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The Foundation of Knowledge

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ALL IMPORTANT ATTEMPTS at establishing a theory of knowledge grow out of the problem concerning the certainty of human knowledge. And this problem in turn originates in the wish for absolute certainty.

The insight that the statements of daily life and science can at best be only probable, that even the most general results of science, which all experiences confirm, can have only the character of hypotheses, has again and again stimulated philosophers since Descartes, and indeed, though less obviously, since ancient times, to search for an unshakeable, indubitable, foundation, a firm basis on which the uncertain structure of our knowledge could rest. The uncertainty of the structure was generally attributed to the fact that it was impossible, perhaps in principle, to construct a firmer one by the power of human thought. But this did not inhibit the search for the bedrock, which exists prior to all construction and does not itself vacillate.

This search is a praiseworthy, healthy effort, and it is prevalent even among "relativists" and "sceptics, who would rather not acknowledge it." It appears in different forms and leads to odd differences of opinion. The problem of "protocol statements," their structure and function, is the latest form in which the philosophy or rather the decisive empiricism of our day clothes the problem of the ultimate ground of knowledge.

What was originally meant by "protocol statements," as the name indicates, are those statements which express the *facts* with absolute simplicity, without any moulding, alteration or addition, in whose elaboration every science consists, and which precede all know-

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ing, every judgment regarding the world. It makes no sense to speak of uncertain facts. Only assertions, only our knowledge can be uncertain. If we succeed therefore in expressing the raw facts in "protocol statements," without any contamination, these appear to be the absolutely indubitable starting points of all knowledge. They are, to be sure, again abandoned the moment one goes over to statements which are actually of use in life or science (such a transition appears to be that from "singular" to "universal" statements), but they constitute nevertheless the firm basis to which all our cognitions owe whatever validity they may possess.

Moreover, it makes no difference whether or not these so-called protocol statements have ever actually been made, that is, actually uttered, written down or even only explicitly "thought"; it is required only that one know what statements form the basis for the notations which are actually made, and that these statements be at all times reconstructible. If for example an investigator makes a note, "Under such and such conditions the pointer stands at 10.5," he knows that this means "two black lines coincide," and that the words "under such and such conditions" (which we here imagine to be specified) are likewise to be resolved into definite protocol statements which, if he wished, he could in principle formulate exactly, although perhaps with difficulty.

It is clear, and is so far as I know disputed by no one, that knowledge in life and science in *some* sense *begins* with confirmation of facts, and that the "protocol statements" in which this occurs stand in the same sense at the *beginning* of science. What is this sense? Is "beginning" to be understood in the temporal or logical sense?

Here we already find much confusion and oscillation. If I said above that it is not important whether the decisive statements have been actually made or uttered, this means evidently that they need not stand at the beginning *temporally,* but can be arrived at later just as well if need be. The necessity for formulating them would arise when one wished to make clear to oneself the meaning of the statement that one had actually written down. Is the reference to protocol statements then to be understood in the *logical* sense? In that event they would be distinguished by definite logical properties, by their structure, their position in the system of science, and one would be confronted with the task of actually specifying these properties. In fact, this is the form in which, for example, Carnap used explicitly to put the question of protocol statements, while later[1] declaring it to be a question which is to be settled by an arbitrary decision.

1. See Carnap, "Über Protokollsätze," *Erkenntnis,* Vol. III, pp. 216 ff.

On the other hand, we find many expositions which seem to presuppose that by "protocol statements" only those assertions are to be understood that also temporally precede the other assertions of science. And is this not correct? One must bear in mind that it is a matter of the ultimate basis of knowledge of *reality,* and that it is not sufficient for this to treat statements as, so to speak, "ideal constructions" (as one used to say in Platonic fashion), but rather that one must concern oneself with real occurrences, with events that take place in time, in which the making of judgments consists, hence with psychic acts of "thought," or physical acts of "speaking" or "writing." Since psychic acts of judgment seem suitable for establishing inter-subjectively valid knowledge only when translated into verbal or written expressions (that is, into a physical system of symbols) "protocol statements" come to be regarded as certain spoken, written or printed sentences, i.e., certain symbol-complexes of sounds or printer's ink, which when translated from the common abbreviations into full-fledged speech, would mean something like: "Mr. N. N. at such and such a time observed so and so at such and such a place." (This view was adopted particularly by O. Neurath).[2] As a matter of fact, when we retrace the path by which we actually arrive at all our knowledge, we doubtless always come up against this same source: printed sentences in books, words out of the mouth of a teacher, our own observations (in the latter case we are ourselves N. N.).

