Critical Rationalism

Critical Rationalism adopts the position that the natural and social sciences differ in their content but not in the logical form of their methods. However, it rejects the Positivist position in favour of a different logic of explanation based on a critical method of trial and error in which theories are tested against 'reality'. This approach is commonly known as the 'method of hypothesis'.

The early foundations of this approach were laid by the English mathematician and theologian, William Whewell (1794–1866), in his monumental work on *The Philosophy of the Inductive Sciences* (1847). Whereas Bacon's view of science had been based on what he believed it should be, Whewell examined how scientists actually carry out their activities. Whewell's view of science was based on his own work as a scientist, not primarily as a philosopher. It has been argued that 'Whewell's exposition of the classical hypothetico-deductive theory of science is probably the most masterful one written before the philosophy of science became a full-bodied discipline in the twentieth century' (Butts 1973: 57).

Whewell was a contemporary of Mill and debated the nature of induction with him. He was critical of Mill's view that scientific knowledge consists of forming generalizations from a number of particular observations, and he challenged the view that observations can be made without preconceptions. He rejected the idea that generalizing from observations is the universally appropriate scientific method and argued that hypotheses must be invented at an early stage in scientific research in order to account for what is observed. For him, observations do not make much sense until they have been organised by some 'conception', an organizing idea, supplied by the researcher. The researcher's task is to find appropriate 'conceptions by which facts are bound together'. He called these 'conceptions' *colligations*. These fundamental ideas cannot be deduced from observations; they cannot be seen in the facts because 'all facts involve ideas unconsciously'. Facts are bound together by a new thought, by 'an act of the mind'. In other words, hypotheses must be applied to bring some order to data.

These 'conceptions' involve the use of new concepts or phrases which have not been applied to these 'facts' previously. In the case of Kepler it was *elliptical orbit*, and for Newton it was *gravitate*. However, Whewell was not able to offer rules for producing these 'conceptions', nor did he believe that the process could be taught. Rather it requires 'inventive talent'; it is a matter of guessing several conceptions and then selecting the right one. He shifted the source of explanations from observations to constructions in the mind of the scientist that will account for observed phenomena.

> To hit upon the right conception is a difficult step; and when this step is once made, the facts assume a different aspect from what they had before: that done, they are seen in a new point of view; and the catching this point of view is a special mental operation, requiring special endowments and habits of thought. Before this, the facts are seen as detached, separate, lawless; afterwards, they are seen as connected, simple, regular; as parts of one general fact, and thereby possessing innumerable new relations before unseen. (Whewell quoted in Brody and Capaldi 1968: 137)

Not all such 'conceptions' produce good theories. However, Whewell thought that it was impossible to doubt the truth of a hypothesis if it fits the facts well. In spite of this kind of self-validation, he was prepared to put hypotheses to the test by making predictions and appropriate observations. It is in this latter view of science that Whewell anticipated Popper's approach.[5] Popper was not particularly interested in the notion of hypotheses being organizing ideas; rather, he was concerned with the view of science in which hypotheses, or conjectures, were produced as tentative answers to a research problem and were then tested.

Popper, the founding father of *Critical Rationalism*, first published his ideas in German in 1934, in *The Logic of Scientific Discovery* (translated into English in 1959); a number of other works since then also set out his ideas (1961, 1972, 1976, 1979). While not a member of the Vienna circle, Popper had a close intellectual contact with it. He shared with this tradition the view that scientific knowledge, imperfect though it may be, is the most certain and reliable knowledge available to human beings. However, he was critical of Positivism, particularly Logical Positivism, and was at pains to distance himself from it. He rejected the idea that observations are the foundation of scientific theories and he recognized the important historical role played by metaphysical ideas in the formation of scientific theories.

Popper's philosophy of science depends on an ontology which views nature as consisting of certain essential uniformities. If nature is organized this way, it follows that there will be universal statements which are true because they correspond to these 'facts' of nature. But, according to Popper, in spite of the belief that science proceeds from observation to theory, to imagine that we can start with pure observation, as the Positivists have claimed, without anything in the nature of a theory, is absurd. Observations are always selective and occur within a frame of reference or a 'horizon of expectations'. Rather than wait for regularities to impose themselves on us from our observations, we must actively impose regularities upon the world. We must jump to conclusions, although these may be discarded later if observations show that they are wrong. It is a process of trial and error, of conjecture and refutation (Popper 1972).

