

from all such psychological components if it is to correspond to the practice of thinking.

Meaning is a function of propositions; it is that function which is expressed in their usefulness as instruments for our actions upon the world. Meaning is not a substantial something attached to a proposition, like "ideas" or "impressions," but a quality; the physical things called "symbols" have a certain function as to operations on all other things—this function is called meaning. It is this functional conception of meaning only which opens the field for the introduction of the concept of probability into the theory of meaning. Probability meaning, as we defined it, must be considered within the framework of this functional theory. It seems to me that only this combination with the probability theory can provide the functional theory of meaning with the tools necessary for a satisfactory theory of scientific propositions, a theory adapted to the actual procedure of science. This is what is shown by the analysis of the relations between impressions and the external world.

### CHAPTER III

#### AN INQUIRY CONCERNING IMPRESSIONS

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#### § 19. Do we observe impressions?

The foregoing chapter was based on the presupposition that impressions are observable facts. We introduced them because we found that physical observations, even of the most concrete type, can never be maintained with certainty; so we tried to reduce them to more elementary facts and arrived at impressions as the immediately given facts. It may be doubtful, we said, that there is a table before me; but I cannot doubt that at least I have the impression of a table. Thus impressions came to be the very archetype of observable facts.

This train of thought is of convincing power, and there are not many philosophers who have been able to resist it.<sup>1</sup> As for myself, I believed in it for a long time, until I discovered at last some of its weak points. Although there is something correct in these reflections, it seems to me now that there is something in them which is essentially false.

<sup>1</sup> If I am to give some names among this exceptional group, I have to mention first Richard Avenarius, whose struggle against the "introjection" of the psychical phenomena and for a "Restitution des natürlichen Weltbegriffs" is the first clear refutation of a standpoint which materialists at all times had already attacked with much ardor but with insufficient means (Avenarius, *Der menschliche Weltbegriff* [Leipzig, 1891]). Recently, Watson in his behaviorism (*Behavior* [New York, 1914]), and Carnap and Neurath in the behavioristic turn they gave to the Vienna positivism (*Erkenntnis*, III [1932], 107, 204, 215) developed similar ideas and in a much more easily accessible and therefore more convincing form. My following exposition, though related to behaviorism, differs however in some respects from it (cf. § 26). Pragmatists also have resisted the positivistic dogma; Dewey, in *Experience and Nature* (Chicago, 1925), gives a very clear refutation of the idea that impressions or sensations are observable facts. Cf. also the very convincing form of behaviorism developed by E. C. Tolman, "Psychology versus Immediate Experience," *Philosophy of Science*, II, No. 3 (1935), 356.

I cannot admit that impressions have the character of observable facts. What I observe are things, not impressions. I see tables, and houses, and thermometers, and trees, and men, and the sun, and many other things in the sphere of crude physical objects; but I have never seen my impression of these things. I hear tones, and melodies, and speeches; but I do not hear my hearing them. I feel heat, and cold, and solidity; but I do not feel my feeling them. It may perhaps be answered: It is true that you do not see your seeing, or hear your hearing; but you sense it in another way, with an "internal" sense which furnishes a direct sensation of impressions corresponding to sensations of external objects furnished by the other senses. But, though this conception of an internal sense has been maintained since Locke by many philosophers, I confess I do not find such a sense within myself.

I do not say that I doubt the existence of my impressions. I believe that there are impressions; but I have never *sensed* them. When I consider this question in an unprejudiced manner, I find that I *infer* the existence of my impressions. To show the structure of this inference, let me give an example taken from physics.

Electricity is an entity which has never been observed by any man. We cannot see it; we infer it. We see copper wires and observe that these wires have different qualities without a visible change in them: sometimes, if we touch them, we feel a shock, and sometimes not; sometimes a lamp connected with the wires lights, sometimes not. To justify this difference of observable facts connected with copper wires we assume that there is an unobservable thing in them which we call electricity.

Of the same type, it seems to me, is the inference leading to impressions. We experience that the things we observe have different qualities, just as have the copper wires. The

main difference is given by the two worlds of dreams and wakefulness: sometimes the things we observe remain for a long time, sometimes only for a short time; sometimes they show constant and persisting qualities, sometimes they offer curious and surprising aspects and combinations. To explain this difference, I introduce the distinction between the physical thing and my impression of the thing; I say that usually there are both physical things and impressions within me but that sometimes there are impressions only without corresponding physical things. The responsibility for the confused and curious things is thus taken away from the "external" things and transferred to another thing called "I." But with this conception the world is doubled; we maintain that also in the regular case of well-ordered things there is the duplicity of external things and my impressions. We need this assumption to justify the explanation that in the case of the confused world one of the two worlds, the external world, is dropped. The distinction between the world of things and the world of impressions or representations is therefore the result of epistemological reflection. It is well known how long a time it took for mankind, in its historical development, to discover this distinction; even today primitive peoples show a confusion of both worlds—they take dreams for realities and substantiate actions of the waking world by experiences they had in dreams (cf. § 25). There is no direct awareness of impressions or representations; we must learn to infer whether the things we observe are "real" or if they are only "apparent," this term meaning that there are processes in my body alone which are not accompanied in the usual fashion by physical things.