On this view protocol statements would be real happenings in the world and would temporally precede the other real processes in which the "construction of science," or indeed the production of an individual's knowledge consists.

I do not know to what extent the distinction made here between the logical and temporal priority of protocol statements corresponds to differences in the views actually held by certain authors—but that is not important. For we are not concerned to determine who expressed the correct view, but what the correct view *is*. And for this our distinction between the two points of view will serve well enough.

As a matter of fact, these two views are compatible. For the statements that register simple data of observation and stand temporally at the beginning could at the same time be those that by virtue of their structure would have to constitute the logical starting-point of science.

2. Neurath, "Protokollsätze," *Erkenntnis,* Vol. III, pp. 104 ff. (This article is translated in the present volume, see pp. 199-208 above.)

II

The question which will first interest us is this: What progress is achieved by formulating the problem of the ultimate basis of knowledge in terms of protocol statements? The answer to this question will itself pave the way to a solution of the problem.

I think it a great improvement in method to try to aim at the basis of knowledge by looking not for the primary *facts* but for the primary *sentences*. But I also think that this advantage was not made the most of, perhaps because of a failure to realize that what was at issue, fundamentally, was just the old problem of the basis. I believe, in fact, that the position to which the consideration of protocol statements has led is not tenable. It results in a peculiar relativism, which appears to be a necessary consequence of the view that protocol statements are empirical facts upon which the edifice of science is subsequently built.

That is to say: when protocol statements are conceived in this manner, then directly one raises the question of the certainty with which one may assert their truth, one must grant that they are exposed to all possible doubts.

There appears in a book a sentence which says, for example, that N. N. used such and such an instrument to make such and such an observation. One may under certain circumstances have the greatest confidence in this sentence. Nevertheless, it and the observation it records, can never be considered *absolutely* certain. For the possibilities of error are innumerable. N. N. can inadvertently or intentionally have described something that does not accurately represent the observed fact; in writing it down or printing it, an error may have crept in. Indeed the assumption that the symbols of a book retain their form even for an instant and do not "of themselves" change into new sentences is an empirical hypothesis, which as such can never be strictly verified. For every verification would rest on assumptions of the same sort and on the presupposition that our memory does not deceive us at least during a brief interval, and so on.

This means, of course—and some of our authors have pointed this out almost with a note of triumph—that protocol statements, so conceived, have in principle exactly the same character as all the other statements of science: they are hypotheses, nothing but hypotheses. They are anything but incontrovertible, and one can use them in the construction of the system of science only so long as they are sup-

ported by, or at least not contradicted by, other hypotheses. We therefore always reserve the right to make protocol statements subject to correction, and such corrections, quite often indeed, do occur when we eliminate certain protocol statements and declare that they must have been the result of some error.

Even in the case of statements which we ourselves have put forward we do not in principle exclude the possibility of error. We grant that our mind at the moment the judgment was made may have been wholly confused, and that an experience which we now say we had two minutes ago may upon later examination be found to have been an hallucination, or even one that never took place at all.

Thus it is clear that on this view of protocol statements they do not provide one who is in search of a firm basis of knowledge with anything of the sort. On the contrary, the actual result is that one ends by abandoning the original distinction between protocol and other statements as meaningless. Thus we come to understand how people come to think[3] that any statements of science can be selected at will and called "protocol statements," and that it is simply a question of convenience which are chosen.

But can we admit this? Are there really only reasons of convenience? It is not rather a matter of where the particular statements come from, what is their origin, their history? In general, what is meant here by convenience? What is the end that one pursues in making and selecting statements?

