitswissenschaft" (edited by Neurath), and finally the works mentioned in the following bibliographies: *Erkenntnis*, I, 315 ff. (general), 335 ff. (Polish logicians); II, 151 ff. (foundations of mathematics), 189 f. (causality and probability); V, 185 ff. (general), 195 ff. (American authors), 199 ff. (Polish authors), 409 ff. (general).

### § 73. THE LOGIC OF SCIENCE IS THE SYNTAX OF THE LANGUAGE OF SCIENCE

In what follows we shall examine the nature of the questions of the logic of science in the wide sense, including, as already indicated, the so-called philosophical problems concerning the foundations of the individual sciences, and we shall show that these questions are questions of syntax. In order to do this, it must first be shown that the object-questions which occur in the logic of science (for example, questions concerning numbers, things, time and space, the relations between the psychical and the physical, etc.) are only pseudo-object-questions—i.e. questions which, because of a misleading formulation, appear to refer to objects while actually they refer to sentences, terms, theories, and the like—and are, accordingly, in reality, logical questions. And secondly, it must be shown that all logical questions are capable of formal presentation, and can, consequently, be formulated as syntactical questions. According to the usual view, all logical investigation comprises two parts: a formal inquiry which is concerned only with the order and syntactical kind of the linguistic expressions, and an inquiry of a material character, which has to do not merely with the formal design but, over and above that, with questions of meaning and sense. Thus the general opinion is that the formal problems constitute, at the most, only a small section of the domain

of logical problems. As opposed to this, our discussion of general syntax has already shown that the formal method, if carried far enough, embraces all logical problems, even the so-called problems of content or sense (in so far as these are genuinely logical and not psychological in character). Accordingly, when we say that the logic of science is nothing more than the syntax of the language of science, we do not mean to suggest that only a certain number of the problems of what has hitherto been called the logic of science (as they appear, for example, in the works previously mentioned) should be regarded as true problems of the logic of science. The view we intend to advance here is rather that all problems of the current logic of science, as soon as they are exactly formulated, are seen to be syntactical problems.

It was Wittgenstein who first exhibited the close connection between the logic of science (or "philosophy", as he calls it) and syntax. In particular, he made clear the formal nature of logic and emphasized the fact that the rules and proofs of syntax should have no reference to the meaning of symbols ([*Tractatus*], pp. 52, 56, and 164). Further, he has shown that the so-called sentences of metaphysics and of ethics are pseudo-sentences. According to him philosophy is "critique of language" (*op. cit.* p. 62), its business is "the logical clarification of ideas" (p. 76), of the sentences and concepts of science (natural science), that is, in our terminology, the logic of science. Wittgenstein's view is represented, and has been further developed, by the Vienna Circle, and in this part of the book I owe a great deal to his ideas. If I am right, the position here maintained is in general agreement with his, but goes beyond it in certain important respects. In what follows my view will sometimes be contrasted with his, but this is done only for the sake of greater clarity, and our agreement on important fundamental questions must not therefore be overlooked.

There are two points especially on which the view here presented differs from that of Wittgenstein, and specifically from his negative theses. The first of these theses (*op. cit.* p. 78) states: "Propositions cannot represent the logical form: this mirrors itself in the propositions. That which mirrors itself in language, language cannot represent. That which expresses *itself* in language, *we* cannot express by language. . . . If two propositions contradict one another, this is shown by their structure; similarly, if one follows from another, etc. What *can* be shown *cannot* be said. . . . It would be as senseless to ascribe a formal property to a proposition as to deny it the formal property." In other words: There are no sentences about the forms of sentences; there is no expressible syntax. In opposition to this view, our construction of syntax has shown that it can be correctly formulated and that syntactical sentences do exist. It is just as possible to

construct sentences about the forms of linguistic expressions, and therefore about sentences, as it is to construct sentences about the geometrical forms of geometrical structures. In the first place, there are the analytic sentences of pure syntax, which can be applied to the forms and relations of form of linguistic expressions (analogous to the analytic sentences of arithmetical geometry, which can be applied to the relations of form of the abstract geometrical structures); and in the second place, the synthetic physical sentences of descriptive syntax, which are concerned with the forms of the linguistic expressions as physical structures (analogous to the synthetic empirical sentences of physical geometry, see § 25). *Thus syntax is exactly formulable in the same way as geometry is.*