I do not say that this reduplication is a false theory; on the contrary, it is a very good one. It explains many facts such as the difference between the image of the concave

mirror and the material table, or between the flash of light produced by a stroke with the fist and the flash of light produced by a lighthouse. In these cases there are external things of quite different character, though *I see* the same external things; and the duplicity theory explains this by assuming that different external objects may produce the same internal process within me. Thus again the distinction between the external thing and the internal process of sensation furnishes a reasonable explanation. This theory, therefore, is as good as any physical theory of a similar kind; but it is a theory and not an observation.

This abstract character of impressions has perhaps been obscured by a prevalent attention to the sense of touch. As for optical impressions it is obvious that I do not see them; but for the tactile impressions it may appear permissible to say that I feel them. This, however, seems to me to be a confusion due to a certain peculiarity of the sense of touch. If we touch an object, we localize it at a spatial point which is situated on the boundaries of our body and not at a distance from the body, as in seeing. We can therefore say that the object we feel is in our body, and thus the idea arises that we feel an impression. But in touching we always feel things. If we slide our hands along the edge of a table, we feel the table in the same sense as we see it with our eyes; blind men, who have had more practice than we, know this and are accustomed to attach the conception of sensing external things to their experiences of touching.

The matter is still more complicated by the fact that in certain cases the object which we sense may be a process occurring within our body. This is the case when we feel pains or hunger. But what we then feel is an occurrence in the same sense as when we see an object with our eyes; just as we see our body, we may feel it. That feelings

like these have the character of a sensation is shown by the fact that they always appear accompanied by a definite localization within our body. We feel headaches in the head, hunger in the abdomen, an overstrained muscle in the leg; and there is a location also if we sense some feelings spread all over the body, like the feeling of fatigue. We are entitled to say that in such cases we sense the inner state of our body; but then there is this object alone, just as in the case of an optical sensation of a distant thing. A sensation of a sensation never occurs; there is only one sensation, its object is an external thing, or a state of our body, and that there is a sensation is not observed but inferred.

What is given are things, or states of things, including states of my body—not impressions. The cause of this confusion of an inference with an observation is to be found, to a certain degree, in the fact that given things have certain qualities which, as investigation shows, are not due to them, or not to them alone. Things are blue, or red, or warm, or hard; but science demonstrates that these qualities do not belong to the external things. To state this more precisely: Science shows that things have these qualities only when they enter into a relation with our body and not when they simply act on one another. When a blue body is put before the objective of a camera, it acts upon the film in the camera; but, if we try to understand this relation, we have to ascribe to the “blue” body the quality of emitting electrical oscillations which have no similarity to the color “blue.” When a hot body is put into cold water, the water starts bubbling and fizzling and betrays in this way the occurrence of some mechanical energy which has nothing in common with the quality “hot.” It is thus demonstrated that certain qualities are not qualities of the external thing alone but of the interaction between the external thing and our body. Such qualities are rightly called sec-

ondary qualities. Interactional qualities of such a specific kind may appear also through the mutual combination of external things without interference of the human body. In general, light rays do not change the bodies they strike; but, when they fall upon a photographic plate, they blacken it and may draw the silhouette of an intermediate body on the plate. Thus light rays possess a "power to draw" not as a quality of themselves in isolation but as an interactional quality occurring only in combination with certain other things. If this other thing is the human body, the interactional quality acquires a special importance; it is this kind of interactional quality which is called secondary quality, according to the traditional philosophic usage.

It is to be kept in mind, however, that the secondary qualities are *qualities* of things, not *things*. The confusion of this difference, the illegitimate objectivization of qualities, is one of the reasons for the false conception that impressions are observed. Philosophers talk of "the blue" which they observe, of "the hot," of "the bitter"; but this is an abuse of words. We never see "the blue," but blue things; we never taste "the bitter," but bitter things. Things as they are given appear provided with certain qualities; so we had better avoid expressions like "We observe these qualities," and replace them by "We observe things having these qualities." The false expression that "we observe qualities," together with the right idea that these qualities are due to a co-operation of our body, leads to the conception that we observe impressions. This seems to be the psychological origin of the untenable observation theory of impressions. Critical analysis replaces it by an inference theory of impressions.

The abstract character of impressions is indicated also by the way in which we describe impressions linguistically. There are no words denoting impressions. There are words

for the secondary qualities; but no words exist for impressions as events in the whole. We describe an impression by denoting a thing which may produce such an impression. We say: "I had the impression of a red square," or "I had the impression of a flash of light." What are the things denoted here? A red square is a piece of red paper or of other material square in form; and a flash of light is a quantity of light as produced by lightning or by light-houses. We add to such words the term "impression of . . . .," and characterize in this way the impression. But this is an indirect way of description; we are obliged to employ it because the corresponding words of daily language concern only observable things and not impressions.

### § 20. The weight of impression propositions

The result of the foregoing section may be stated in the form that impression propositions are indirect, not direct. It is a great mistake to believe that proceeding from observation statements of physics to impression statements is a movement from "not wholly direct" statements toward "direct" statements, or at least toward "more direct" statements. The converse is true; this way leads to "less direct" statements, impression statements being the result of an inference and not of observation. The maximum of "direct character" is with the observation statements; from these there is one way of inference leading to the indirect propositions of physics, and another way of inference leading to the indirect propositions concerning "my impressions."

