

1. "BEWITCHING" OR CONFUSING METAPHYSICS?

THE DEMARCATION BETWEEN SCIENCE AND METAPHYSICS ACCORDING  
TO  
KARL POPPER

Prof. M. Elaine Botha  
Department of Philosophy, PU for CHE

ABSTRACT

The problems of both classical and modern theory of knowledge, according to Popper, reside in the problem of demarcation: a problem closely related to the problem of induction. The paper argues the view that Popper's view of metaphysics is ambiguous, requiring another criterion to distinguish between "good" and "bad" metaphysics. The sources of the problem are pinpointed, and Popper's distinction between three types of theory outlined. The article then explores the distinction between types of theories and the issues of falsification, testability and refutation, before going on to a consideration of the relationship between science and metaphysics, and weighing up the issue of good and bad metaphysics. From this emerges clearly that the second "criterion of demarcation" is needed to make precisely this distinction; also in view of Popper's unclear, even ambiguous, view of metaphysics.

THE "PROBLEM" OF DEMARCATION

Popper claims that the problems of both classical and modern theory of knowledge can be traced back to the problem of demarcation, i.e. "to the problem of finding the criterion of the empirical character of science". He claims that the problem concerning the demarcation between science and pseudo-science is closely related to the problem of induction (1968:91,92). Scientists and philosophers believed in induction because

-430-

they thought that it was the method of induction which functioned as the criterion between science and non-science. They thought that if induction were given up, the scientific community would have to give up the claim that science, by its method, is superior to non-science, e.g. metaphysics. Popper does not believe that induction provides such a criterion of demarcation between science and metaphysics and attempts to formulate one which would make it possible to distinguish between the empirical sciences on the one hand and mathematics and logic as well as "metaphysical systems" on the other. This he calls the problem of demarcation.

It will be argued in this paper that Popper's view of metaphysics is ambiguous and that this ambiguity requires a modification or at least reformulation of his argument in favour of a criterion of demarcation between science and metaphysics. The ambiguity becomes evident when Popper's own philosophy is subjected to reflexive criticism. In terms of his criterion of demarcation his philosophy cannot be regarded as "science". So it must be seen as an "acceptable type of metaphysics". The question is then on which grounds are we required to assume that his "metaphysics" is not of the bewitching and confusing kind? Presumably Popper would argue that his arguments are open to rational criticism and therefore not vulnerable in the same sense as metaphysics. Yet, it is clear that the proposed criterion of demarcation will have to be modified or supplemented by another criterion which would make it possible to distinguish between "good" and "bad" metaphysics.

#### SOURCES OF THE PROBLEM

According to Popper three main sources gave rise to the problem of demarcation: the problem of induction (Hume's problem); the verifiability criterion of meaning as suggested by logical positivism (especially Carnap), which proposed that "meaning" was the criterion which ought to be applied to statements in order to distinguish between their scientific or metaphysical character; and the problems posed by so-called pseudo-scientific systems such as Marxism, psycho-analysis (Freud) and individual psychology (Adler). These pseudo-scientific systems appeared to possess extraordinary explanatory power and were apparently compatible with the most divergent human behaviour, so that it was practi-

cally impossible to describe any human behaviour that might not be claimed as verification for these theories (Popper, 1965:35, 36).

What the exact nature of the types of knowledge is that Popper juxtaposes to "science" by means of his demarcation criterion, is not very clear. That which is non-empirical or non-scientific includes non-science, pseudo-science, and metaphysics. Moreover, in his "Autobiography" Popper says that the problem was not so much a problem of demarcating science from metaphysics, but rather a problem of demarcating science from pseudo-science, which claims to find empirical verification for its statements, but refuses to indicate any conceivable circumstances in which theories would be refuted (1974:31). When he gives examples of pseudo-science he refers to Marx, Freud and Adler, whose views resemble astrology and myths! In order to demarcate these realms of knowledge from genuine science he formulates the criterion of demarcation, viz. testability, refutability or falsifiability (1965:256).

#### THE DEMARCATION BETWEEN DIFFERENT TYPES OF THEORY

When dealing with the status of science and metaphysics, Popper (1965:197) makes a distinction between three types of theory: Logical and mathematical theories; Empirical and scientific theories; and Philosophical or metaphysical theories. The first group can be tested by critically examining two or more rival theories in order to refute either the one or the other and to make a decision about the truth or falsehood of a theory.