Wittgenstein's second negative thesis states that the logic of science ("philosophy") cannot be formulated. (For him, this thesis does not coincide with the first, since he does not consider the logic of science and syntax to be identical; see below.) "Philosophy is not a theory, but an activity. A philosophical work consists essentially of elucidations. The result of philosophy is not a number of 'philosophical propositions,' but to make propositions clear" (p. 76). Consistently Wittgenstein applies this view to his own work also; at the end he says: "My propositions are elucidatory in this way: he who understands me finally recognizes them as senseless, when he has climbed out through them, on them, over them. (He must, so to speak, throw away the ladder, after he has climbed up on it.) He must surmount these propositions; then he sees the world rightly. Whereof one cannot speak, thereof one must be silent" (p. 188). According to this, the investigations of the logic of science contain no sentences, but merely more or less vague explanations which the reader must subsequently recognize as pseudo-sentences and abandon. Such an interpretation of the logic of science is certainly very unsatisfactory. [Ramsey first raised objections to Wittgenstein's conception of philosophy as nonsense, but important nonsense ([*Foundations*], p. 263), and then Neurath, in particular, ([*Soziol. Phys.*], pp. 395 f. and [*Psychol.*], p. 29) definitely rejected it.] When in what follows it is shown that the logic of science is syntax, it is at the same time shown that the logic of science can be formulated, and formulated not in senseless, if practically indispensable, pseudo-sentences, but in perfectly correct sentences. The difference of opinion here indicated is not merely theoretical; it has an important influence on the practical form of philosophical investigations. Wittgenstein considers that the only difference between the sentences of the speculative metaphysician and those of his own and other researches into the logic of science is that the sentences of the logic of science—which he calls philosophical elucidations—in spite of their theoretical lack of sense, exert, practically, an important psychological influence upon the philosophical investigator, which the properly metaphysical sentences do not, or, at least, not in the same way. Thus there is only a difference of degree, and that a very

vague one. The fact that Wittgenstein does not believe in the possibility of the exact formulation of the sentences of the logic of science has as its consequence that he does not demand any scientific exactitude in his own formulations, and that he draws no sharp line of demarcation between the formulations of the logic of science and those of metaphysics. In the following discussion we shall see that translatability into the formal mode of speech—that is, into syntactical sentences—is the criterion which separates the proper sentences of the logic of science from the other philosophical sentences—we may call them metaphysical. In some of his formulations, Wittgenstein has clearly overstepped this boundary; this consequence of his belief in the two negative theses is psychologically quite understandable.

In spite of this difference of opinion, I agree with Wittgenstein that there are no special sentences of the logic of science (or philosophy). The sentences of the logic of science are formulated as syntactical sentences about the language of science; but no new domain in addition to that of science itself is thereby created. The sentences of syntax are in part sentences of arithmetic, and in part sentences of physics, and they are only called syntactical because they are concerned with linguistic constructions, or, more specifically, with their formal structure. Syntax, pure and descriptive, is nothing more than the mathematics and physics of language.

Wittgenstein says of the rules of logical syntax (see above) that they must be formulated without any reference to sense or meaning. According to our view the same thing holds also for the sentences of the logic of science. But Wittgenstein, as it appears, thinks that these sentences (the so-called philosophical elucidations) go beyond the formal and refer to the sense of the sentences and terms. Schlick ([*Wende*] p. 8) interprets Wittgenstein's position as follows: philosophy "is that activity by which the meaning of propositions is established or discovered"; it is a question of "what the propositions actually *mean*". The content, soul, and spirit of science naturally consist in what is ultimately *meant* by its sentences; the philosophical activity of rendering significant is thus the alpha and omega of all scientific knowledge".

## § 74. PSEUDO-OBJECT-SENTENCES

We have already distinguished (in an inexact manner) between object-sentences and logical sentences. We will now contrast instead (at first also in an inexact manner) the two domains of *object-sentences* and *syntactical sentences*, only those logical sentences which are concerned with form being here taken into account and included in the second domain. Now there is an intermediate field between these two domains. To this intermediate field we will

assign the sentences which are formulated as though they refer (either partially or exclusively) to objects, while in reality they refer to syntactical forms, and, specifically, to the forms of the designations of those objects with which they appear to deal. Thus these sentences are syntactical sentences in virtue of their content, though they are disguised as object-sentences. We will call them *pseudo-object-sentences*. If we attempt to represent in a formal way the distinction which is here informally and inexactly indicated, we shall see that these pseudo-object-sentences are simply *quasi-syntactical sentences of the material mode of speech* (in the sense already formally defined, see § 64).

