

Karl Popper (1902–1994)

W. H. NEWTON-SMITH

Born in Vienna, Karl Popper studied at the University of Vienna from 1918 to 1922, after which he became apprenticed to a master cabinetmaker, Adalbert Posch. In his intellectual autobiography, Popper reported that he learned more about epistemology from Posch than from any other of his teachers. In 1925 he enrolled in the City of Vienna's new Pedagogic Institute to work on the psychology of thought and discovery. However, his interests turned to methodology and in 1928 he obtained his doctorate for a thesis on methodological problems in psychology.

While teaching mathematics and physics in a secondary school he wrote his *Logik der Forschung*, which was published in 1934, appearing in an English translation in 1959 as *The Logic of Scientific Discovery*. In 1937 he went to New Zealand as a lecturer in philosophy at Canterbury University College. While there he wrote his influential works *The Poverty of Historicism* and *The Open Society and its Enemies*. Appointed Reader and subsequently Professor in Logic and Scientific Method at the London School of Economics in 1946 he remained there for the balance of his academic career. Until his death in 1994 he continued to publish prolifically.

The distinctive feature of Popper's philosophy of science is his attitude to induction. Like Hume he held that no inductive inference is ever rationally justified. Finding that 1 million randomly selected samples of sodium burn with a yellow flame provides no reason at all, according to Hume and Popper, for thinking that all pieces of sodium will burn with a yellow flame. What we would normally count as evidence for such a hypothesis does not even give fallible grounds for thinking it is more probably true than false. Inductive arguments, arguments in which the premises do not entail the conclusion but purport to support it, simply have no rational force. Consequently Popper sought to rely entirely on deductive argumentation. While we can never have the least positive reason for thinking that a hypothesis is true or probably true, we can use a deductive argument to show that it is false. For given that we have observed one black swan we can deductively infer that it is false that all swans are white. This is the crux of Popper's philosophy of science. It is only the rejection of beliefs or hypotheses that can have the sanction of reason (but see below).

Hume never sought to persuade us to abandon induction. For him, it is part of our nature to proceed inductively. Custom and habit carry us forward where reason fails. To put the point anachronistically, for Hume we are "hard-wired" to induct. It is

simply a bemusing feature of the human condition that our inductive procedures do not have the sanction of reason. But for Popper, on the other hand, we do not or should not proceed inductively. And he claims that good scientists never do so. The Popperian scientist, equipped with a fertile imagination, simply makes a bold conjecture and the bolder the better. He then seeks to refute that conjecture by observation and experimentation. If a contrary instance is found the conjecture is falsified and hence rejected. In which case the scientist starts again with a new conjecture. If a conjecture is not falsified in a test, it has been "corroborated." Corroboration, as defined by Popper, does not provide any reason for thinking that the hypothesis has any likelihood of holding in the future. It is simply a report that it has not yet failed. Critics have wondered why, in this case, we should trust even a highly corroborated hypothesis. Clearly we do so when, for example, we trust our fate to airplanes designed on the basis of aeronautical theories. The answer for Popper is that we have no reason at all to do so. We proceed on blind faith! Critics also object that rejecting a hypothesis in the face of a contrary instance is itself a disguised form of induction. For in so doing we are assuming that the future will be like the past: what failed on Monday will also fail on Tuesday.

In utterly rejecting anything other than deductive justification, Popper committed himself to a very strong form of fallibilism, according to which not only can we not have certain knowledge in science or in everyday life, we can have no positive reasons, however weak, for holding that particular beliefs in science or in everyday life are even more likely to be true than false. Some readers of Popper may well have failed to see the extreme consequences of his fallibilism. For it applies also to the beliefs we form about what we observe. Consequently, it follows that we can have no rational grounds for claiming to have discovered that a hypothesis had been falsified. For we can have no more reason for rejecting a hypothesis than we have for our belief that we have observed a counterexample. That being so, Popper's fallibilism amounts to an extreme form of skepticism. We can have no reasons for thinking that any empirical proposition is true; nor can we have any reasons for thinking that it is false. Much of what Popper wrote has plausibility only if we set aside this extreme consequence of his position and this I will do in much of what follows.