The end can be no other than that of science itself, namely, that of affording a *true* description of the facts. For us it is self-evident that the problem of the basis of knowledge is nothing other than the question of the criterion of truth. Surely the reason for bringing in the term "protocol statement" in the first place was that it should serve to mark out certain statements by the truth of which the truth of all other statements comes to be measured, as by a measuring rod. But according to the viewpoint just described this measuring rod would have shown itself to be as relative as, say, all the measuring rods of physics. And it is this view with its consequences that has been commended as the banishing of the last remnant of "absolutism" from philosophy.[4]

But what then remains at all as a criterion of truth? Since the proposal is not that all scientific assertions must accord with certain definite protocol statements, but rather that all statements shall accord with one another, with the result that every single one is consid-

3. K. Popper as quoted by Carnap, *op. cit., Erkenntnis,* Vol. III, p. 223.
4. Carnap, *op. cit.,* p. 228.

ered as, in principle, corrigible, truth can consist only in a *mutual agreement of statements.*

III

This view, which has been expressly formulated and represented in this context, for example, by Neurath, is well known from the history of recent philosophy. In England it is usually called the "coherence theory of truth," and contrasted with the older "correspondence theory." It is to be observed that the expression "theory" is quite inappropriate. For observations on the nature of truth have a quite different character from scientific theories, which always consist of a system of hypotheses.

The contrast between the two views is generally expressed as follows: according to the traditional one, the truth of a statement consists in its agreement with the facts, while according to the other, the coherence theory, it consists in its agreement with the system of other statements.

I shall not in general pursue the question here whether the latter view can not also be interpreted in a way that draws attention to something quite correct (namely, to the fact that in a quite definite sense we cannot "go beyond language" as Wittgenstein puts it). I have here rather to show that, on the interpretation required in the present context, it is quite untenable.

If the truth of a statement is to consist in its coherence or agreement with the other statements, one must be clear as to what one understands by "agreement," and *which* statements are meant by "other."

The first point can be settled easily. Since it cannot be meant that the statement to be tested asserts the same thing as the others, it remains only that they must be *compatible* with it, that is, that no contradictions exist between them. Truth would consist simply in absence of contradiction. But on the question whether truth can be identified simply with the absence of contradiction, there ought to be no further discussion. It should long since have been generally acknowledged that only in the case of statements of a tautological nature are truth (if one will apply this term at all) and absence of contradiction to be equated, as for instance with the statements of pure geometry. But with such statements every connection with reality is purposely dissolved; they are only formulas within a determinate calculus; it makes no sense in the case of the statements of *pure* geometry to ask whether they agree with the facts of the world: they need only be compatible with the axioms

arbitrarily laid down at the beginning (in addition, it is usually also required that they follow from them) in order to be called true or correct. We have before us precisely what was earlier called *formal* truth and distinguished from *material* truth.

The latter is the truth of synthetic statements, assertions of matters of fact, and if one wishes to describe them by help of the concept of absence of contradiction, of agreement with other statements, one can do so only if one says that they may not contradict *very special* statements, namely just those that express "facts of immediate observation." The criterion of truth cannot be compatibility with any statements whatever, but agreement is required with certain exceptional statements which are not chosen arbitrarily at all. In other words, the criterion of absence of contradiction does not by itself suffice for material truth. It is, rather, entirely a matter of compatibility with very special peculiar statements. And for this compatibility there is no reason not to use—indeed I consider there is every justification for using—the good old expression "agreement with reality."

The astounding error of the "coherence theory" can be explained only by the fact that its defenders and expositors were thinking only of such statements as actually occur in science, and took them as their only examples. Under these conditions the relation of non-contradiction was in fact sufficient, but only because these statements are of a very special character. They have, that is, in a certain sense (to be explained presently) their "origin" in observation statements, they derive, as one may confidently say in the traditional way of speaking, "from experience."

If one is to take coherence seriously as a general criterion of truth, then one must consider arbitrary fairy stories to be as true as a historical report, or as statements in a textbook of chemistry, provided the story is constructed in such a way that no contradiction ever arises. I can depict by help of fantasy a grotesque world full of bizarre adventures: the coherence philosopher must believe in the truth of my account provided only I take care of the mutual compatibility of my statements, and also take the precaution of avoiding any collision with the usual description of the world, by placing the scene of my story on a distant star, where no observation is possible. Indeed, strictly speaking, I don't even require this precaution; I can just as well demand that the others have to adapt themselves to my description; and not the other way round. They cannot then object that, say, this happening runs counter to the observations, for according

to the coherence theory there is no question of observations, but only of the compatibility of statements.

