

CHAPTER 6

A COMPARISON BETWEEN DESCARTES AND POPPER ON THE FOUNDATIONS OF KNOWLEDGE

6.0 Introduction

From the foregoing discussion, it might be apparent at the first glimpse that the differences between Descartes' and Popper's epistemologies are striking. The purpose of the present chapter in making a detailed comparison is not simply epistemological, however, but also historical—in so far as it marks the development from Cartesian epistemology to the Popperian one. It is hoped that these investigations will shed some light on issues especially on the problem of the foundations of knowledge, concepts of knowledge, and truth and belief in the revolutionary growth of human knowledge. The table below summarises the most significant points of comparison that I shall consider. As a matter of fact, in a broader context, there are significant similarities between them notably in the problem of mind-body relation, but this fall outside the scope of the present study.

Descartes

Popper

(1) Knowledge-situation [KS]
and philosophical battlefield [PB]:

- (i) Aristotelian conception
of knowledge [KS]
- (ii) Aristotelianism and Scepticism
[PB]

(2) Knowledge as absolute certainty
and indubitable

(3) Foundationalism

(4) Justificationism

(5) Rationalism

(6) Truth as manifest – *veritas Dei*

(7) Scientific Methods:
hypothesis
deduction
experiment

(8) Moral and epistemology

(1) Knowledge-situation [KS]
and philosophical battlefield [PB]:

- (i) Einstein's theory [KS]
- (ii) Theories of Freud, Adler and Marx
[KS]
- (iii) Vienna Circle [PB]
- (iv) Scepticism [PB]

(2) Scientific knowledge as conjectural,
hypothetical and uncertain

(3) Fallibilism

(4) Falsificationism

(5) Critical Rationalism

(6) Truth as regulative ideal

(7) Scientific methods:
conjecture
deduction
testing
corroboration

(8) Ethics and scientific knowledge

6.1 Knowledge-situation and Philosophical Battlefield

In order to understand the thought of philosophers we must firstly comprehend two essential elements in the formation of their thoughts, that is: firstly, the background knowledge-situations which were the sources of their reflections; and secondly, the philosophical schools and doctrines against which they developed their own thought.

Thus, I shall firstly endeavour to reconstruct the knowledge-situations within which Descartes and Popper were enveloped. And then followed by an attempt to reconstruct an equally important philosophical battlefield or the theatre of operations within which Descartes and Popper worked out their ideas. It is important, before we go further to compare their ideas, to reconstruct both elements for we would be unable to explain specific developments from Descartes to Popper and we would be unable to decipher in depth various subtleties of their doctrines, unless we take into account those essential elements in the formation of the philosophical thought of Descartes and Popper. Let me now firstly turn to Descartes.

The background knowledge-situation which was the source of inspiration for Descartes' epistemological views is by now a well-recognized fact. On the one hand, the problem of knowledge for Descartes is to undermine the generally empiricist epistemological assumptions that lead toward Aristotelianism and to replace them with an epistemology of clear and distinct ideas. Thus, Descartes' epistemological project was connected with the larger reform of the university and of knowledge in general, and all its social, religious, and cultural implications. It was part and parcel of the general overthrow of the dominant intellectual system, and of the authoritarianism on which it was built. The rejection of the senses and the call for an epistemology founded on clear and distinct ideas was a call to reject the authority of Aristotle and the textbooks, and of the teachers and the university. In this way it was the first step in a rather concrete and ambitious attempt at reforming knowledge, reforming education, and, in general sense, reforming society as well. On the other hand, Descartes was indeed trying to answer the sceptics. In doing so he deployed doubt both in that tradition (of ancient scepticism) and against its contemporary

representatives. It is designed to head off any subsequent recurrence of scepticism, and his claim that he has taken doubt to its extreme, as far as any doubt could be taken, is central to his claim that what he recovers from the process is a foundation of knowledge.

Now, what was the philosophical tradition which Descartes was primarily fighting against? First and foremost was Aristotle and Scholastic philosophy. There had been thinkers who did nothing more than to criticise Aristotle and to distrust scholastic philosophy and, to the greatest extent, to distrust philosophy itself. But Descartes had had a quite different ambition: it was to replace Aristotle and to provide a new textbook for the schools. It was against the philosophy of Aristotle and scholasticism that Descartes was directing his thought, and developed his own epistemological and methodological conceptions. It should be noted, however, that Descartes was not the only one to locate his project for the reform of philosophy in the larger social and political context of the seventeenth century Europe. But he had succeeded to distinguish himself from the mathematical programme of Galileo, Gassendi's atomist programme and the materialistic worldview of Hobbes.

The second target of his project was to provide an answer to the challenge of Montaigne's scepticism, and thus laid down a new foundation of knowledge. The philosophy of Descartes was a struggle to emerge from Montaigne's universal scepticism and to find an unshakable certain knowledge that is incapable of being doubted anymore. I shall now turn to Popper.