Falsification provided Popper with his criterion for the demarcation of science from non-science or pseudo-science. He described this criterion as the very center of his philosophy of science. Impressed positively by the success of Einstein and negatively by what he took to be the failure of Freud and Marx, he looked for the hallmark of the scientific and thought he had found it in falsification. A theory is scientific just in case it makes predictions that could in principle be observed not to obtain. If they do not obtain the theory is refuted. According to Popper psychoanalysis ruled nothing out and hence could not be falsified and was not scientific. He held that Marxism was originally falsifiable. However, in the face of negative instances, Marxism was revised so as to become immune from refutation. In Popper's terminology any such unfalsifiable theories are metaphysical rather than scientific. Unfortunately, much of what we count as science turns out not to be falsifiable. A theory, such as quantum mechanics, which makes only probabilistic predictions, is not falsifiable. Consider the hypothesis that the probability that this coin will land heads on the next toss is p . The coin may land tails any number of times without falsifying that hypothesis! Popper sought to avoid this difficulty by adopting a methodological rule that would reject this hypothesis if after some number

N of trials the results diverged significantly from p . Critics have not been satisfied that there is any reasonable way of fixing an appropriate value for N without the use of inductive argumentation.

Popper did come to appreciate that there are metaphysical elements in good scientific theories and that metaphysical theories such as Darwinism had important beneficial influences on scientific development. Having recognized this Popper shifted somewhat and sought to evaluate metaphysical theories as well. This is to be done by considering whether the theory solves problems, whether its purported solutions can be examined critically and whether it solves the problems better than rival theories. This in turn generates a more general demarcation criterion for distinguishing between what he referred to as criticizable versus non-criticizable theories. It is no doubt a step forward to consider the merits of theories in general without special regard to whether they are scientific or not. But it means abandoning what once had pride of place within his philosophy of science: a hallmark of the scientific. Even Freud and Marx meet the condition of being criticizable theories, as Popper's own writings make manifest.

The method of science is to propose bold theories, the bolder the better. The scientist then seeks to refute them. Devoting oneself merely to finding out that theories are false does not seem a very edifying vocation. If there were only a finite number of theories in any branch of science, one could take comfort in the fact that with each rejection, the probability of the next theory selected being true would increase. But unhappily there are an infinite number of rival theories. A Popperian scientist expects that even his most cherished theory will eventually be falsified. If all he can ever find is that a theory is false, what positive gloss can he put on his scientific endeavors? For Popper the scientist hopes to have theories – false theories – that are ever better approximations to the truth. These are theories with, in his words, “increasing truthlikeness or verisimilitude.” The move from Newton to Einstein was progressive, because while Newton said some true things about the world and some false things, Einstein said more true things and fewer false things. We can picture this as Newton getting a certain percentage of his claims right and Einstein scoring a higher percentage. Some future scientist can hope for a higher score yet. The idea that the aim of science is not truth *per se* but ever more approximately true theories has attracted adherents including many who reject Popper's account of scientific method. Unfortunately Popper's own technical definition of verisimilitude proved unsatisfactory. It turned out that on his definition all theories other than true ones have the same degree of truthlikeness. Popper's approach has inspired much further work on this notion but at present no satisfactory explication of truthlikeness has been forthcoming.

Popper is convinced that science is generating ever more truthlikeful theories. But as someone who avoids all inductive argumentation he has to regard this belief as irrational. Intuitively we might argue that the fact that Einstein passes more tests than Newton gives us reasonable grounds for thinking that Einstein's theory is more truthlikeful than Newton's. But this is an inductive argument. The conclusion is reasonable only if we assume that the area of the universe we have explored to date is a representative sample of the entire universe. Perhaps it is just a local peculiarity that Einstein fares better than Newton.