But, if we now proceed to analyze the weight belonging to indirect propositions of these two kinds, we find a remarkable difference. The weight of the indirect propositions of physics is inferior to the weight of observation propositions; this is due to the fact that the indirect

propositions of physics have a surplus meaning as compared with the observation propositions. The indirect propositions concerning impressions, however, have less meaning than observation propositions, and therefore they have a superior weight. As this inverse behavior in respect of weight is a feature of very high importance, it must be explained in detail.

We have pointed out that an impression proposition is formulated in language by reference to physical objects which produce this impression. This is an essential feature because there are no other means to describe an impression. The description, however, is not performed by pointing to one object alone; we add some other objects which would produce the same impression. If we say, "I had the impression of a flash of light," this reads: "I had an impression such as is produced by the beam of a lighthouse, *or* by a flash of lightning, *or* by a blow with the fist on my eye." Impressions are therefore characterized by a disjunction of physical objects. The occurrence of this disjunction produces the diminution of intension; we shall point out later how this is performed. Now we must consider more precisely the disjunction occurring here.

It is not always necessary to enumerate all the terms of this disjunction. This can be avoided by the use of the concept of similarity; and we must show how this is to be done.

The objects we sense are not always different; some of them are very similar. If I look at this table, and then look five minutes later, the second table is similar to the first one; I usually even say that it is the same table. This is a bit imprudent, as far as it concerns only what I see just now; I had better say, "The table Number 1 is in the relation of similarity to the table Number 2." Whether this similarity is to be interpreted as identity of the physical

objects depends on a number of other circumstances. The table Number 3, which I saw in another room, is also in the relation of similarity to the two other tables, but it is not physically identical. This is of course not directly observed, as little as the physical identity in the other case is observed; it is inferred from some other relations between other things. Thus the relation of physical identity expresses a complex of elementary relations. The primary relation is that of similarity; and our observation statements consist primarily in maintaining that the relation of similarity is valid between several things.

By this means we can characterize the terms of the disjunction demarcating an impression. For example, we can speak of "an impression produced by the beam of a lighthouse, or by another physical object which stands in the relation of similarity to such a searchlight." It is to be noted that this concept of similarity is different from "physical similarity," since a light ray would be similar, in our sense, to a blow with the fist on the eye. Our similarity is what philosophers call "similarity of impression"; but it is to be remarked that we need not introduce the term "impression" to characterize this similarity—we can define the relation by pointing out a quality of things as we see them. We could say that it is a quality of things as a primitive man sees them, i.e., a man who was never perverted by philosophical analysis. Let us call this relation *immediate similarity*.<sup>2</sup>

Since we did not employ the term "impression" in the construction of our disjunction, we can drop it and express our statement in the form, "There is a thing *a*, or another thing standing in the relation of immediate similarity to

<sup>2</sup> The importance of the similarity relation for the logical construction of basic statements was first pointed out by Carnap in his *Der logische Aufbau der Welt* (Leipzig and Berlin, 1928).

$a_i$ ." Let us call this statement the *similarity disjunction*. From its form as a disjunction, it becomes obvious that a diminution of intension is performed; to state, "There is the thing  $a_i$  or another thing," states less than, "There is the thing  $a_i$ ." Our disjunction, however, is not yet sufficiently extended; we must expand it by a further term, and in this expansion the word "impression" will enter. The term to be added concerns the phenomenon of the dream.

If we "see the thing  $a_i$  in a dream," there is no physical thing at all, but only an impression as it would have been produced by the thing  $a_i$ , or another thing similar to it. It is true, we do not know this while dreaming; but we know it afterward, and therefore we must take account of this case by adding this possibility to our disjunction.

The impression is my own internal state as it is produced by  $a_i$ , or a thing similar to  $a_i$ . To understand this completely, we ought to give an explanation of the term "my own"; however, this may be postponed to a later section (§ 28). Independently of this explanation, we may say that the term "impression" is defined by means of the concept of immediate similarity. But, although it is defined with reference to the object  $a_i$  or to similar objects, the statement that there is, besides the object, an impression as an internal state of my mind, adds something to the statement about the object alone. Thus stating, "There is the object  $a_i$ , or an object similar to it, and in addition a corresponding impression," would be an increase of intension.

We add, however, the new term not in the form of a conjunction but in the form of a disjunction; so we obtain a further diminution of intension, compared with the similarity disjunction so far considered. The new statement reads: "There is the thing  $a_i$ , or a thing similar to  $a_i$ , or there is no observed physical thing, but only an impression as it would have been produced by the thing  $a_i$ ." We call

this statement the *longer similarity disjunction*; the previously constructed disjunction may be called *shorter similarity disjunction*, if it is distinguished from the longer one.

Let us denote by  $S'(a_i)$  a thing similar to  $a_i$ ; the sign  $S'(a_i)$  thus already means a disjunction, constructed of all things similar to  $a_i$ . By  $I'(a_i)$  we denote an impression of the type produced by  $a_i$ . The sign  $\vee$  reads "or." Then our two disjunctions have the form

Shorter similarity disjunction:  $a_i \vee S'(a_i)$

Longer similarity disjunction:  $a_i \vee S'(a_i) \vee I'(a_i)$

We shall call statements of such a kind *basic statements*. After having construed their logical form, it is easy for us to show that they lead to a higher weight. This is due to the diminution of intension; the calculus of probability expresses this relation by an inequality<sup>3</sup> stating that the probability of a disjunction is greater than (in exceptional cases equal to, but never smaller than) the probability of each of the single terms of the disjunction. This is why the transition to basic sentences involves an increase of the weight; we need no "intuition" to prove this, or any "immediate knowledge of the certainty of the given" —we need nothing but the rules of probability. The longer similarity disjunction has a still higher weight than the shorter one.