Since no one dreams of holding the statements of a story book true and those of a text of physics false, the coherence view fails utterly. Something more, that is, must be added to coherence, namely, a principle in terms of which the compatibility is to be established, and this would alone then be the actual criterion.

If I am given a set of statements, among which are found some that contradict each other, I can establish consistency in a number of ways, by, for example, on one occasion selecting certain statements and abandoning or altering them and on another occasion doing the same with the other statements that contradict the first.

Thus the coherence theory is shown to be logically impossible; it fails altogether to give an unambiguous criterion of truth, for by means of it I can arrive at any number of consistent systems of statements which are incompatible with one another.

The only way to avoid this absurdity is not to allow any statements whatever to be abandoned or altered, but rather to specify those that are to be maintained, to which the remainder have to be accommodated.

IV

The coherence theory is thus disposed of, and we have in the meantime arrived at the second point of our critical considerations, namely, at the question whether *all* statements are corrigible, or whether there are also those that cannot be shaken. These latter would of course constitute the "basis" of all knowledge which we have been seeking, without so far being able to take any step towards it.

By what mark, then, are we to distinguish these statements which themselves remain unaltered, while all others must be brought into agreement with them? We shall in what follows call them not "protocol statements," but "basic statements" for it is quite dubious whether they occur at all among the protocols of science.

The most obvious recourse would doubtless be to find the rule for which we are searching in some kind of economy principle, namely, to say: we are to choose those as basic statements whose retention requires a *minimum* of alteration in the whole system of statements in order to rid it of all contradictions.

It is worth noticing that such an economy principle would not enable us to pick out certain statements as being basic once and for all, for it might happen that with the progress of science the

basic statements that served as such up to a given moment would be again degraded, if it appeared more economical to abandon them in favor of newly found statements which from that time on—until further notice—would play the basic role. This would, of course, no longer be the pure coherence viewpoint, but one based on economy; "relativity," however, would characterize it also.

There seems to me no question but that the representatives of the view we have been criticizing did in fact take the economy principle as their guiding light, whether explicitly or implicitly; I have therefore already assumed above that on the relativity view there are purposive grounds which determine the selection of protocol statements, and I asked: Can we admit this?

I now answer this question in the negative. It is in fact not economic purposiveness but quite other characteristics which distinguish the genuine basic statements.

The procedure for choosing these statements would be called economic if it consisted say in conforming to the opinions (or "protocol statements") of the majority of investigators. Now it is of course the case that we do not doubt the existence of a fact, for example a fact of geography or history, or even of a natural law, when we find that in the relevant contexts its existence is very frequently reported. It does not occur to us in those cases to wish to investigate the matter ourselves. We acquiesce in what is universally acknowledged. But this is explained by the fact that we have precise knowledge of the manner in which such factual statements tend to be made, and that this manner wins our confidence; it is not that it agrees with the view of the majority. Quite the contrary, it could only arrive at universal acceptance because everyone feels the same confidence. Whether and to what extent we hold a statement to be corrigible or annulable depends solely on its *origin,* and (apart from very special cases) not at all upon whether maintaining it requires the correction of very many other statements and perhaps a reorganization of the whole system of knowledge.

Before one can apply the principle of economy one must know to *which* statements it is to be applied. And if the principle were the *only* decisive rule the answer could only be: to *all* that are asserted with any claim to validity or have ever been so asserted. Indeed, the phrase "with any claim to validity" should be omitted, for how should we distinguish such statements from those which were asserted quite arbitrarily, as jokes or with intent to deceive? This distinction cannot even be formulated without taking into considera-

tion *the derivation* of the statements. So we find ourselves once more referred to the question of their origin. Without having classified statements according to their origin, any application of the economy principle of agreement would be quite absurd. But once one has examined the statements with respect to their origin it becomes immediately obvious that one has thereby already ordered them in terms of their validity, and that there is no place left for the application of the principle of economy (apart from certain very special cases in still unfinished areas of science). We can see also that the establishment of this order points the way to the basis of which we are in search.