Popper himself is tempted by such arguments. At one point he claimed that we could argue for the greater truthlikefulness of Einstein over Newton on the grounds that it

would be “a highly improbable coincidence if a theory like Einstein’s could correctly predict very precise measurements not predicted by its predecessors unless there is ‘some truth’ in it” (Schlipp 1974: 1192–3). This argument has many adherents particularly among those who advocate realism about scientific theories. But it is a form of induction known as *inference to the best explanation*. We are invited to infer that Einstein’s theory has more truth in it than Newton’s theory on the grounds that that assumption provides the best explanation of the greater predictive success of Einstein’s theory. Respectable as this argument may be, it is not open to one who rejects all but deductive argumentation. One might feel that in all fairness we should allow Popper just this one little inductive move. He himself concedes in the passage quoted above that “there may be a ‘whiff’ of inductivism here.” But if an inductive move is legitimate here, why not elsewhere as well? Once we allow induction a role, Popper loses claim to our attention. For what made his philosophy of science unique and thereby interesting was its explicit and total rejection of induction. But without induction, his belief in scientific progress is irrational.

Philosophers of science are divided on many issues. But they are almost unanimous in rejecting a Popperian account of science. Whether or not we have a satisfactory answer to Hume’s skepticism about induction, it takes courage to deny that scientists proceed inductively. Scientists make an inductive move when they conclude that there is some probable truth in the theory of the electron on the grounds that that theory explains why televisions work. Even the scientist who concludes more modestly that there are at least good reasons to think that the theory of the electron will give successful observational predictions in the future is assuming the legitimacy of induction. Popper’s falsificationist theory of science is itself falsified by scientific practice. His grand experiment in offering a non-inductivist theory of science serves only to heighten our appreciation of the deep-seated commitment to induction.

Popper argued for a number of philosophical positions quite independent of his falsificationism. For instance, he was a passionate defender of the freedom of the will. He argued against the determinist’s thesis that the future is fixed by the past states of the universe together with the laws of nature. His strategy was to seek to show that not all future events involving human agents can be scientifically predicted. However, critics have been unable to see how an inability even in principle to predict some future human actions shows that those actions may not be determined nonetheless. More is needed to establish freedom than an inability to predict. In addition he has urged a controversial three-part ontology. He posits a world of physical objects (“world 1”), a world of subjective experiences (“world 2”), and a world of the “objective contents of thought” (“world 3”). “World 3” is reminiscent of the world of abstract Platonic objects that some philosophers have felt driven to postulate. But what is perhaps quite unique to Popper is the thought that this world, initially created by us, takes on an autonomy whereby it acts in a quasi-causal way on the objects of “world 2” and even of “world 1.” Few philosophers have been willing to follow him in this lavish postulation of an unfalsifiable theory of causally active abstract objects.

History is likely to remember Popper more as a cultural figure than a philosopher in the narrow Anglo-Saxon sense of the term. For through his *The Poverty of Historicism* (1944) and his *The Open Society and its Enemies* (1945), he may well have had more influence in the social and cultural spheres than any other twentieth-century

philosopher. His initial aim was to provide an intellectually decisive critique of Marx and Marxism. The resulting polemic became a hugely influential attack on totalitarianism in general and a glimpse of an inspiring if only vaguely sketched Utopia: the Open Society.

Popper saw both fascism and Communism as resting on a pernicious *historicism*, a vision of history moving inevitably to some fixed final destination. Popper's historicist thinks he can detect by intuitive observation historical trends that he mistakenly takes to be iron laws and not mere trends that can be reversed. Popper characterizes Marxism, his paradigm of historicism, as bad historical prophecy combined with the injunction "*Help to bring about the inevitable!*" (1976: 35). Even granting Popper's assumption about the negative role that a belief in historicism has played and even granting the cogency of his arguments against it, his position does not really address the general problem of totalitarianism. For unfortunately there are totalitarian regimes that have come about as a result of forces other than belief in historicism.