To this middle territory belong many of the questions and sentences relating to the investigation of what are called philosophical foundations. We will take a simple example. Let us suppose that in a philosophical discussion about the concept of number we want to point out that there is an essential difference between numbers and (physical) things, and thereby to give a warning against pseudo-questions concerning the place, weight, and so on of numbers. Such a warning will probably be formulated as a sentence of, say, the following kind: "Five is not a thing but a number" ( $\mathfrak{S}_1$ ). Apparently this sentence expresses a property of the number five, like the sentence "Five is not an even but an odd number" ( $\mathfrak{S}_2$ ). In reality, however,  $\mathfrak{S}_1$  is not concerned with the number five, but with the word 'five'; this is shown by the formulation  $\mathfrak{S}_3$  which is equipollent to  $\mathfrak{S}_1$ : "'Five' is not a thing-word but a number-word." While  $\mathfrak{S}_2$  is a proper object-sentence,  $\mathfrak{S}_1$  is a pseudo-object-sentence;  $\mathfrak{S}_1$  is a quasi-syntactical sentence (material mode of speech), and  $\mathfrak{S}_3$  is the correlated syntactical sentence (formal mode of speech).

We have here left out of account those logical sentences which assert something about the *meaning*, *content*, or *sense* of sentences or linguistic expressions of any domain. These also are pseudo-object-sentences. Let us consider as an example the following sentence,  $\mathfrak{S}_1$ : "Yesterday's lecture was about Babylon."  $\mathfrak{S}_1$  appears to assert something about Babylon, since the name 'Babylon' occurs in it. In reality, however,  $\mathfrak{S}_1$  says nothing about the town Babylon, but merely something about yesterday's lecture and the word 'Babylon'. This is easily shown by the following non-formal

Babylon it does not matter whether  $\mathfrak{S}_1$  is true or false. Further, that  $\mathfrak{S}_1$  is only a pseudo-object-sentence is clear from the circumstance that  $\mathfrak{S}_1$  can be translated into the following sentence of (descriptive) syntax: "In yesterday's lecture either the word 'Babylon' or an expression synonymous with the word 'Babylon' occurred" ( $\mathfrak{S}_2$ ).

Accordingly, we distinguish *three kinds of sentences*:

1. Object-sentences	2. Pseudo-object-sentences = quasi-syntactical sentences	3. Syntactical sentences
	<i>Material mode of speech</i>	<i>Formal mode of speech</i>
Examples: "5 is a prime number"; "Babylon was a big town"; "lions are mammals."	Examples: "Five is not a thing, but a number"; "Babylon was treated of in yesterday's lecture." ("Five is a number-word" is an example belonging to the autonymous mode of speech.)	Examples: "Five is not a thing-word, but a number-word"; "the word 'Babylon' occurred in yesterday's lecture"; "'A. ~ A' is a contradictory sentence."

The intermediate field of the pseudo-object-sentences, the boundaries of which have so far been only materially and inexactly indicated, can also be exactly, and moreover formally, demarcated. The pseudo-object-sentences are, namely, quasi-syntactical sentences of the material mode of speech. [We can leave the autonymous mode of speech out of account here, since there is practically no danger of a sentence belonging to this mode of speech being mistaken for an object-sentence.] The criterion of the material mode of speech assumes a simpler form when we are concerned with an object-language  $S_1$  which contains its own syntax-language  $S_2$  as a sub-language. For instance, let  $S_1$  be the English language representing the whole language of science; then the syntax-language  $S_2$ , in which the syntax of  $S_1$  is formulated, is a sub-language of  $S_1$ . This expresses the fact that we regard syntax not as a special domain outside that of the rest of science but as a sub-domain of science as a whole, which forms a single system (Neurath: *Einheitswissenschaft*) having a single language  $S_1$ . *That a language may contain its own syntax without contradiction*

we have already shown. Even if the syntax-language  $S_2$  is a sub-language of  $S_1$  it is, of course, both possible and necessary to distinguish between a sentence  $\mathfrak{S}_1$ , of  $S_1$  (which may also belong to  $S_2$ ), and a syntactical sentence  $\mathfrak{S}_2$ , concerning  $\mathfrak{S}_1$ , which belongs to  $S_2$  and therefore also to  $S_1$ . For simplicity's sake, we will formulate the criterion of the material mode of speech for the simplest sentential form only (and further, for the sake of brevity and clarity, we will formulate it for a symbolic sentence) (see § 64). Let  $\mathfrak{S}_1$  be 'P(a)';  $\mathfrak{S}_1$  is called *quasi-syntactical* in respect of 'a', if there exists a syntactical predicate 'Q' such that 'P(a)' is equipollent to 'Q('a')' ( $\mathfrak{S}_2$ ) and 'P(b)' is equipollent to 'Q('b')', and correspondingly for every expression isogenous with 'a'. Now 'P' may possibly be a syntactical predicate which is equivalent in meaning to 'Q' (this would be shown formally by the fact that 'P('a')' would also be a sentence, and moreover a sentence equipollent to 'Q('a')', and that, further, 'P('b')' would be equipollent to 'Q('b')', and correspondingly for every expression isogenous with 'a'); if this is not the case, we call  $\mathfrak{S}_1$  a sentence of the *material mode of speech*. 'Q' is called a syntactical predicate correlated to the quasi-syntactical predicate 'P'; and  $\mathfrak{S}_2$  is called a syntactical sentence correlated to the quasi-syntactical sentence  $\mathfrak{S}_1$ . *In the translation from the material to the formal mode of speech,  $\mathfrak{S}_1$  is translated into  $\mathfrak{S}_2$ .*