Refutation in the empirical sciences also takes place through critical examination. The only important difference here is that empirical arguments can also be used in this process ... yet, "critical thought" remains the main instrument. Popper says that "Observations are used only if they fit into (our) critical discussion" (1965:197).

Philosophical theories can be examined critically even though they are irrefutable. Metaphysical statements fall outside the domain of science because they can in no way be falsified - whatever is allowed to be named "science" has to be tested severely (Popper, 1965:279).

#### WHAT WOULD CONSTITUTE SUCH A TEST?

Popper argues that Logical positivism's verifiability criterion of meaning was inappropriate because it not only excluded metaphysics, but also the most interesting of all scientific statements, the scientific theories - the universal laws of nature. These were no more reducible to observation reports than so-called "metaphysical pseudo-propositions" (Popper, 1965:261:281).

According to Popper science proceeds by way of imaginative guesses - conjectures - that are then exposed to stringent testing in order to determine whether these conjectures can be falsified. This potential for falsification (testability or refutability) was that which made a theory or statement scientific. It was its power to rule out or to exclude the occurrence of some possible events. He says that: "... the more a theory forbids, the more it tells us" (1974:31). This potential to be falsified, tested or refuted is the criterion Popper suggests as the demarcation criterion. He wants this criterion to be regarded as a proposal for an agreement or convention (1959:37). This process of testing is an intersubjective process which forms a very important aspect of the idea of mutual rational control by critical discussion. This requirement of intersubjective testability implies that there can be no ultimate statements in science which cannot be tested and in principle refuted (1959:47). Crucial experiments in science do not verify scientific theories, but falsify them (1965:112).

He acknowledges that scientific discovery is impossible without faith in ideas which are of a purely speculative kind, and sometimes even quite hazy; a faith which is completely unwarranted from the point of view of science and which is, to that extent "metaphysical". Yet, once it is regarded as science (or as an empirical theoretical system), it will have to satisfy the following three requirements: It must be synthetic, so that it may represent a non-contradictory, a possible world. It must satisfy the criterion of demarcation, i.e. it must not be metaphysical, but must represent a world of possible experience. It must be a system distinguished in some way from other such systems as the one which represents our world of experience. Such a system is characterized by the fact that

it has been submitted to and has stood up to severe tests (1965:279). "Experience" thus appears as a distinctive method whereby one theoretical system may be distinguished from others, so that empirical science is not only characterized by its logical form, but in addition by its distinctive method (1959:39).

#### IMMUNIZATION AGAINST REFUTATION

Popper soon realized that it was possible to immunize a theory against any possible form of falsification. Not all forms of immunization, though, could be excluded. Some prove to be fruitful. They can stand up to testing to a certain extent and therefore the criterion of testability cannot be regarded as a very precise criterion. Because this is the case, Popper differentiates various types of theoretical systems on the basis of their relationship to testability (or falsifiability) and to immunization procedures:

There are **metaphysical theories** of a pure existential character (1959:60). There are theories like the psycho-analytic theories of Freud, Adler and Jung or like astrological lore (pseudo-science?). There are **unsophisticated theories** like "all swans are white" or the **geocentric theory** "All stars other than planets move in circles". These theories are falsifiable, though falsification can always be evaded through immunization. Popper mentions the "case of Marxism" in a separate category. Initially it was classified under the pseudo-scientific and the metaphysical theories, later it proved that Marxism actually had been refutable. It was refuted by the course of historical events, but through reinterpretation (i.e. the theory of revolution) it became immunized and thus evades falsification. It is now irrefutable! (1965:37; Musgrave, 1968:82). The last category contains the more abstract theories like Newton or Einstein's theories of gravitation. They are falsifiable, but this can be evaded through immunization or the introduction of auxiliary hypotheses. Popper's claim that these hypotheses are testable and add to the original empirical content of the theory, seems to contradict his statement that they are utilized in the process of immunization. This interpenetration of science by metaphysical ideas and science's apparent partial dependence on metaphysical notions for its existence raise the question concerning the relationship between science and metaphysics.