From his own writings we know very well that one of the background knowledge-situations that helped in the formation of Popper's epistemological and methodological views was Einstein whose theories convinced him about the fallible character of human knowledge. On the other hand, there were the theories of Freud, Adler and Marx which Popper rejected as pseudo-scientific. From his examination of these theories Popper formulated a criteria that in order to be counted as scientific, a theory must, at least in principle, be refutable. It should be noted here that Popper's theory of scientific knowledge and methodology have not only been a refinement of some existing ideas, although he sometimes approached the same problem from different angles, but Popper provided a new methodology which attempts to meet the challenge of a new knowledge-situation.

Next, what was the philosophical school which Popper was primarily challenging against? It is no doubt the Logical Positivism of the Vienna Circle. Throughout his philosophical writings, including his autobiography, it is obvious that Popper's early epistemological and methodological conceptions were formulated in his conscious opposition to the philosophy of the Vienna Circle. All his doctrines reflect his struggle to emerge from the predominant logical empiricist. But, since 1960, Popper has shifted his attention toward epistemological optimism where he launched a critique against scepticism. He now consistently distinguished his idea of fallibilism from that of philosophical scepticism.

From this brief survey of both Descartes' and Popper's knowledge-situations and philosophical battlefields, I shall now proceed to the discussion of their specific views on the problem of the foundations of knowledge.

6.2 Conception of Knowledge

For Descartes, *scientia* (knowledge) is a systematic body of knowledge that is firm and certain which is built on a rational foundation that made it indubitable, and it is made possible by the divine guarantee. This conception of knowledge is no doubt derived from the Aristotelian tradition, but Descartes, although he retains the term “*scientia*” for certain and unshakable knowledge, does not retain the Aristotelian conception in its entirety. This is because Descartes believes in the natural ability of human being to attain certain knowledge in the sense of Aristotle’s *scientia*. But, on the other hand, he rejects such conception of *scientia* which is based on the empiricist epistemological assumptions as to be replaced with a new epistemological foundations on which he will build something firm and lasting in the sciences.

After three hundred years, there occurs a sea change in the conception of knowledge where certainty is no more an aim in the quest for knowledge. For Popper, knowledge is conjectural: it only consists of guesses, hypotheses, and nothing of final and certain truths. Obviously it seems that knowledge in Popper’s sense is very different from that of Descartes which equates knowledge with certainty. For Popper, the quest for certainty is proven to be an idol for the possibility of mistake is always present even in what seems as the best scientific knowledge of our time. What can only be obtained in the place of certain knowledge are the ‘plausible but uncertain and prejudiced opinions (*doxa*) of fallible mortals’ (CR, 124). Thus, his interest in the quest for (scientific) knowledge is to criticise and test them so that we can find out our mistakes and then learn from them, and thus proceed to better theories.

Then, we need to ask: should we give up our quest for certainty in knowledge? Is there anything in this life that we can know for certain? Descartes' answer to the last question might be as follows: yes, it is possible; and thus it is worthwhile to resume our quest for certainty. For we can know for certain that we exist (*cogito*), and nothing can doubt it. In fact, Popper does admit that the belief in our own existence is very strong. But he rejects it as insufficient to be a foundation from which we can build the edifice of our knowledge for it is very narrow (OK, 35-6). Now, it can be said that, basically, Descartes' *cogito* is correct for it is impossible to think of oneself except as something existing in the world. But it may also be necessary to go beyond that in order to counter Popper's claim about its narrow scope. Here comes the second of Descartes' first principles that is, God exists and is no deceiver (MFP, 149). This principle implies God's role in creating us so as to be able to penetrate into the natures of things, and creating us so as to be able to be sure that we are able to do so (Sorell 2005, 76).

6.3 Foundationalism versus Fallibilism

In order to build a systematic body of knowledge which is certain and firm, Descartes should firstly seek a secure foundation from which he can erect its edifice. At this juncture, Descartes introduces his most famous house metaphor which compares his previous system of beliefs to a house with weak foundations. Like the owner of such a home, he will knock it down and build anew in its place (DM, 47; CSM II, 407). But the new foundation for his brand new house of knowledge must accomplish two tasks: firstly, to replace the empiricist principles which mark the Aristotelian tradition; and secondly, it should be an

epistemological foundation that is immune to sceptical attack. Now, Descartes introduces his Method of Doubt that will help him raze his old house of knowledge to the ground in the hope of thereby discovering indubitable foundations.

Descartes applies three successive levels of doubt from which our thought might be affected by error, that is: sensory doubt, dreaming doubt, and evil demon doubt. In brief summary, by employing the first doubt he discovers that he can be systematically deceived by his senses, and through the second doubt he thinks that he can establish the truth about his own existence, and lastly by the third he can establish the truths about the existence of God and the truth of his clear and distinct ideas. Basically, the Method of doubt provides foundations for knowledge because it helps to eliminate error and establish some basic truths from which all scientific truths can be deduced.

