

Unity of Science Forum

1938

DECEMBER

The Unity of Science Forum is conducted by the International Institute for the Unity of Science (Executive Committee: Philipp Frank, Charles W. Morris, Otto Neurath. Address: 267 Obrechtstraat, The Hague, Holland) This monthly communication forms a section of the Dutch periodical „Synthese“.

EMPIRICISM AND THE LANGUAGE OF SCIENCE

by RUDOLF CARNAP

The *chief problem of empiricism*¹⁾ can be formulated in this way: if we wish to construct a language for the whole of science, what kind of sentences shall we admit? Complete verifiability — in the sense of possibility of definitive, irrevocable establishment of truth (or falsity) — cannot be required. By such a requirement the following kinds of sentences would be excluded from the language to be constructed: a) universal sentences (“laws”), because of the unlimited number of instances; b) singular sentences about physical things, because of the unlimited number of predictions deducible from a sentence of this kind with the help of physical laws; c) perhaps all sentences.

Therefore in the case of many — and perhaps all — sentences we have to do with (gradual) *confirmation rather than* with (absolute) *verification*. A sentence may be confirmed to a higher and higher degree if the number of positive instances of that sentence that are confirmed by observations increases more and more. A sentence must be *confirmable* — i.e. capable of being confirmed at least to some degree — rather than verifiable, in order to have empirical content.

Let us suppose we are going to construct an empirical language for the whole of science, including all special fields, e.g. physics, biology, psychology, social science. At which point in the system of terms shall we begin with the construction? At the one end of the system there are the elementary, concrete terms like ‘blue’ and ‘hard’, which can be applied on the basis of simple observations. On the other end there are the abstract terms as they occur in the most general laws of theoretical physics, e.g. ‘electric field’. There are now two possible ways open to

¹⁾ The views here indicated are explained and discussed in greater detail in the paper “Testability and Meaning”, *Philos. of Science*, Vol. 3, 1936, and 4, 1937.

us²⁾, each of them having certain advantages. The first way consists in taking elementary terms as primitive and then introducing other terms, up to the highest level of abstraction. If a suitable set of elementary terms is chosen as a basis, every other term of the language of science is either definable or at least reducible to them. (A term is called reducible to other terms if rules for its use can be laid down by the help of the other terms, either in the form of an explicit definition or in an indirect, non-explicit way.) The second way consists in taking abstract terms as primitive. If a suitable set is chosen, here again every other term, down to the elementary ones, can be introduced. And here, it seems, explicit definitions will do. This second way represents the systematic procedure as it is applied in the most advanced fields of science, especially in physics. The first way is interesting from the point of view of empiricism because it allows a closer check-up with respect to the empirical character of the language of science. By beginning our construction at the bottom, we see more easily whether and how each term proposed for introduction is connected with possible observations.

If we choose the first way, there are several possibilities as to the field from which to take the primitive elementary terms. The chief possibilities are: 1. physical elementary terms (e.g. 'blue', 'hot', as attributed to a physical body), 2. psychological elementary terms (e.g. 'having a perception of blue', 'having a tooth-ache', as attributed to an organism). The thesis that a sufficient basis for the whole of the scientific language can be found among terms of the kind (1), in other words that all scientific terms are reducible to these terms, is the main thesis of Physicalism. The analogous thesis about kind (2) may be taken as one of the main theses of positivism (in a certain sense of this word). Construed in this way, the two assertions are compatible.

If we assume that both bases are possible, which of them is more convenient for the construction of an empirical scientific language for intersubjective use? The difference can be formulated in the following way. We will call a term observable if a sentence which attributes it to a thing can, under suitable circumstances, be confirmed to a high degree by a very small number of observations. A term of kind (2) (psychological), e.g. 'thinking about Chicago', is observable, because I can confirm the sentence 'Carnap is now thinking about Chicago' to a high degree

²⁾ The distinction of the two ways is discussed more in detail — within the context of a general discussion of the relation between a calculus and its interpretation — in the monograph "Foundations of Logic and Mathematics" (=Encyclopedia of Unified Science, Vol. 1, No. 3. Chicago, 1939).

almost immediately. This sentence can be confirmed by others also, either by the simple methods we use in everyday life, e.g. by asking me what I am thinking about, or by some more subtle method of psychology. But others cannot confirm it in the short and simple way in which I can. Thus the psychological term 'thinking about Chicago' is in this case not observable by others although confirmable by them. In general, a psychological term is, although intersubjectively confirmable, at best subjectively observable. On the other hand, an elementary physical term (kind 1), e.g. 'white', is intersubjectively observable because everyone among us can confirm the sentence 'this thing is white' to a high degree by a few observations. This is the reason why I should prefer a physical basis to a psychological one for the construction of a scientific language for intersubjective use. This, however, is not an assertion but a proposal; a psychological basis can certainly also be chosen (and has been used in a former book of mine).

BIOGRAPHICAL AND BIBLIOGRAPHICAL NOTES

Rudolf Carnap born 1891. Studied Physics, Mathematics, Philosophy in Jena, and Freiburg i. B. 1910-1914. Dr. phil. Jena 1921. "Privatdozent" Vienna, 1926, Professor Prague, 1931, now University of Chicago, Chicago Ill.. He published a great many articles, pamphlets and books.

Der logische Aufbau der Welt, Leipzig, 1928; Scheinprobleme in der Philosophie. Das Fremdpsychische und der Realismusstreit. Leipzig 1928; Abriss der Logistik, mit besonderer Berücksichtigung der Relationstheorie und ihrer Anwendungen. (Schriften zur wissenschaftlichen Weltauffassung, Band 2) Wien 1929; Logische Syntax der Sprache. (Schriften zur wissenschaftlichen Weltauffassung, Band 8) Wien 1934. (English translation, London) 1937; Die Aufgabe der Wissenschaftslogik, (Einheitswissenschaft, Heft 33) Wien 1934; The Unity of Science, London 1934; Philosophy and Logical Syntax, London 1935.