We may construct a third form of basic statement by adding the assumption that there is also an impression in the case of the first terms of the disjunction. That is, we also state the occurrence of the impression in the case of the existence of the physical object. This combination may be called the *impression form*; it reads in symbols

Impression form:  $a_i \cdot I'(a_i) \vee S'(a_i) \cdot I'(a_i) \vee I'(a_i)$

<sup>3</sup> Cf. the author's *Wahrscheinlichkeitslehre* (Leiden, 1935), p. 97, eq. (13).

The introduction of the impression into the first terms means a diminution of the weight; but we may conceive it as highly probable that there is always within myself an internal process when I see a thing, and so the weight of the impression disjunction is not much less than the weight of the longer similarity disjunction. According to a rule of logistics,<sup>4</sup> the disjunction occurring in the impression form is equivalent to the term  $I'(a_i)$ ; so we get the simple expression

Impression form:  $I'(a_i)$

We see that the third form of basic statements is nothing but the statement that there is an impression of the type produced by the thing  $a_i$ . This is the form usually employed by positivism.

We add some examples. A shorter similarity disjunction is expressed in the statement: "There is a searchlight or a thing similar to it." Things of the latter kind would be a flash of lightning, or a blow of the fist. The transition to the longer similarity disjunction would be performed by adding "or I have only the impression of a searchlight." This would include the case that I am perhaps dreaming while stating the sentence. If it appears unjustified to anyone to call a blow of the fist a thing similar to a searchlight, he may cross this blow out of the shorter similarity disjunction and include it in the term  $I'(a_i)$  of the longer one. This is a matter of definition only. The transition to the impression disjunction would read: "There is an impression of the type as produced by a searchlight." The latter statement, though of a rather high weight, is not quite as certain as the statement using the longer similarity disjunction; but the difference of degree is very small.

The weight obtained for the longer similarity disjunction

<sup>4</sup> Cf. *ibid.*, p. 27, 4c\*.

must now be given closer consideration. Is it equal to absolute certainty? Positivists and other philosophers have maintained this idea; for them impressions are indubitable facts, and they emphasize that just on this account impressions form the very basis of our knowledge of the external world. Our refusal to accept impressions as observable facts must influence this conception; we have to enter into an independent investigation of the weight occurring here. The guiding principle in this inquiry will be our interpretation of impression sentences as "similarity disjunctions."

We may take for granted that sentences of the kind, "There is a flash of lightning," are not absolutely certain. The increase of the weight toward certainty, if it comes about at all, must be performed by the introduction of the "or." Let us ask, first, whether the rules of probability can teach us something about this question.

There is a principle of probability stating that a complete disjunction  $A \vee \bar{A}$  (i.e.,  $A$  or non- $A$ ) has the degree of probability 1. Incomplete disjunctions have, in general, a smaller degree of probability; it is not excluded, however, that they have the probability 1. Now it is obvious that the similarity disjunction is incomplete. This must be the case because otherwise it would state nothing; to say, "There is a flash of lightning, or there is not," would be an empty assertion and could not furnish a basis suitable for information about facts. It follows that the rules of probability do not teach us anything about the question of the certainty of the similarity disjunction; they leave the question entirely open.

We must, therefore, look to other reflections as a guide to an answer to our question. We can obtain an answer if we consider the possibility of a later refutation of a basic

sentence. For this purpose we must notice the meaning of the relevant terms.

If we say, "There is a flash of lightning, or an immediately similar object, or nothing but an impression of this type," the description is furnished by means of the physical thing "flash of lightning." This is because this term of the disjunction defines the other ones; the immediately similar objects are determinate only because they are referred to the flash of lightning. So too is the impression. Now the term "flash of lightning" denotes an object which has been formerly seen; the basic statement, therefore, gives a comparison between a present object and a formerly seen object. We admit that this comparison does not presuppose that the formerly seen object really was a flash of lightning, in the physical sense of this word; it is sufficient that it was an object which *I called* a flash of lightning. But this restriction does not influence our result that the comparison concerns both a present and a formerly seen object. Such a comparison, however, makes use of the reliability of memory and so is not absolutely sure. It turns out, therefore, that a basic statement is not absolutely certain.

The objection may be raised that a comparison with formerly seen physical objects should be avoided, and that a basic statement is to concern the present fact only, as it is. But such a reduction would make the basic statement empty. Its content is just that there is a similarity between the present object and one formerly seen; it is by means of this relation that the present object is described. Otherwise the basic statement would consist in attaching an individual symbol, say a number, to the present object; but the introduction of such a symbol would help us in no way, since we could not make use of it to construct a comparison with other things. Only in attaching the same

symbol to different objects, do we arrive at the possibility of constructing relations between the objects; but in the distribution of the symbols the elementary comparison is then already performed. It is the function of the basic statements to formulate these elementary comparisons, under the viewpoint of immediate similarity; this is why basic statements can be used as a basis for further inferences.

We see that the conception of basic statements as absolutely certain propositions is untenable. This conception disregards the fact that basic statements never concern the present object only, but formerly experienced objects also—a feature which is essential to basic statements.