In order to make it clearer and facilitate its practical application to the following examples, we will formulate the criterion (still for the simplest form of sentence) once more, in a less exact, non-formal way (the examples of sentences which come later, especially those of the logic of science, belong almost entirely to the word-language; in consequence, they are themselves not formulated sufficiently exactly to make possible the application to them of exact concepts).  $\mathfrak{S}_1$  is called a sentence of the material mode of speech if  $\mathfrak{S}_1$  asserts a property of an object which has, so to speak, parallel to it, another, and syntactical, property; that is to say, when there is a syntactical property which belongs to a designation of an object if, and only if, the original property belongs to the object.

It is easy to see that in the previous example concerning 'Babylon' this criterion is fulfilled for the sentence  $\mathfrak{S}_1$ : the syntactical (in this case the descriptive-syntactical) property which is asserted in  $\mathfrak{S}_2$  of the word 'Babylon' is parallel to that property which is

asserted in  $\mathcal{S}_1$  of the town of Babylon; for if, and only if, yesterday's lecture was concerned with a certain object, did a designation of that object occur in the lecture. The criterion of the material mode of speech is likewise fulfilled for the sentence  $\mathcal{S}_1$  of the example concerning 'five'; for if, and only if, the property expressed in  $\mathcal{S}_1$ —that of being not a thing but a number—belongs to some object (for instance, to the number five) does the property expressed in  $\mathcal{S}_2$ —that of being not a thing-word but a number-word—belong to a designation of this object (in the example, to the word 'five').

### § 75. SENTENCES ABOUT MEANING

In this section, we shall consider various kinds of sentences of the material mode of speech, especially those kinds which occur frequently in philosophical discussions. On the basis of these investigations we shall be better able to diagnose the material mode of speech in subsequent cases. Further, by this means the whole character of philosophical problems will become clearer to us. The obscurity with regard to this character is chiefly due to the deception and self-deception induced by the application of the material mode of speech. The disguise of the material mode of speech conceals the fact that the so-called problems of philosophical foundations are nothing more than questions of the logic of science concerning the sentences and sentential connections of the language of science, and also the further fact that the questions of the logic of science are formal—that is to say, syntactical—questions. The true situation is revealed by the translation of the sentences of the material mode of speech, which are really quasi-syntactical sentences, into the correlated syntactical sentences and thus into the formal mode. We do not mean by this that the material mode of speech should be entirely eliminated. Since it is in general use and often easier to understand, it may well be retained in its place. But it is a good thing to be conscious of its use, so as to avoid the obscurities and pseudo-problems which otherwise easily result from it.

In a sentence  $\mathcal{S}_1$  of the material mode of speech, the illusion that a genuine object-sentence is present is most easily dissipated if  $\mathcal{S}_1$  belongs in part to the syntax-language  $\mathcal{S}_2$ , but contains at the same

time elements of  $\mathcal{S}_1$  which do not belong to  $\mathcal{S}_2$ . [Not all sentences of this kind are sentences of the material mode of speech. For example, the sentence "The University of Freiburg bears the inscription 'the truth will make you free'" is not a quasi-syntactical sentence but a simple sentence of descriptive syntax.] Especially important here are those sentences which express a relation of designation, that is to say, those in which one of the following expressions occurs: 'treats of', 'speaks about', 'means', 'signifies', 'names', 'is a name for', 'designates', and the like. We shall now give a series of such sentences concerning *meaning*, and, along with them, the correlated syntactical sentences. The first of these examples has already been discussed. [It is, of course, of no importance whether or not the sentences in the examples are true.]

#### *Material mode of speech*

—(quasi-syntactical sentences)

1 a. Yesterday's lecture treated of Babylon.

2 a. The word 'daystar' *designates* (or: *means*; or: *is a name for*) the sun.

3 a. The sentence  $\mathcal{S}_1$  *means* (or: *asserts*; or: has the *content*; or: has the *meaning*) that the moon is spherical.

4 a. The word 'luna' in the Latin language *designates* the moon.

5 a. The sentence '...' of the Chinese language *means* that the moon is spherical.

#### *Formal mode of speech*

(the correlated syntactical sentences)

1 b. In yesterday's lecture the word 'Babylon' (or a synonymous designation) occurred.

2 b. The word 'daystar' is synonymous with 'sun'.