Popper developed his philosophy of science in response to Hume's earlier argument that generalizing from past observations cannot be logically justified. Hume had suggested that the idea we have of cause and effect comes from having experienced many instances of constant conjunctions

[5] For a detailed discussion of Whewell's work see Butts (1968, 1973).

in the past. This led him to ask two related questions, one about generalising from experience, and the other about the belief in the uniformity of nature; whether '*instances of which we have had no experience, must resemble those, of which we have had experience*' and whether '*the course of nature continues always uniformly the same*' (Hume 1888: 89). On the first he concluded that '*even after the observation of the frequent or constant conjunction of objects, we have no reason to draw any inference concerning any object beyond those of which we have had experience*' (Hume 1888: 139), and on the second, 'that the supposition, *that the future resembles the past*, is not founded on arguments of any kind, but is deriv'd entirely from habit, by which we are determin'd to expect for the future the same train of objects, to which we have been accustom'd' (1888: 134). Popper had no disagreement with Hume's argument that there are no logical grounds for using past experience to establish causal laws, but he was dissatisfied with his view that the tendency we have to accept this is the result of custom or habit. He was concerned that holding an expectation that regularities are everywhere may lead us to attempt to find them even when there are none. These expectations may lead to dogmatic attitudes and an unwillingness to give up a belief in a particular regularity.

Hence, Popper concluded that it is up to the scientist to invent regularities in the form of theories, but these theories must then be tested by making appropriate observations; the attitude must be critical rather than dogmatic.

> For the dogmatic attitude is clearly related to the tendency to *verify* our laws and schemata by seeking to apply them and to confirm them, even to the point of neglecting refutations, whereas the critical attitude is one of readiness to change them – to test them; to refute them; to *falsify* them, if possible. This suggests that we may identify the critical attitude with the scientific attitude, and the dogmatic attitude with the one which we have described as pseudo-scientific. (Popper 1972: 50)

The theories produced by this process are passed on, not as dogmas, but with the injunction that they be further improved.

This critical attitude makes use of both verbal argument and observation; observation is used in the interest of argument.

> [T]he role of logical argument, of deductive logical reasoning, remains all-important for the critical approach; not because it allows us to prove our theories, or to infer them from observation statements, but because only by pure deductive reasoning is it possible for us to discover what our theories imply, and thus to criticize them effectively. Criticism ... is an attempt to find the weak spots in a theory, and these, as a rule, can be found only in the more remote logical consequences which can be derived from it. It is here that purely logical reasoning plays an important part in science. (Popper 1972: 51)

The question of whether theories or observations come first was not a problem for Popper.

> It is quite true that any particular hypothesis we choose will have been preceded by observations – the observations, for example, which it is designed to explain. But these observations, in their turn, presupposed the adoption of a frame of reference: a frame of expectations: a frame of theories. If they are significant, if they created a need for explanation and thus gave rise to the invention of a hypothesis, it was because they could not be explained within the old theoretical framework, the old horizon of expectations. There is no danger here of an infinite regress. (Popper 1972: 47)

Critical Rationalism, as expounded by Popper, is a search for truths about the world. However, he argued that we can never hope actually to establish whether theories are in fact true; all we can hope to do is to eliminate those which are false. Science aims to get as near the truth as possible by a process of rational criticism in which theories are tested against descriptions of observed states of affairs. These theories are either rejected or provisionally accepted, and are then subjected to further tests. We never know when we have produced a true theory; all we have are those theories which have, for the present, survived this critical testing process. For Popper, 'truth' means 'correspondence with the facts', and 'facts' are descriptions of observed states of affairs.

For reasons similar to those that motivated the Logical Positivists to want to demarcate science from metaphysics, one of Popper's major concerns was to develop a secure criteria for demarcating science from pseudoscience. Science is separated from other forms of knowledge by the fact that its theories are capable of being exposed to rigorous empirical testing and therefore to the possibility of being falsified. Marx's theory of history (Historicism) and Freud's psychoanalysis were regarded by him as non-scientific theories. Psychoanalysis can explain everything an individual can do or experience, while in the case of Marx's theory it may be less a matter of whether the theory can be falsified than of it having been falsified and still being retained. The adherents of the theory may reject what might be regarded as falsifying evidence by constantly modifying the theory. 'Once your eyes were thus opened you saw confirming instances everywhere; the world was full of verifications of the theory. Whatever happened always confirmed it' (Popper 1972: 35). Because all observations can be explained or excused by such theories, no observation can challenge them. Therefore, according to Popper, as the theories cannot be falsified, they do not have scientific status. He did not intend to show that non-science was meaningless; rather, that if metaphysical notions were included in theories, the testing process would soon establish whether they had any scientific status. Hence, the Positivist distinction between theoretical and observation statements is rejected, as is the possibility of establishing the truth of a theory.