V

Here of course the greatest care is necessary. For we are treading on the path which has been followed from ancient times by all those who have ever embarked upon the journey towards the ultimate grounds of truth. And always they have failed to reach the goal. In the ordering of statements according to their origin which I undertake for the purpose of judging their certainty, I start by assigning a special place to those that I make *myself*. And here a secondary position is occupied by those that lie in the past, for we believe that their certainty can be impaired by "errors of memory"—and indeed in general the more so the farther back in time they lie. On the other hand, the statements which stand at the top, free from all doubt, are those that express facts of one's own "perception," or whatever you like to call it. But in spite of the fact that statements of this sort seem so simple and clear, philosophers have found themselves in a hopeless labyrinth the moment they actually attempted to use them as the foundation of all knowledge. Some puzzling sections of this labyrinth are for example those formulations and deductions that have occupied the center of so many philosophical disputes under the heading "evidence of inner perception," "solipsism," "solipsism of the present moment," "self-conscious certainty," etc. The Cartesian *cogito ergo sum* is the best-known of the destinations to which this path has led—a terminating point to which indeed Augustine had already pushed through. And concerning *cogito ergo sum* our eyes have today been sufficiently opened: we know that it is a mere pseudo-statement, which does not become genuine by being expressed in the form *"cogitatio est"*—"the contents of consciousness exist."[5] Such a statement, which does not express anything itself, cannot in any sense serve as the basis of anything.

5. Cf. "Positivismus und Realismus," *Erkenntnis*, Vol. III, p. 20 (see the present volume, p. 82 above).

It is not itself a cognition, and none rests upon it. It cannot lend certainty to any cognition.

There exists therefore the greatest danger that in following the path recommended one will arrive at empty verbiage instead of the basis one seeks. The critical theory of protocol statements originated indeed in the wish to avoid this danger. But the way out proposed by it is unsatisfactory. Its *essential* deficiency lies in ignoring the different rank of statements, which expresses itself most clearly in the fact that for the system of science which one takes to be the "right" one, one's *own* statements in the end play the only decisive role.

It would be theoretically conceivable that my own observations in no way substantiate the assertions made about the world by other men. It might be that all the books that I read, all the teachers that I hear are in perfect agreement among themselves, that they never contradict one another, but that they are simply incompatible with a large part of my own observation statements. (Certain difficulties would in this case accompany the problem of learning the language and its use in communication, but they can be removed by means of certain assumptions concerning the place in which the contradictions are to appear.) According to the view we have been criticizing I would in such a case simply have to sacrifice my own "protocol statements," for they would be opposed by the overwhelming mass of other statements which would be in mutual agreement themselves, and it would be impossible to expect that these should be corrected in accordance with my own limited fragmentary experience.

But what would actually happen in such a case? Well, under no circumstances would I abandon my own observation statements. On the contrary, I find that I can accept only a system of knowledge into which they fit unmutilated. And I can always construct such a system. I need only view the others as dreaming fools, in whose madness lies a remarkable method, or—to express it more objectively—I would say that the others live in a different world from mine, which has just so much in common with mine as to make it possible to achieve understanding by means of the same language. In any case no matter what world picture I construct, I would test its truth always in terms of my own experience. I would never permit anyone to take this support from me: my own observation statements would always be the ultimate criterion. I should, so to speak, exclaim "What I see, I see!"

VI

In the light of these preliminary critical remarks, it is clear where we have to look for the solution of these confusing difficulties: we must use the Cartesian road in so far as it is good and passable, but then be careful to avoid falling into the *cogito ergo sum* and related nonsense. We effect this by making clear to ourselves the role which really belongs to the statements expressing "the immediately observed."

What actually lies behind one's saying that they are "absolutely certain"? And in what sense may one describe them as the ultimate ground of all knowledge?

Let us consider the second question first. If we imagine that I at once recorded every observation—and it is in principle indifferent whether this is done on paper or in memory—and then began from that point the construction of science, I should have before me genuine "protocol statements" which stood temporally at the beginning of knowledge. From them would gradually arise the rest of the statements of science, by means of the process called "induction," which consists in nothing else than that I am stimulated or induced by the protocol statements to establish tentative generalizations (hypotheses), from which those first statements, but also an endless number of others, follow logically. If now these others express *the same* as is expressed by later observation statements that are obtained under quite definite conditions which are exactly specifiable beforehand, then the hypotheses are considered to be confirmed so long as no observation statements appear that stand in contradiction to the statements derived from the hypotheses and thus to the hypotheses themselves. So long as this does not occur we believe ourselves to have hit correctly upon a law of nature. Induction is thus nothing but methodically conducted guessing, a psychological, biological process whose conduct has certainly nothing to do with "logic."