Our analysis of the weight of impression statements leads us to a psychological explanation of the theory which determines the positivist to believe in the character of impressions as elementary observational facts. The passage to less doubtful propositions is erroneously taken as the passage to more intuitive propositions. This conception is suggested by an analogous process for concepts of a higher level. Passing from "There is an electrical discharge from a cloud to the ground" to "There is a flash of lightning" is a transition to a more certain proposition and, jointly, to a more intuitive one. Passing from "There is a flash of lightning" to "I have the impression of a flash of lightning" is a transition, once more, toward a more certain proposition, but to a less intuitive one. Whereas the line of certainty permanently ascends in this transition, the line of intuitiveness ascends first, and later on descends, with a maximum on a certain middle level. We may be allowed to symbolize this idea by the diagram of Figure 3, although we do not intend to make proposals as to a practicable measurement of the degree of intuitiveness. It is the confusion of both lines which causes the positivistic conception

of the immediate character of impressions—a theory which breaks down before the criticism of an unprejudiced psychological examination.

The higher degree of certainty co-ordinated to the impression statement is due to its character of being a disjunction. A disjunction does not lead, however, to an intuitive “more general thing”; the generalization is expressible in the terms of language only, but is not accom-

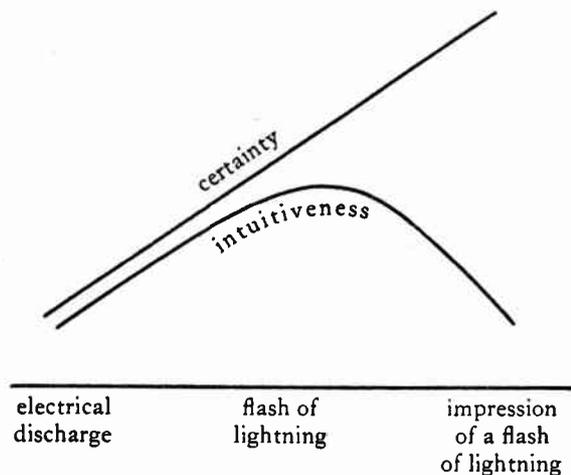


FIG. 3.—Transition from higher physical statements through observation propositions to impression propositions.

panied by a corresponding intuitive process. If “impression” is not identified with the inner process inferred but not observed, we should be obliged to interpret it as such a “thing defined by a disjunction,” a thing, for example, which is either the flash of lightning or a thing similar to it. We cannot imagine such a “general thing”; what we see are always particular things, including qualities which perhaps are not objectively justified. We see the image in the mirror as a bodily thing; if we know this observation to be

doubtful, we may reduce the intension of our statement by adding an “or,” i.e., by saying, “There is either a bodily thing or only a bundle of light rays similar to it”—but we cannot see a “more general thing” such as would correspond to this disjunction. Positivism, with its conception of impressions as intuitive objects, has fallen a victim to the old metaphysical tendency to replace linguistic processes by intuitive entities. We cannot admit, however, that the nominalistic dissolution of conceptual realism, elsewhere the genuine tendency of the positivistic program, has to be stopped in face of the problem of the basic elements of knowledge.

### § 21. Further reduction of basic statements

Our conclusion concerning the uncertainty of basic statements raises the question whether we may carry on the method of reduction and arrive at statements of another kind which will be absolutely certain. This is to say that the direction toward certainty may be pursued a stretch farther; it will be no objection to this procedure if we admit that we perform this by reflection and not by an analysis of what is “immediately given.”

Reflections of this kind may be substantiated by the fact that a direct comparison between a previously seen object and a present one is not possible. It is true that a basic statement gives a comparison between two objects and not a simple noting of one object; but what are compared are not objects at different temporal positions. When we see the present object, we no longer see the previously seen one; so we cannot compare them. Instead of the previously seen object we have only an image of it, furnished by memory; thus what we actually compare is a recollection image, on the one hand, and an object, on the other.

What is a recollection image? We know, in having such

an image, that, though we have the feeling of seeing an object, there is no object at all but only an internal process in the mind which we call an impression. But this is known only, not seen. What we see is not the impression but an object; and thus there is no other means of describing the impression than by describing the object which we have the feeling of having seen. This object is called a recollection image. The word "image" is to express that we do not believe in the reality of this object but that it is a representative of the original physical object. It would not be right, however, to say that the recollection image is "in" my head. In my head there is an internal process which I do not directly observe. The image seen is outside my head, in the place of a physical object although we know that there is no object at all.

Returning to our reflections concerning basic statements, we must admit that the comparison there spoken of is not performed directly but only by means of the intercalated recollection image. The comparison is divided into two processes: a comparison between the present thing and the recollection image and, second, a comparison between the recollection image and the previously seen thing. Now only the first comparison can be directly performed; the second has the character of a hypothesis: it is the assumption that the present recollection image is similar to the previously seen object. This is what is called the assumption of the *reliability of memory*.

We see that the analysis of this psychological process may indeed be interpreted as justifying the contention that our basic statements are not final elements but are capable of a further reduction which leads to new basic statements. Only the comparison between the present thing and the recollection image is a basic statement, properly speaking; the comparison between the recollection image and the

previously seen object is performed by an inference, not by observation. Let us call the first comparison a *basic statement in the narrower sense*, whereas our former basic statements, combining both comparisons, may be denoted as *basic statements in the wider sense*. We are to say, then, that basic statements in the narrower sense contain only comparisons between present things. Basic statements in the wider sense are indirect sentences, based on basic statements in the narrower sense.