In addressing the methods of the social sciences in one of his later publications, Popper summarized what he called his main thesis.

> (a) The method of the social sciences, like that of the natural sciences, consists in trying out tentative solutions to certain problems: the problems from which our investigations start, and those which turn up during our investigation. Solutions are proposed and criticised. If a proposed solution is not open to pertinent criticism, then it is excluded as unscientific, although perhaps only temporarily.
> (b) If the attempted solution is open to pertinent criticism, then we attempt to refute it; for all criticism consists of attempts at refutation.
> (c) If an attempted solution is refuted through our criticism we make another attempt.
> (d) If it withstands criticism, we accept it temporarily; and we accept it, above all, as worthy of being further discussed and criticised.
> (e) Thus the method of science is one of tentative attempts to solve our problems; by conjectures which are controlled by severe criticism. It is a consciously critical development of the method of 'trial and error'.
> (f) The so-called objectivity of science lies in the objectivity of the critical method. This means, above all, that no theory is beyond attack by criticism; and further, that the main instrument of logical criticism – the logical contradiction – is objective. (Popper 1976: 89–90)

The differences between the methods advocated by Positivism and Critical Rationalism, and how they translate into strategies of social research, will be elaborated in chapter 5.

Classical Hermeneutics

Of all the responses to be considered here, *Hermeneutics* is the most diverse and complex, and the least well understood by social scientists. 'Hermeneutic' literally means making the obscure plain but is generally translated as 'to interpret'.[6] For the most part, hermeneutics has been concerned with interpreting texts. However, the relevance of hermeneutics to contemporary social science lies in the possibility of regarding as texts the records made of social life, and in the application of the approaches that have been established to interpret them.

Hermeneutics emerged in the seventeenth century in Germany and referred, initially, to the principles of biblical interpretation developed by Protestant groups to provide clergy with manuals for scriptural exegesis. However, textual exegesis and theories of interpretation, in religious, literary and legal fields, date back to antiquity. In time, the English usage of the word referred to non-biblical interpretation, particularly of texts that are obscure or symbolic, in order to get at hidden meaning. The advent of

[6] The following outline of the hermeneutic tradition is based mainly on Palmer (1969), Outhwaite (1975), Makkreel (1975), Linge (1976), Rickman (1976, 1979, 1988), Bauman (1978), Thompson (1981a,b), Betanzos (1988) and Gadamer (1989).

rationalism in the eighteenth century led to the Bible being interpreted to make it relevant to 'enlightened rational' people. Its mythical elements were purged and, by natural reason, great moral truths were extracted from the historical context in which they were hidden (an activity known as *philological hermeneutics*). Hence, the aim of early hermeneutics was the understanding of texts written in radically different situations.

The next stage, developed by Schleiermacher, provided the foundation for modern hermeneutics. Because he saw hermeneutics as a science for understanding any utterance in language, hermeneutics moved from a concern with the analysis of texts from the past to the problem of how a member of one culture grasps the experiences of a member of another culture, or how a person from one historical period understands life in another historical period. It became the study of understanding itself, of the conditions of dialogue (this became known as *general hermeneutics*).

For Schleiermacher, understanding has two dimensions: grammatical interpretation, which corresponds to the linguistic aspect of understanding and which sets the boundaries within which thought operates; and psychological interpretation, which attempts to recreate the creative act which produced the text or social activity. Psychological interpretation involves placing oneself within the mind of the author or the social actor in order to know what was known by this person as s/he wrote the text or prepared for and engaged in some social act. It is the art of re-experiencing the mental processes of the author of a text or the conversation of a social actor; it is the reverse of the process which produced the text or conversation as it starts with the finished expression or activity and goes back to the mental activity by which it was produced. It consists of a laborious process of endeavouring to construct the life context in which the activity has taken place and in which it makes sense. This process is known as the *hermeneutic circle*, of endeavouring to grasp the unknown whole in order to understand the known parts.

> We understand the meaning of an individual word by seeing it in reference to the whole of the sentence; and reciprocally, the sentence's meaning as a whole is dependent on the meaning of individual words. By extension, an individual concept derives its meaning from a context or horizon within which it stands; yet the horizon is made up of the very elements to which it gives meaning. By dialectical interaction between the whole and the part, each gives the other meaning; understanding is circular. (Palmer 1969: 87)

Since communication is a dialogical relationship, the hermeneutic circle assumes a community of meaning shared by the speaker (or author) and the hearer (or reader). However, evidence of these shared meanings consists of largely incomprehensible fragments of elements in the 'conversation'. The task is to piece together these bits and pieces in order to reconstruct the system of shared meanings.