In this way the actual procedure of science is described schematically. It is evident what role is played in it by the statements concerning what is "immediately perceived." They are not identical with those written down or memorized, with what can correctly be called "protocol statements," but they are the *occasions* of their formation. The protocol statements observed in a book or memory are, as we acknowledged long ago, so far as their validity goes, doubtless to be compared to hypotheses. For, when we have such a statement before us, it is a mere assumption that it is true, that it

agrees with the observation statements that give rise to it. (Indeed it may have been occasioned by no observation statements, but derived from some game or other.) What I call an observation statement cannot be identical with a genuine protocol statement, if only because in a certain sense it cannot be written down at all—a point which we shall presently discuss.

Thus in the schema of the building up of knowledge that I have described, the part played by observation statements is first that of standing temporally at the beginning of the whole process, stimulating it and setting it going. How much of their content enters into knowledge remains in principle at first undetermined. One can thus with some justice see in the observation statements the ultimate origin of all knowledge. But should they be described as the basis, as the ultimate certain ground? This can hardly be maintained, for this "origin" stands in a too questionable relation to the edifice of knowledge. But in addition we have conceived of the true process as schematically simplified. In reality what is actually expressed in protocols stands in a less close connection with the observed, and in general one ought not to assume that any pure observation statements ever slip in between the observation and the "protocol."

But now a second function appears to belong to these statements about the immediately perceived, these "confirmations"* as we may also call them, namely, the corroboration of hypotheses, their *verification.*

Science makes prophecies that are tested by "experience." Its essential function consists in making predictions. It says, for example: "If at such and such a time you look through a telescope adjusted in such and such a manner you will see a point of light (a star) in coincidence with a black mark (cross wires)." Let us assume that in following out these instructions the predicted experience actually occurs. This means that we make an anticipated

* The term used by the author is "Konstatierung" which he sometimes equates with "observation statement" i.e., "Beobachtungssatz," and generally tends to quote, in a manner indicating his awareness that it is a somewhat unusual usage and perhaps a not altogether adequate technical term. Wilfred Sellars in a recently published essay ("Empiricism and the Philosophy of Mind," *Minnesota Studies in the Philosophy of Science,* Volume I, University of Minnesota Press, 1956) uses the term "report" in referring to what seems to be the kind of statement Schlick is discussing. I do not adopt this term, despite some undoubted advantages it has over "confirmation," because of the close connection that "Konstatierung" has with confirmation or verification, a connection so close that Schlick uses the same term unquoted to refer to confirmation. Furthermore, as the text shows, confirmations are never false, as Schlick understands them; but this is certainly not a characteristic of reports, as the term "report" is used in everyday or even scientific language. (Translator's note.)

confirmation, we pronounce an expected judgment of observation, we obtain thereby a feeling of *fulfilment,* a quite characteristic satisfaction: we are *satisfied.* One is fully justified in saying that the confirmation or observation statements have fulfilled their true mission as soon as we obtain this peculiar satisfaction.

And it is obtained in the very moment in which the confirmation takes place, in which the observation statement is made. This is of the utmost importance. For thus the function of the statements about the immediately experienced itself lies in the immediate present. Indeed we saw that they have so to speak no duration, that the moment they are gone one has at one's disposal in their place inscriptions, or memory traces, that can play only the role of hypotheses and thereby lack ultimate certainty. One cannot build any logically tenable structure upon the confirmations, for they are gone the moment one begins to construct. If they stand at the beginning of the process of cognition they are logically of no use. Quite otherwise however if they stand at the end; they bring verification (or also falsification) to completion, and in the moment of their occurrence they have already fulfilled their duty. Logically nothing more depends on them, no conclusions are drawn from them. They constitute an absolute end.

Of course, psychologically and biologically a new process of cognition begins with the satisfaction they create: the hypotheses whose verification ends in them are considered to be upheld, and the formulation of more general hypotheses is sought, the guessing and search for universal laws goes on. The observation statements constitute the origin and stimuli for these events that follow in time, in the sense described earlier.

It seems to me that by means of these considerations a new and clear light is cast upon the problem of the ultimate basis of knowledge, and we see clearly how the construction of the system of knowledge takes place and what role the "confirmations" play in it.