3 b.  $\mathcal{S}_1$  is equipollent to the sentence 'The moon is spherical.'

4 b. There is an equipollent expressional translation of the Latin into the English language in which the word 'moon' is the correlate of the word 'luna'.

5 b. There is an equipollent sentential translation of the Chinese into the English language in which the sentence 'The moon is spherical' is the correlate of the sentence '...'.

The following examples, 6 and 7, show how the difference between the *meaning of an expression* and the *object designated by the expression* can be formally represented. [This difference is emphasized by the phenomenologists, but explained only in a psychological, not in the logical, sense.]



6a. The expressions 'merle' and 'blackbird' have the same meaning (or: mean the same; or: have the same *intensional object*).

7a. 'Evening star' and 'morning star' have a different meaning, but they designate the same object.

[With respect to a symbolic (P-) language, the above correlates may also be formulated thus: 6b. ' $\mathcal{U}_1 = \mathcal{U}_2$ ' is analytic. 7b. ' $\mathcal{U}_1 = \mathcal{U}_2$ ' is not analytic but P-valid.]

In the case of sentences the formal representation of the difference between the fact designated and the meaning is analogous. [The usual formulations like 'mean the same' or 'have the same content' are ambiguous; in some cases 8b is intended, in others 9b, and in many the intention remains obscure.]

8a. The sentences  $\mathcal{S}_1$  and  $\mathcal{S}_2$  have the same meaning.

9a.  $\mathcal{S}_1$  and  $\mathcal{S}_2$  have a different meaning but they represent (or: describe) the same fact.

[With respect to a symbolic language: 8b. ' $\mathcal{S}_1 \equiv \mathcal{S}_2$ ' is analytic. 9b. ' $\mathcal{S}_1 \equiv \mathcal{S}_2$ ' is not analytic but P-valid.]

10a. The sentences of arithmetic state (or: express) certain properties of numbers and certain relations between numbers.

11a. A particular sentence of physics states the condition of a spatial point at a given time.

The following examples 12a, 13a, and 14a appear at first to be of the same kind as 1a and 4a. Actually, however, they demonstrate particularly clearly the danger of error which is involved in the use of the material mode of speech.

12a. This letter is about the son of Mr. Miller.

13a. The expression 'le cheval de M' designates (or: means) the horse of M.

14a. The expression 'un éléphant bleu' means a blue elephant.

6b. 'Merle' and 'blackbird' are L-synonymous.

7b. 'Evening star' and 'morning star' are not L-synonymous, but P-synonymous.

8b.  $\mathcal{S}_1$  and  $\mathcal{S}_2$  are L-equipollent.

9b.  $\mathcal{S}_1$  and  $\mathcal{S}_2$  are not L-equipollent but P-equipollent.

10b. The sentences of arithmetic are composed of numerical expressions and one- or many-termed numerical predicates combined in such and such a way.

11b. A particular sentence of physics consists of a descriptive predicate and spatio-temporal co-ordinates as arguments.

12b. In this letter a sentence  $\text{Pr}(\mathcal{U}_1)$  occurs in which  $\mathcal{U}_1$  is the description 'the son of Mr. Miller'.

13b. There is an equipollent expressional translation from the French into the English language in which 'the horse of M' is the correlate of 'le cheval de M'.

14b. (Analogous to 13b.)

Let us assume that Mr. Miller has no son; even in this case the sentence 12a may still be true; the letter will then merely be telling a lie. Now, from the true sentence 12a, according to the ordinary logical rules of inference, a false sentence can be derived. In order to make the derivation more exact, we will use a symbolism in place of the word-language. Instead of 'this letter' we will write 'b'; instead of 'b is about a' we will write ' $H(b, a)$ '; and instead of 'the son of a' we will write 'Son'a' (descriptive in Russell's symbolism, see §38c). Hence for 12a will be written: ' $H(b, \text{Son' Miller})$ ' ( $\mathcal{S}_1$ ). According to a well-known theorem of logistics (see my [Logistik], §7c: L 7.2), from a sentence  $\text{Pr}(\mathcal{U}rg)$  in which a description occurs as argument, a sentence is derivable which asserts that there exists something which has the descriptive property. Accordingly, from  $\mathcal{S}_1$  would be derivable ' ( $\exists x$ ) (Son(x, Miller))' ( $\mathcal{S}_2$ ); or, in words: "a son of Mr. Miller exists". This, however, is a false sentence. Similarly the possibly false sentence "There is a horse of M" is derivable from 13a, and the false sentence "there is a blue elephant" from 14a. On the other hand, by the usual rules no false sentences can be derived from the sentences 12b, 13b, and 14b of the formal mode of speech. These examples show that the use of the material mode of speech leads to contradictions if the methods of inference which are correct for other sentences are thoughtlessly used also in connection with it. [It cannot be maintained that the formulations 12a, 13a, and 14a are incorrect, or that the use of the material mode of speech leads necessarily to contradictions; for, after all, the word-language is not bound by the rules of logistics. If, therefore, one wishes to admit the material mode of speech, one must apply to it a system of rules which is not only more complicated than that of logistics but is also more complicated than that which governs the rest of the sentences of the word-language.]