## THE RELATIONSHIP BETWEEN SCIENCE AND METAPHYSICS

Popper uses two models or metaphors to illustrate his view on the relationship between science and metaphysics:

In his discussion and rejection of the positivist's criterion of the meaning of language, he uses the image of a square to demonstrate that metaphysics does not lie outside of the sphere of meaningful language. When it comes to science and metaphysics, he claims, they are both within the square. The line that separates them signifies the distinction between science (which is testable) and metaphysics (which is not) (1965:257). The second metaphor differs slightly, yet to my mind significantly from the first. In *The Logic of Scientific Discovery* (1959:277) Popper argues that in order to obtain a picture or model of science, the various ideas and hypotheses might be visualized as particles suspended in a fluid (metaphysics). Testable science is the precipitation of these particles at the bottom of the vessel; they settle down in layers of universality. The thickness of the deposit grows with the number of these layers - every new layer corresponding to a theory more universal than those beneath it. As the result of this process, ideas previously floating in higher metaphysical regions may sometimes be reached by the growth of science and thus make contact with it and settle. Examples of such ideas are atomism, the idea of a single physical principle or ultimate element from which others derive, etc. A third argument concerning this relationship is found in Popper's discussion of Carnap's criterion of meaning as a criterion of demarcation. Popper says that Carnap's failure to overthrow metaphysics was the consequence of an ill-advised attempt to destroy metaphysics wholesale, instead of trying to eliminate piecemeal, as it were, metaphysical elements from the various sciences, whenever this could be done without endangering scientific progress by misplaced criticism.

These images and arguments give rise to various questions: Is the separation between science and metaphysics as drastic as implied in the model of the square? If the intention of this model was only to make the point that metaphysical statements are meaningful, the second image (fluid and precipitating particles), presents another and not to illustrate the

demarcation thesis, then the second image raises the following problem: Must metaphysics be eliminated from science or not? The image creates the impression that the presence of the (metaphysical) fluid is necessary for the "precipitation process" of sciencē to take place; a position defended by Popper quite explicitly elsewhere. But why then is only a piecemeal elimination required, whereas a wholesale elimination of metaphysics is regarded as too radical? (1965:264). If all metaphysics is bad, then one would want to argue that a wholesale elimination was imperative. If science required metaphysics in order to develop and if this metaphysics contained both "good" and "bad" elements which were to be subjected to a piecemeal process of elimination of the "bad" metaphysics, one has only created another level (that of metaphysics) where a criterion of demarcation is required. If other arguments of Popper are also taken into account, the final picture concerning the characterization of metaphysics and its relationship to science becomes even more confusing.

Popper acknowledges that metaphysical ideas do play an important role in the origin of science (1974:1067, 1183). Even mythological ideas have played such a role in the history of science (cf. Popper's reference to the role of Copernicus' Neo-Platonic views, 1965:187). These metaphysical notions, such as, for example, the unscientific faith in laws and regularities, guide our guesses - the marvellously imaginative and bold conjectures or "anticipations" that are carefully and soberly controlled by systematic tests (1959:279, 314). On the other hand, we had already been warned against "... those metaphysical systems which tend to bewitch and confuse us" (Open society, 1966; vol. 2, 299).

#### GOOD AND BAD METAPHYSICS?

It becomes clear that we seem to need a second "criterion of demarcation" - one that can distinguish between "good" and "bad" metaphysics! Popper does give us an important clue in this direction when he discusses the apparent irrefutability of philosophical systems such as determinism, idealism (and subjectivism), irrationalism and nihilism (1974:120 and 1965:194). Here he introduces the notion of rational and critical assessment of these theories. They can be critically discussed within the

context of a certain problem-situation which it purports to deal with. Every rational theory, no matter whether scientific or philosophical, is rational in so far as it tries to solve certain problems. It is comprehensible and reasonable only in its relation to a given problem-situation (1065:199). The setting of the problem-situation therefore determines the possibility of a critical and rational discussion of a problem. The solution of a philosophical problem, Popper claims, is never final. It cannot be based on a final proof or upon final refutation. This is a consequence of the irrefutability of scientific theories. A single comment in this respect would have to suffice:

Criticism and critical discussion presuppose some set of criteria that is being implemented in this process. When a philosophical theory is being discussed it at least presupposes an alternative philosophical perspective concerning the problem under discussion. The final arbiter in such a discussion is often reason,<sup>1</sup> i.e. reason committed to a metaphysical perspective, or a theoretical framework. Popper would have to clarify the exact nature of "metaphysical experience" over and against the "empirical experience" which characterizes science. But he will also have to give a clearer account of the way in which empirical experience embedded in metaphysical frameworks can be rationally criticized by criteria which are in turn embedded in metaphysical frameworks. He would also have to explain how communication between these diverse perspectives is actually possible, given the differing sets of criteria being employed and the variety of assumptions from which problems are approached.