Cognition is originally a means in the service of life. In order to find his way about in his environment and to adjust his actions to events, man must be able to foresee these events to a certain extent. For this he makes use of universal statements, cognitions, and he can make use of them only in so far as what has been predicted actually occurs. Now in science this character of cognition remains wholly unaltered; the only difference is that it no longer serves the purposes of life, is not sought because of its utility. With the confirmation of prediction the scientific goal is achieved: the joy in cognition is the joy of verification, the triumphant feeling of

having guessed correctly. And it is this that the observation statements bring about. In them science as it were achieves its goal: it is for their sake that it exists. The question hidden behind the problem of the absolutely certain basis of knowledge is, as it were, that of the legitimacy of this satisfaction with which verification fills us. Have our predictions actually come true? In every single case of verification or falsification a "confirmation" answers unambiguously with a yes or a no, with joy of fulfilment or disappointment. The confirmations are final.

Finality is a very fitting word to characterize the function of observation statements. They are an absolute end. In them the task of cognition at this point is fulfilled. That a new task begins with the pleasure in which they culminate, and with the hypotheses that they leave behind does not concern them. Science does not rest upon them but leads to them, and they indicate that it has led correctly. They are really the absolute fixed points; it gives us joy to reach them, even if we cannot stand upon them.

VII

In what does this fixity consist? This brings us to the question we postponed earlier: in what sense can one speak of observation statements as being "absolutely certain"?

I should like to throw light on this by first saying something about a quite different kind of statement, namely about *analytic* statements. I will then compare these to the "confirmations." In the case of analytic statements it is well known that the question of their validity constitutes no problem. They hold *a priori;* one cannot and should not try to look to experience for proof of their correctness for they say nothing whatever about objects of experience. For this reason only "formal truth" pertains to them, i.e., they are not "true" because they correctly express some fact. What makes them true is just their being correctly constructed, i.e. their standing in agreement with our arbitrarily established definitions.

However, certain philosophical writers have thought themselves obliged to ask: Yes, but how do I know in an individual case whether a statement really stands in agreement with the definition, whether it is really analytic and therefore holds without question? Must I not carry in my head these definitions, the meaning of all the words that are used when I speak or hear or read the statement even if it endures only for a second? But can I be sure that my psychological capacities suffice for this? Is it not possible, for example, that at the end

of the statement I should have forgotten or incorrectly remembered the beginning? Must I not thus agree that for psychological reasons I can never be sure of the validity of an analytic judgment also?

To this there is the following answer: the possibility of a failure of the psychic mechanism must of course always be granted, but the consequences that follow from it are not correctly described in the sceptical questions just raised.

It can be that owing to a weakness of memory, and a thousand other causes, we do not understand a statement, or understand it erroneously (i.e. differently from the way it was intended)—but what does this signify? Well, so long as I have not understood a sentence it is not a statement at all for me, but a mere series of words, of sounds or written signs. In this case there is no problem, for only of a statement, not of an uncomprehended series of words, can one ask whether it is analytic or synthetic. But if I have misinterpreted a series of words, but nevertheless interpreted it as a statement, then I know of just *this* statement whether it is analytic or synthetic and therefore valid *a priori* or not. One may not suppose that I could comprehend a statement as such and still be in doubt concerning its analytic character. For if it is analytic I have understood it only when I have understood it as analytic. To understand means nothing else, that is, than to be clear about the rules governing the use of the words in question; but it is precisely these rules of usage that make statements analytic. If I do not know whether a complex of words constitutes an analytic statement or not, this simply means that at that moment I lack the rules of usage: that therefore I have simply not understood the statement. Thus the case is that either I have understood nothing at all, and then nothing more is to be said, or I know whether the statement *which* I understand is synthetic or analytic (which of course does not presuppose that these words hover before me, that I am even acquainted with them). In the case of an analytic statement I know at one and the same time that it is valid, that formal truth belongs to it.

The above doubt concerning the validity of analytic statements was therefore out of order. I may indeed doubt whether I have correctly grasped the meaning of some complex of signs, in fact whether I shall ever understand the meaning of any sequence of words. But I cannot raise the question whether I can ascertain the correctness of an analytic statement. For to understand its meaning and to note its *a priori* validity are in an analytic statement *one and the same* process. In contrast, a synthetic assertion is characterized by the fact that I do not in the least know whether it is

true or false if I have only ascertained its meaning. Its truth is determined only by comparison with experience. The process of grasping the meaning is here quite distinct from the process of verification.