Before turning to the question of the certainty of the new basic statements, we must investigate the transition from basic statements in the narrower sense to basic statements in the wider sense. We said that this transition depends on the presupposition of the reliability of memory. This demands a more precise formulation.

Imagine that there is a certain confusion in our memory so that recollection images seen today, although caused by green bodies seen yesterday, are similar to red bodies seen yesterday, whereas the recollection images seen today, although caused by red bodies seen yesterday, are similar to green bodies seen yesterday. It would be impossible ever to discover this confusion because the comparison cannot be performed; we cannot directly compare a thing recollected today with a thing seen yesterday. So the supposed confusion would be meaningless, according to our definition of meaning. If the hypothesis of the reliability of memory should state that this confusion does not happen, the hypothesis would be a pseudo-statement and not worthy of further discussion. But we need not interpret the hypothesis in such a naïve manner; we can give it another interpretation which leads to a verifiable content (cf. also § 27).

To show this, let us introduce a method by which the recollection images are eliminated. It is true that, when

we call a certain object a table, we compare it to a recollection image called forth by the word "table"; but we might employ another method. For this purpose, we might make use of our collection of specimens which contains specimens of all things, together with their designations (§ 5). When I say, "This is a table," I would then compare the object denoted by the word "table" in our collection of specimens to the object in question; so the recollection image would be replaced by a specimen taken from our collection, and the comparison would involve two physical objects but no recollection image.

We can say now what reliability of memory is: Memory is reliable when the method of recollection images leads to the same basic statements, in the narrower sense, as the method employing the collection of specimens. With this procedure the reliability of memory is defined in a testable way; it is the way which we actually use whenever the reliability of our memory is in question. If we doubt that our recollection image of a certain thing is right, we procure a new impression by looking at the thing. Sometimes the control is made by means of scientific textbooks and dictionaries; as these books do not furnish direct impressions but only definitions of the words, this procedure is to be conceived as the reduction of a recollection image to other recollection images of higher reliability.

In actual thinking the described strict method of comparison by means of the collection of specimens cannot be carried through on account of its technical complication. It is replaced by the function of memory. The reliability of memory can be controlled, as we have seen; this control, however, can only be performed in some special cases. For the other cases, we make use of an induction, supposing that memory is reliable also when it is not controlled. This hypothesis, however, lowers the certainty of the results.

Basic statements in the wider sense, therefore, are less reliable than basic statements in the narrower sense. The first result of our inquiry, therefore, is a confirmation of the idea that our former basic statements are not absolutely certain.

The transition from basic statements in the narrower sense to basic statements in the wider sense obtains a very simple form by means of the described hypothesis of the reliability of memory. If any basic statement in the narrower sense is given, we have only to replace the term "recollection image of the previously seen object" by the term "the previously seen object" and thus obtain the corresponding basic statement in the wider sense. The transition is performed, therefore, if we drop the reference to the recollection image and give to the basic statement the common form of a comparison between objects at different positions in time.

The transition in question contains a further hypothesis which we must now point out. It is the presupposition that objects which stood in the relation of immediate similarity, at a former observation, stand in the same relation when they are observed later on. We will call this idea the *hypothesis of the constancy of the perceptual function*. We must show how this assumption can be examined.

This examination can be performed by means of our collection of specimens. In this there are several objects bearing the names "flash of lightning," "beam of a lighthouse," "blow of the fist on the eye," etc., which show, in simultaneous comparison, the relation of immediate similarity. If we regard the same objects on the following day, we find that they still show the same relation. This is what is meant by constancy of the perceptual function.

Now it is obvious that this constancy will not be shown by all objects. It depends, in the common phraseology, on

the physical constancy of the objects; if the objects change, the perceptual relations change. A tree seen in summer may be immediately similar to the color named "green" in our color table, whereas in winter it is immediately similar to the color named "white"—because snow fell in the botany department of our collection of specimens. But there are objects which do not change; more precisely formulated: If the objects are under certain observable conditions, they do not change. It is a matter of experience to find out these conditions. But if we have found them, we believe in the constancy of the similarity relation. This is not only a presupposition concerning the existence of invariant physical objects. It might happen that two objects show constantly no difference in respect to physical reactions of all possible kinds but that they look similar on one day and different on another day. The physical reactions of which we speak consist in chains of happenings, the results of which are observed by us; for this observation we may presuppose the constancy of the perceptual function and arrive at the result that the original objects did not change physically. But the direct observation of the objects may show that the objects are not similar, although they were before. Two rectangular sheets of white paper may look similar on one day, whereas the next day they do not look similar, and instead one of them may look similar to a circular sheet of paper—although an examination by means of rules and meter bars shows that the paper still has the rectangular form. The similarity relation depends not only on the physical qualities of the objects but also on a certain constancy of the sensational processes in the human body; this is what we call the *constancy of the perceptual function*.