Popper, in contrast to the historicists' policy of waiting for the inevitable, grand-scale, social change, advocates "piecemeal social engineering." We should make small experimental adjustments in our social institutions; this he illustrates with such examples as the introduction of a new sales tax. We then observe the results of the test; find out our errors and learn from our mistakes. For Popper this is explicitly an extension to the sphere of politics of the scientific method, although ironically the boldness that characterized the ideal scientist's conjectures is to be replaced by cautious small-scale conjectures. The bad moves are exposed; new ones are tried in their place. Our social engineer is urged to undertake a "systematic fight against definite wrongs, against concrete forms of injustice or exploitation, and avoidable suffering such as poverty or unemployment" (1957: 91).

In the social and political sphere, the notion of scientific rationality or reasonableness is liberalized to give a wider notion of rationality or reasonableness as openness to criticism: an attitude of readiness to listen to critical arguments and to learn from experience. A commitment to rationality in this sense is a necessary core of Popper's lightly sketched vision of an open society. An open society is a democratic one that promotes criticism and diversity without repression or irreconcilable social divisions, avoids violence, and encourages toleration. Critical public discussion with the participation of all is the means whereby those in an open society seek to arrive at a consensus on social and political issues. While the details are slight, Popper makes clear his touchingly naive view that the "free world" is a reasonable approximation to his ideal of an open society, having "very nearly, if not completely, succeeded in abolishing the greatest evils which have hitherto beset the social life of man" (1963: 370).

The core of the idea of an open society is supposed to lie in the recognition of our fallibility. Popper's approach is reminiscent of Mill, who argued in *On Liberty* that we have an interest in promoting diversity of opinion. Beliefs may be incorrect. If we are wrong, our best hope in correcting ourselves lies in critical discussion with those who disagree. And if we are in fact correct, the critical discussion will bring out more clearly the contents of and grounds for our beliefs. But it is hard to see how any argument of this character can give us Popper's full conception of an open society. For instance, an interest in critical discussion is logically compatible with a majority maintaining a class of slaves whose role in life was to provide us with critical comment! Attractive as the

nexus of values embodied in the open society are, they do not seem derivable just from the refutation of historicism together with the recognition of our fallibility. While society would no doubt benefit from more critical dialogue, it is arguable that the stability of social institutions requires that not everything is open to debate at all times.

There are serious tensions between the method of piecemeal social engineering and the advocacy of an open society. On the one hand, this method may only be viable for those who have already established an open society. The transitions in Albania and Romania, for example, from a closed to an open society were not achieved by piecemeal social engineering and probably could not have been achieved by anything other than revolution. On the other hand, it is not clear that all problems facing open societies can be solved through piecemeal social engineering. Globalization presents problems the resolution of which will require international regulatory mechanisms and these will not come about through piecemeal social engineering.

For all the deficiencies in argumentation and conception, Popper's rhetoric has been much used and used to largely beneficial effect. *The Poverty of Historicism* and *The Open Society* were texts widely read in samizdat under Communism and certainly had an inspirational role for dissidents seeking to open their societies. At the same time these texts were widely used by western European social democratic parties of the left to distance themselves from the Communist Parties of Europe. Progress to social equality was to be achieved by piecemeal social engineering, not revolutionary change. And in China in the period just before Tiananmen Square the liberal wing of the Communist Party used Popper explicitly in their analysis of the mistakes of the Cultural Revolution and in advocating open, critical discussion of social issues.

Popper is no doubt right in encouraging more critical discussion of social and political issues. Unfortunately his own philosophical system, with which he seeks to underpin this encouragement, is limited. His utter rejection of induction, his fallibilism, severely restricts the scope of rational criticism. Given that only deductive argumentation has rational force, the only intellectually justified criticism that can be made of any position in science or in society is that the position is logically incoherent. But such a limited form of criticism is unlikely greatly to assist in the solution of the social ills that concerned Popper.

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