There is but one exception to this. And we thus return to our "confirmations." These, that is, are always of the form "Here now so and so," for example "Here two black points coincide," or "Here yellow borders on blue," or also "Here now pain," etc. What is common to all these assertions is that *demonstrative* terms occur in them which have the sense of a present gesture, i.e. their rules of usage provide that in making the statements in which they occur some experience is had, the attention is directed upon something observed. What is referred to by such words as "here," "now," "this here," cannot be communicated by means of general definitions in words, but only by means of them together with pointings or gestures. "This here" has meaning only in connection with a gesture. In order therefore to understand the meaning of such an observation statement one must simultaneously execute the gesture, one must somehow point to reality.

In other words: I can understand the meaning of a "confirmation" only by, and when, comparing it with the facts, thus carrying out that process which is necessary for the verification of all synthetic statements. While in the case of all other synthetic statements determining the meaning is separate from, distinguishable from, determining the truth, in the case of observation statements they coincide, just as in the case of analytic statements. However different therefore "confirmations" are from analytic statements, they have in common that the occasion of understanding them is at the same time that of verifying them: I grasp their meaning at the same time as I grasp their truth. In the case of a confirmation it makes as little sense to ask whether I might be deceived regarding its truth as in the case of a tautology. Both are absolutely valid. However, while the analytic, tautological, statement is empty of content, the observation statement supplies us with the satisfaction of genuine knowledge of reality.

It has become clear, we may hope, that here everything depends on the characteristic of immediacy which is peculiar to observation statements and to which they owe their value and disvalue; the value of absolute validity, and the disvalue of uselessness as an abiding foundation.

A misunderstanding of this nature is responsible for most of the unhappy problems of protocol statements with which our en-

quiry began. If I make the confirmation "Here now blue," this is *not* the same as the protocol statement "M. S. perceived blue on the nth of April 1934 at such and such a time and such and such a place." The latter statement is a hypothesis and as such always characterized by uncertainty. The latter statement is equivalent to "M. S. made . . . (here time and place are to be given) the confirmation 'here now blue.'" And that this assertion is not identical with the confirmation occurring in it is clear. In protocol statements there is *always* mention of perceptions (or they are to be added in thought—the identity of the perceiving observer is important for a scientific protocol), while they are never mentioned in confirmations. A genuine confirmation cannot be written down, for as soon as I inscribe the demonstratives "here," "now," they lose their meaning. Neither can they be replaced by an indication of time and place, for as soon as one attempts to do this, the result, as we saw, is that one unavoidably substitutes for the observation statement a protocol statement which as such has a wholly different nature.

VIII

I believe that the problem of the basis of knowledge is now clarified.

If science is taken to be a system of statements in which one's interest as a logician is confined to their logical connections, the question of its basis, which would then be a 'logical" question, can be answered quite arbitrarily. For one is free to define the basis as one wishes. In an abstract system of statements there is no priority and no posteriority. For instance, the most general statements of science, thus those that are normally selected as axioms, could be regarded as its ultimate foundation; but this name could just as well be reserved for the most particular statements, which would then more or less actually correspond to the protocols written down. Or any other choice would be possible. But all the statements of science are collectively and individually *hypotheses* the moment one considers them from the point of view of their truth value, their validity.

If attention is directed upon the relation of science to reality the system of its statements is seen to be that which it really is, namely, a means of finding one's way among the facts; of arriving at the joy of confirmation, the feeling of finality. The problem of the "basis" changes then automatically into that of the unshakeable point of contact between knowledge and reality. We have come to know these absolutely fixed points of contact, the confirmations, in

their individuality: they are the only synthetic statements that are not *hypotheses*. They do not in any way lie at the base of science; but like a flame, cognition, as it were, licks out to them, reaching each but for a moment and then at once consuming it. And newly fed and strengthened, it flames onward to the next.

These moments of fulfilment and combustion are what is essential. All the light of knowledge comes from them. And it is for the source of this light the philosopher is really inquiring when he seeks the ultimate basis of all knowledge.