This constancy is presupposed also in the transition from basic statements in the narrower sense to basic statements

in the wider sense. It is contained in the use of certain words denoting, in current language, impressions. We say "the impression of a white rectangle" and suppose in using this term that all objects which furnish this impression, i.e., which are immediately similar to a rectangular sheet of white paper, will also be immediately similar later on. Without this presupposition, the use of words as we employ them would be ambiguous; we should always have to add a time index, such as, "the impression of a flashlight as it looked on March 5, 1936." The meaning of the term "as it looked" becomes clarified if we replace the impression form by the similarity disjunction. This disjunction in the shorter form would read: "An object of the class of things similar to a flashlight, on March 5, 1936." The so-called "descriptions of impressions" occurring in usual basic statements are permissible only if the hypothesis of the constancy of the perceptual function is valid.

We know, however, that it is not always valid. There are well-known exceptions: putting our hand into a pot of water of a certain definite temperature, we may sometimes sense the water as warm, sometimes as cold, according as we have immediately before put our hand into colder or warmer water. In this case the water always shows the same objective relations to other physical bodies, expressed by the constant registering of the thermometer; but we sense it differently. Thus the perceptual function here is not constant. The case is different from the foregoing example (which we constructed artificially) in so far as the perceptual function is not a variable dependent on time directly but on the nature of the physical objects perceived immediately before. So we have to add not a time index but a remark concerning the objects previously perceived: we have to say, for example, "the feeling of hot water as it occurs after touching cold water." Other examples of this

kind occur in optical sensations; the sensed color of a surface may depend on the color of the surrounding surface. In this case it is the spatially adjacent sensation and not the temporally adjacent one which is to be named in the exact description. Psychology has pointed out a number of similar cases, and we take notice of them in our observational technique. Setting aside these exceptional cases, we keep in general to the hypothesis of the constancy of the perceptual function.

This hypothesis, therefore, introduces a further element of uncertainty into basic statements in the wider sense. For it is obvious that, practically speaking, we can control this hypothesis only in certain cases and extend its validity from these by inductive inferences. If we add this to the foregoing results concerning the reliability of memory, we find that basic statements in the wider sense are by no means absolutely certain.

Our investigation thus confirms our idea that, if there are absolutely certain statements at all, these can only be basic statements in the narrower sense. The question remains whether statements of this kind may be absolutely certain or not.

The answer to this question can now be given. It reads that, even if there are such statements, it will never be possible to formulate them. Every formulation occupies a stretch of time, and during this time there may occur certain changes of the kind already indicated. We imagined, in our discussion of the reliability of memory and of the constancy of the perceptual function, a rather slow change of conditions, which furnishes observable differences only from day to day; but we cannot exclude the possibility that there is, or will be, a much quicker change, in which minutes or seconds take the place of the days in our examples. Human forms of speech cannot cope with such

possibilities. Our basic statements in the narrower sense are, strictly speaking, basic statements in the wider sense in which the involved time interval is of short duration. Consequently there is only an approximation to basic statements in the narrower sense; and this implies that there is in any utterable proposition only an approximation to absolute certainty. Absolute certainty is a limit which we shall never reach.

We may be glad if there is at least an unlimited approximation, i.e., if it is possible to increase the certainty to any desired degree of probability, less by a small difference  $\epsilon$  than certainty. There is, however, no proof that even this is so. Quantum mechanics showed that this unlimited approximation is not valid for predictions concerning future events; it may be that the same restriction holds for statements concerning the immediate present. However, this is of no important practical bearing because all statements which we can construct in practice are statements for which a remnant of uncertainty persists.

### § 22. Weight as the sole predicate of propositions

Our inquiry concerning impression statements has far-reaching consequences for the theory of truth.

Throughout the first chapter we entertained the presupposition that propositions about concrete physical facts, which we called observation propositions, are absolutely verifiable. A more precise analysis showed that this conception is untenable, that even for such statements only a weight can be determined. With the object of obtaining more reliable statements, we then introduced impression propositions; throughout the second chapter we upheld the supposition that at least these propositions are capable of absolute verification. We have discovered now that even this is not tenable, that impression propositions also can

only be judged by the category of weight. Thus there are left no propositions at all which can be absolutely verified. The predicate of truth-value of a proposition, therefore, is a mere fictive quality; its place is in an ideal world of science only, whereas actual science cannot make use of it. Actual science instead employs throughout the predicate of weight. We have shown, in the first place, that this predicate takes the place of the truth-value in all cases in which the latter cannot be determined; so we introduced it for propositions about the future, so long as their events are not yet realized, and for indirect propositions, which remain unverified for all time. We see now that all propositions are, strictly speaking, of the latter type; that all propositions are indirect propositions and never exactly verifiable. So the predicate of weight has entirely superseded the predicate of truth-value and remains our only measure for judging propositions.

If we, nevertheless, speak of the truth-value of a proposition, this is only a schematization. We regard a high weight as equivalent to truth, and a low weight as equivalent to falsehood; the intermediate domain is called "indeterminate." The conception of science as a system of true propositions is therefore nothing but a schematization. For many purposes this conception may be a sufficient approximation; but, for an exact epistemological inquiry, this conception cannot furnish a satisfactory basis. An approximation is permissible always within a certain domain of application only, whereas outside these boundaries it leads to grave incongruity with the factual situation. The same holds for the schematized conception of science as a system of true propositions. In the hands of careful and not too consistent philosophers, it has not done much mischief; it has led instead to some unanswerable questions which have been modestly put outside the domain of solv-

able problems. But in the hands of pretentious and consistent logicians this schematized conception has produced serious misunderstandings of science and has led to grave distortions in the interpretation of scientific methods. In case of discrepancies between the constructed epistemological system and actual science the full weight of deductive method has outbalanced the unprejudiced view of the factual situation; instead of the deductive method being turned backward to a revision of the presupposed structure of science, this schematized structure has been abused as a support for a radical misinterpretation of the very nature of science.