#### A POSITIVE ROLE FOR METAPHYSICS?

Apart from the already mentioned heuristic role Popper ascribes to influential metaphysics (1959:38, 39), he also recognizes the significance

---

<sup>1</sup> With apology to Kant and Wolterstorff!



of a "metaphysical research programme" (Popper, 1974:175; note 242)<sup>2</sup> Such a metaphysical research programme provides a possible framework for testable scientific theories (1974:134). An example of such a programme is Darwinism. The value of such a programme for science is very great, because it may be criticized and improved. Popper's views on the role of metaphysics changed in the course of time, for he says that "Although when writing this book I was aware of holding metaphysical beliefs, and although I even pointed out the suggestive value of metaphysical ideas for science, I was not alive to the fact that some metaphysical doctrines were rationally arguable and, in spite of being irrefutable, criticizable" (1959:206, footnote 2).

Popper's view of metaphysics is certainly not clear and in some respects downright ambiguous. The criterion of demarcation at least, also needs to be applied to metaphysics. So we require not only a criterion of demarcation between science and metaphysics, but it also a criterion between "good" and "bad" metaphysics.

#### A SECOND CRITERION OF DEMARCATION?

It gradually becomes clear that we do seem to need a second "criterion of demarcation" - one that can distinguish between "good" and "bad" metaphysics! Popper does give us an important clue in this direction when he discusses the apparent irrefutability of philosophical systems such as determinism, idealism (and subjectivism), irrationalism and nihilism (1974:120 and 1965:194). Here he introduces the notion of rational and critical assessment of these theories. They can be critically discussed within the context of a certain problem-situation which they purport to deal with. Every rational theory, no matter whether scientific or philosophical, is rational in so far as it tries to solve certain problems. It is comprehensible and reasonable only in its relation to a given problem-situation (1965:199). The setting of the problem-situation therefore determines the possibility of a critical and rational discussion

<sup>2</sup> Lakatos' idea of "scientific research programmes" is modelled on this notion (1970:184).

of a problem. The solution of a philosophical problem, Popper claims, is never final. It cannot be based on a final proof or upon final refutation. This is a consequence of the irrefutability of scientific theories.

Both Agassi (1975) and Lakatos (1970), students of Popper, seem to regard the notion of metaphysics far more positively than Popper himself. Popper does acknowledge that metaphysical research programmes have influenced the development of science and claims that he proposes a new metaphysical view of the world and with a new research programme based on the idea of the reality of dispositions and on the propensity interpretation of probability (1974:120).

#### REFERENCES

AGASSI, J. 1975. Science influx, chapter 9. Boston studies, vol. XXVIII. Dordrecht: Reidel.

LAKATOS, IMRE. 1970. Falsification and the methodology of scientific research programmes (In: Lakatos, I. and Musgrave, Alan E. (eds.) Criticism and the growth of knowledge. Cambridge : University Press.

MUSGRAVE, ALAN E. 1968. On a demarcation dispute. Response to W.W. Bartley, III. (In: Lakatos, Imre and Musgrave Alan E. (eds.) Problems in the philosophy of science. Amsterdam : North-Holland.)

POPPER, K.R. 1959. The Logic of scientific discovery. New York: Basic Books.

POPPER, K.R. 1965. Conjectures and refutations. The growth of scientific knowledge. New York : Harper and Row.

POPPER, K.R. 1966. The Open society and its enemies. (In: Lakatos, Imre and Musgrave, Alan, E. (eds.) Problems in the Philosophy of science. Proceedings of the International Colloquium in the Philosophy of Science. London. 1965, vol. II. Amsterdam North-Holland.)

POPPER, K.R. 1968. Remarks on the problems of demarcation and of rationality - response to W.W. Bartley, III. (In: Lakatos, Imre and Musgrave, Alan E. (eds.) Problems in the Philosophy of science. Proceedings of the International Colloquium in the Philosophy of Science. London. 1965, vol. 3. Amsterdam North-Holland.)

POPPER, K.R. 1974. Autobiography. (In: Schilpp, P.A. (ed.) 1974. The Philosophy of Karl Popper, vol. I. The Library of Living Philosophers, vol. XIV, Illinois: La Salle.)

SCHILPP, P.A. (ed.) 1974. The Philosophy of Karl Popper, vol. I and II. The Library of Living Philosophers, vol. XIV. Illinois : La Salle.