Some sentences contain a relation of meaning which is to some extent concealed. With sentences of this kind it is not obvious, at first sight, that they belong to the material mode of speech. The most important examples of this are the sentences which use the so-called *indirect* or *oblique* mode of speech (that is to say, sentences which say something about a spoken, thought, or written sentence, but which do so not by a statement of the original wording but instead by means of a 'that', 'whether', or other 'w...' sentence, or of a subordinate sentence without a connective word, or of an infinitive with 'to'). In the following examples, 15a and 16a, the formulations 15b and 16b show that the sentences in which the indirect mode of speech occurs are of the same kind as the examples previously discussed, and hence also belong to the material mode of speech.



I. *Material mode of speech*1. *Sentences in indirect speech*

15 a. Charles said (wrote, thought) Peter was coming tomorrow (or: that Peter was coming tomorrow).

16 a. Charles said where Peter is.

2. *Sentences about meaning*

15 b. Charles said a sentence which means that Peter is coming tomorrow.

16 b. Charles said a sentence which states where Peter is.

II. *Formal mode of speech*

15 c. Charles said the sentence 'Peter is coming tomorrow' (or: a sentence of which this is a consequence).

16 c. Charles said a sentence of the form 'Peter is —' in which a spatial designation takes the place of the dash.

The use of the indirect mode of speech is admittedly short and convenient; but it contains the same dangers as the other sentences of the material mode. For instance, sentence 15 a, as contrasted with sentence 15 c, gives the false impression that it is concerned with Peter, while in reality it is only concerned with Charles and with the word 'Peter'. When the direct mode of speech is used, this danger does not occur. For instance, the sentence: "Charles says 'Peter is coming tomorrow'" does not belong to the material mode of speech: it is a sentence of descriptive syntax. The direct mode of speech is the ordinary form used in the word-language for the formal syntactical mode. (On the construction of the syntactical designation of an expression with the help of inverted commas, see § 41.)

The examples so far given suffice to show that, with certain formulations in the material mode of speech, there is the danger of obscurity or of contradictions. It is true that in such simple cases as these the danger is easy to avoid. But in less obvious cases of essentially the same kind, especially in philosophy, the application of the material mode of speech has time and again led to inconsistencies and confusions.

## § 76. UNIVERSAL WORDS

We will call a predicate of which every full sentence is an analytic sentence a *universal predicate*, or, if it is a word in the word-language, a **universal word**. [For every genus of predicates a uni-

versal predicate can easily be defined. For instance, if  $pr_1$  is a  $pr_1$  of any genus whatsoever, we define the universal predicate  $pr_2$ , of the same genus, as follows:  $pr_2(v_1) \equiv (pr_1(v_1) \vee \sim pr_1(v_1))$ .] The investigation of universal words is especially important for the analysis of philosophical sentences. They occur very often in such sentences both in metaphysics and in the logic of science, and are for the most part in the material mode of speech. In order to facilitate the practical application of the criterion for 'universal word', let us also formulate it in an informal way. A word is called a universal word if it expresses a property (or relation) which belongs analytically to all the objects of a genus, any two objects being assigned to the same genus if their designations belong to the same syntactical genus. Since the rules of syntax of the word-language are not exactly established, and since linguistic usage varies considerably on just this point of the generic classification of words, our examples of universal words must always be given with the reservation that they are valid only for one particular use of language.

*Examples:* 1. 'Thing' is a universal word (provided that the designations of things constitute a genus). In the word-series 'dog', 'animal', 'living creature', 'thing', every word is a more comprehensive predicate than the previous one, but only the last is a universal predicate. In the corresponding series of sentences, 'Caro is a dog', '... is an animal', '... a living creature', 'Caro is a thing', the content is successively diminished. But the final sentence is fundamentally different from the preceding ones, in that its L-content is null and it is analytic. If in 'Caro is a thing', 'Caro' is replaced by any other thing-designation, the result is again an analytic sentence; but if 'Caro' is replaced by an expression which is not a thing-designation, the result is not a sentence at all.