This description seems to me to apply to the positivistic theory of meaning which makes meaning dependent on verifiability. So long as the demand of verifiability is not overstrained, that is, so long as a highly probable proposition is considered as true, this theory is a useful approximation; the greater part of scientific propositions can be retained as meaningful, future propositions and all kinds of indirect sentences included. But with the introduction of higher pretensions into the methods of analysis, a great number of the propositions of science are pointed out as unverifiable; the positivistic theory of meaning, then, expels these propositions from the domain of meaning and substitutes for them other sentences which, for any unprejudiced eye, cannot perform the functions of the condemned propositions. This procedure is carried through with more or less consistency; but none of its representatives has as yet had the courage to carry his principle through to its ultimate consequence and to admit that there are no meaningful sentences at all left in science.

The probability theory of meaning is free from such a dogmatism. If it admits verifiability in the sense of an approximation, it does not fail to recognize that even an

approximate verification is possible for a group of sentences only and that in general the predicate of weight cannot be dispensed with. Thus the theory of meaning is constructed in a form wide enough to include as meaningful both verifiable propositions and propositions for which only a weight is determinable. When at last it is pointed out that absolute verification is a fiction never realized in practical science, this theory of meaning is not shaken; it is able to furnish the form of a generalized theory of meaning in which weight is the only predicate on which meaning is based. In this way a more general verifiability theory of meaning has been constructed in which verification is to denote only the determination of a degree of probability.

It is of some interest to survey, from this point of view, the train of our ideas. Our investigation started with the supposition that there are three predicates of propositions: meaning, truth-value, and predictional value. Applying the positivistic theory of meaning, we found that the predicate of meaning can be reduced to the predicate of truth-value; but expanding these considerations to indirect propositions, we discovered that this reduction furnished a too narrow concept of meaning and that we had to add the predicate of predictional value in order to obtain a wider basis for meaning. Verifiability in the wider sense, including the determinability of a predictional value, or weight—this was the quality upon which we made meaning dependent. Our last inquiry into the nature of impressions showed, however, that there are no propositions at all which are absolutely verifiable. It is in all cases the predicate of predictional value alone on which meaning is based. In this way the triplet of predicates, meaning, truth-value, and predictional value, has been reduced to one of these terms, to predictional value or weight. The concept of truth appears as an idealization of a weight of high degree,

and the concept of meaning is the quality of being accessible to the determination of a weight. What we introduced as a bridge from the known to the unknown turns out to be the only measure of scientific thinking; the bridging principle has absorbed the other members of the triplet of predicates of propositions.

This result is in strong contrast to certain ideas which have been developed in defense of the truth theory of meaning. It has been argued that predictional value concerns only our subjective expectation and that it cannot furnish a basis for the definition of meaning; inversely, it is said, a predictional value presupposes meaning in the sense of absolute verifiability because we can expect only events which later on can be judged as having happened or not having happened. This objection is an example of the erroneous consequences to which the schematized conception of science may lead. It mistakes the fact that the so-called verification of the event, after its happening or not happening, is nothing but another determination of a weight, with the only difference that this weight is of a higher degree and can be approximately identified with truth. We pointed this out in the example of the cubical world, showing that a direct view through the walls could not absolutely convince us that there are birds outside but would only furnish us some new physical objects, the nature and localization of which would have to be found out by means of probability inferences. It is true that these inferences furnish a higher degree of probability for the hypothesis of the birds than could be obtained before. But this is all that can be maintained; there is no absolute verification. It is therefore not true that probability inferences can refer only to facts which are accessible to direct verification by other methods. The argument on which the objection is based would read in a precise formulation:

We can only expect, with any degree of predictational value, events which later on will obtain a higher predictational value. In this form, however, the lack of cogency is obvious.

The probability theory of meaning cannot be reduced to the truth theory of meaning; on the contrary, the latter must be conceived as a schematized form of the former, valid only in the sense of an approximation.

If, from this point of view, we take up the question of the positivistic construction of the world, we find that the introduction of the impression basis does not free us from probability statements, not even at the very basis itself. It is not only the inferences from the basis to external things which have a probability character; the same is valid for every statement concerning basic facts. This is the last blow against the positivistic theory, shaking even the last remnant of absolutism still left to it after the rejection of its wider pretensions. The psychological origin of this theory was the tendency to restore absolute certainty to all statements about the world; if statements about impressions were absolutely certain, and if statements about physical things were nothing but equivalent transformations of impression statements, this aim would be reached. We found in the preceding chapter that the second part of this theory is not tenable, that the relations between impressions and physical facts are probability relations, and that the certainty of the basis cannot be transferred to our knowledge of external objects. In the present chapter we found that a similar fate attends the basis itself in the light of a precise examination. There is no certainty at all remaining—all that we know can be maintained with probability only. There is no Archimedean point of absolute certainty left to which to attach our knowledge of the world; all we have is an elastic net of probability connections floating in open space.

#### CHAPTER IV

### THE PROJECTIVE CONSTRUCTION OF THE WORLD ON THE CONCRETA BASIS