2. 'Number' is a universal word (provided that the numerical expressions constitute a genus, as for instance in Languages I and II, as opposed to Russell's language where they form a part of the class-expressions of the second level). In the series of predicates, 'number of the form  $2^n + 1$ ', 'odd number', 'number', only the last is a universal predicate. In the series of sentences '7 has the form  $2^n + 1$ ', '7 is odd', '7 is a number', the second is already analytic, but only the third has the property that every sentence which results from it if '7' is replaced by another 3 is again analytic. If '7' is replaced by an expression which is not a 3, then no sentence results (on the assumptions made at the beginning).

*Examples of universal words:* 'thing', 'object', 'property', 'relation', 'fact', 'condition', 'process', 'event', 'action', 'spatial

point', 'spatial relation', 'space' (system of spatial points connected by spatial relations), 'temporal point', 'temporal relation', 'time' (system of temporal points connected by temporal relations); 'number', 'integer' (in I and II), 'real number' (in some systems), 'function', 'aggregate' (or 'class'); 'expression' (in a language of pure syntax); and many others.

We all use such universal words in our writings in almost every sentence, especially in the logic of science. That the use of these words is necessary is, however, only due to the deficiencies of the word-languages, i.e. to their inadequate syntactical structure. Every language can be transformed in such a way that universal words no longer occur in it, and this without any sacrifice either of expressiveness or conciseness.

We will now distinguish *two methods of employing* universal words (without making an exact and formal differentiation). The second method involves the material mode of speech, and will be dealt with later. The *first method* has to do with genuine object-sentences. Here a universal word serves to point out the syntactical genus of another expression. In some cases the syntactical genus of the other expression is already univocally determined by its form alone; the special indication of it by means of the added universal word is then only of use in making it more prominent, as an aid to the comprehension of the reader. In other cases, however, the addition of the universal word is necessary, since without it the other expression would be ambiguous. In all these cases of the first way of using it, the universal word is, so to speak, *dependent*; it is an *auxiliary grammatical symbol* added to another expression, something like an index.

*Examples:* 1. "By means of the process of crystallization...." Since crystallization belongs without any ambiguity to the genus of the processes, one might simply say: "By means of crystallization...." Here the universal word 'process' only serves to point out the genus to which the word 'crystallization' belongs. Similarly in the following examples: 2. "The condition of fatigue...." 3. "The number five...."

In the following sentences the universal word is necessary for univocality. It can be rendered superfluous by the use of a suffix ('7' and '7<sub>r</sub>') or by introducing various explicit expressions in place of the ambiguous one. 4a. "The integer 7...." 4b. "The real number 7...." 5a. "The condition of friendship...." 5b. "The relation of friendship...."

In the word-language universal words are especially needed as *auxiliary symbols for variables*, that is, in the formulation of universal and existential sentences, for the purpose of showing from which genus the substitution-values are to be taken. The word-language employs as variables words ('a', 'some', 'every', 'all', 'any', and so on) to which no particular genus is correlated as their realm of values. If, as is usual in the symbolic languages, different kinds of variables were used for the different genera of substitution-values, the addition of a universal word would be superfluous. Accordingly, the universal word here serves to some extent as an index to a variable, which indicates the genus of its substitution-values.

*Examples:* We will contrast the formulations of the word-language with those of the symbolic language of logics. 6a. "If any number..., then...." 6b. " $(x)(\dots \supset \dots)$ " (where 'x' is a  $\beta$ ). 7a. "There is a number...." 7b. " $(\exists x)(\dots)$ " (where 'x' is a  $\beta$ ). 8a. "I know a thing which...." 8b. " $(\exists x)(\dots)$ " (where 'x' is a thing-variable). 9a. "Every numerical property...." 9b. " $(F)(\dots)$ " (where 'F' is a  $\beta$  of which the values are  $\beta$ pr<sup>1</sup>). 10a. "There is a relation...." 10b. " $(\exists F)(\dots)$ " (where 'F' is a  $\beta$ ).

Wittgenstein [*Tractatus*] p. 84 says: "So the variable name 'x' is the proper sign of the pseudo-concept *object*. Wherever the word 'object' ('thing', 'entity', etc.) is rightly used, it is expressed in logical symbolism by the variable name.... Wherever it is used otherwise, i.e. as a proper concept-word, there arise senseless pseudo-propositions.... The same holds of the words 'complex', 'fact', 'function', 'number', etc. They all signify formal concepts and are presented in logical symbolism by variables, not by functions or classes (as Frege and Russell thought). Expressions like '1 is a number', 'there is only one number nought', and all like them are senseless." Here the correct view is taken that the universal words designate formal (in our terminology: syntactical) concepts (or, more exactly: are not syntactical but quasi-syntactical predicates) and that in the translation into a symbolic language they are translated into variables (or, again more exactly: they determine the kind of variables by which the words 'a', 'every', and so on, are translated; it is only the kind of variables that is determined, and not their design; in the examples given above, 'y' or 'z' can equally well be taken instead of 'x'). On the other hand, I do not share Wittgenstein's opinion that this method of employing the universal words is the only admissible one. We shall see later that, precisely in the most important cases, there is another method of use in which the universal word is employed independently ("as a proper concept-word"). There it is a question of sentences of the material mode of speech which are to be translated into syntactical sentences. Sentences of this kind with

a universal word are held by Wittgenstein to be nonsense, because he does not consider the correct formulation of syntactical sentences to be possible.

*The use of universal words in questions* in connection with one of the w... interrogatives ('what', 'who', 'where', 'which', etc.) is akin to their use in universal and existential sentences. Here also, in translation into a symbolic language, the universal word determines the choice of the kind of variable. A yes-or-no question demands either the affirmation or the denial of a certain sentence  $\mathcal{S}_1$ , that is to say, the assertion of either  $\mathcal{S}_1$  or  $\sim\mathcal{S}_1$ . [Example: The question "Is the table round?" requires us to assert in answer either: "the table is round" or: "the table is not round."] As contrasted with this, a w... question demands in reference to a certain sentential function the assertion of a closed full sentence (or sentential framework). In a symbolic question, the genus of the arguments requested is determined by the kind of the argument variables. In the word-languages this genus is indicated by means either of a specific w... interrogative (such as 'who', 'where', 'when') or of an unspecific w... interrogative (such as 'what', 'which') with an auxiliary universal word. Hence here also the universal word is, so to speak, an index to a variable.

*Examples:* 1. Suppose I want to ask someone to make an assertion of the form "Charles was — in Berlin", where a time-determination of which I am ignorant but which I wish to learn from the assertion is to take the place of the dash. Now the question must indicate by some means that the missing expression is to be a time-determination. If symbols are used this can be effected by giving a sentential function in which in the place of the argument a variable 't', which is established as a temporal variable, occurs. [To symbolize the question, the variable whose argument is requested must be bound by means of a question-operator, e.g. '(?t) (Charles was t in Berlin)'.] In the word-language the kind of argument requested is made known either by means of the specific question-word 'when' ("When was Charles in Berlin?") or by means of the universal word 'time' or 'temporal point' attached to an unspecific question-word ("At what time was Charles in Berlin?").

2. I wish to ask someone to make me an assertion of the form "Charles is — of Peter", where a relation-word is to take the place of the dash ('father', 'friend', 'teacher', or the like). The symbolic formulation of this question, by means of the relational variable 'R', is: '(?R) (R(Charles, Peter))'. Its formulation in the word-language by means of the addition of the universal word 'relation' to an unspecific question-word is: "What relation is there between Charles and Peter?"

## § 77. UNIVERSAL WORDS IN THE MATERIAL MODE OF SPEECH

In the first use of the universal word, which we have up to now been discussing, it appears as an auxiliary symbol determining the genus of another expression; it was found that, if in place of this other expression a symbol indicating its own genus was introduced, then the universal word could be dispensed with. As opposed to this, *in the second use the universal word appears as an independent expression*, which in the simplest form occupies the place of the predicate in the sentence in question. Sentences of this kind belong to the *material mode of speech*; for a universal word is here a quasi-syntactical predicate; the correlated syntactical predicate is that which designates the appertaining expressional genus. [Example: 'number' is a universal word because it belongs analytically to all the objects of a genus of objects, namely, that of the numbers; the correlated syntactical predicate is 'numerical expression' (or 'number-word'), since this applies to all expressions which designate a number. The sentence "Five is a number" is a quasi-syntactical sentence of the material mode of speech; a correlated syntactical sentence is "'Five' is a number-word".]

### Sentences with universal words

(Material mode of speech)

17a. The moon is a *thing*; five is not a thing, but a *number*.

### Syntactical sentences

(Formal mode of speech)

17b. 'Moon' is a thing-word (thing-name); 'five' is not a thing-word, but a number-word.

In 17a, as contrasted with sentences like "the thing moon...", "the number five...", the universal words 'thing' and 'number' are independent.

18a. A property is not a *thing*.

18b. An adjective (property-word) is not a thing-word.

That the formulation 18a is open to objection is shown by the following consideration. 18a violates the ordinary rule of types. This comes out particularly clearly when an attempt is made to formulate it symbolically, either by means of '(F) (Prop(F))  $\supset$   $\sim$  Thing(F))' or by means of '(x) (Prop(x))  $\supset$   $\sim$  Thing(x))'; in the first case, 'Thing(F)', and in the second case 'Prop(x)', is inconsistent with the rule of types. Therefore, if 18a is admitted as a sentence (it makes no difference whether true or false), by the usual syntax of logistics Russell's antinomy can be constructed. If this is to be avoided, special complicated syntactical rules are necessary.