It is hard, to most of us today, to imagine an investigation of basic philosophical principles in this way. Some might feel dissatisfied with the ways Descartes tried to save knowledge from sceptical attack, while others would not be convinced that we could establish fundamental epistemic truths by showing how to answer the sceptics (Broughton 2002, 1). Thus, in considering Descartes' views on the foundations of knowledge and his use of the Method of Doubt, it is important to bear in mind both the general intellectual climate, the revival of sceptical thought in the sixteenth and seventeenth centuries which created disagreements in religious matters and in the understanding of nature. And all the conceptions of scientific enterprise, in specifically modern sense, did not yet exist. This, of course, makes Descartes see the problems and prospects of philosophy very differently from the way we do.

Popper is a fallibilist and presents his fallibilism by contrast with the foundationalist character of earlier epistemologies of Descartes and of Logical Positivism. Popper seems to advocate two types of fallibilism. The first one could be summarised in the thesis 'humans are fallible', while the second one is captured in the claim 'human knowledge is fallible'. From these point of views Popper rejects the idea that there are any infallible foundations (or sources) of knowledge. Popper thinks that there are all kinds of sources of knowledge, but none has final authority. And he concludes that there is no solid bedrock of knowledge, and the structure of knowledge erected on piles driven into a swamp should be enough to carry the structure of our present knowledge (LSD, 111)

So, according to Popper, scientific knowledge is the type of knowledge that can be neither definitively proven nor established with certainty. It may quite possibly be false, and thus it should remain tentative forever (LSD, 280). Thus, Popper insists that scientific knowledge should be regarded, not as a set of propositions, but as a series of problem situations, tentative solutions, error eliminations, and new problem situations.

In presenting his doctrine of fallibility, Popper contrasts between Cartesian doubt and the doubt of Socrates and Montaigne. To him, Socrates and Montaigne doubt human knowledge, and remain firm in their rejection of any pretension to knowledge, while Descartes on the other hand doubts everything but then end up with the possession of absolutely certain knowledge (CR, 21). Given his advocacy of fallibilism, Popper has been accused of being a sceptic (Musgrave 2004, 16). But, his response to this accusation is decisive where he retorts that he is not a sceptic for two reasons: firstly, he is never

interested in certainty, as did the foundationalists (for example, Descartes) and the sceptics. And secondly, that he believes in the growth of scientific knowledge in which science is the best epistemic engine since its self-corrective critical method has provided us with lots of conjectural knowledge. He strongly rejects foundationalism based on several wrong philosophical assumptions as he says: ‘The first, the false idea, is that we must *justify* our knowledge, or our theories, by *positive* reasons, that is, by reasons capable of establishing them, or at least of making them highly probable; at any rate, by better reasons than that they have so far withstood criticism. This idea implies, I suggest, that we must appeal to some ultimate or authoritative source of true knowledge; which still leaves open the character of that authority—whether it is human, like observation or reason, or super-human (and therefore super-natural)’ (CR, 39).

6.4 Descartes’ Justificationism and Popper’s Falsificationism

The central epistemological problem in the traditional theory of knowledge is justificationism, that is the assumption that knowledge is a special kind of belief and that it consists of those beliefs which can be justified. The term justificationism, of course, was not Descartes’ invention, but the notion of justification plays an essential role in his epistemology. For him, in order to avoid error we are obliged to be justified in our beliefs, that is never accept anything as true without having sufficient reasons for doing so (MFP, 167).

The instruction to limit our beliefs to things on which we have evident knowledge is already set forth in writings preceding the *Meditations*. In the *Rules*, Descartes already

holds that “only those objects should engage our attention, to the sure and indubitable knowledge of which our mental powers seem to be adequate” (HR I, Rule 2 and 3). Descartes asserts that ‘in accordance with the above maxim we reject all such merely probable knowledge and make it a rule to trust only what is completely known and incapable of being doubted’ (HR I, 3). This instruction also recurs later in Part II of the *Discourse*, where it appears as the first of Descartes’ four Rules of Method: “never to accept anything as true that I did not evidently know to be such: that is to say, carefully to avoid precipitation and prejudice; and to include in my judgments nothing more than that which would present itself to my mind so clearly and so distinctly that I were to have no occasion to put it in doubt” (DM, 35).

Popper’s epistemology, however, is revolutionary from the fact that he breaks away from the problem of justification which occupied central position in modern epistemological tradition and propounds the idea of falsification, that is to say, the question of how theories can be criticised. In doing so, he shows that the problem of justification is not germane to epistemology (Popper 1983, 119). Popper criticises many aspects of justificationism in his first published book, *Logik der Forschung* (1934), and develops his own solutions partly in the context of a debate with several logical positivists who were thoroughly justificationist in their thinking. In doing so, he criticises their idea of verificationism and replaces it with the problem of criticism, that is to say, how theories can be criticised.

One of Popper’s criticisms against justificationism is that knowledge is taken to be subjective, where the epistemological focus lies in the knowledge that some individual or

knower possesses. Popper admits that there is such knowledge in this sense, but he argues that it is not the primary concern of epistemology. He persuasively argues that what should be the primary focus of philosophy is the study of objective knowledge (OK, 106-90). Another aspect of his criticism against justificationism is that knowledge is understood as being certain. This ideal of certain knowledge has led many epistemologists to get involved in what Popper calls 'the quest for certainty' (OK, 37). Popper denies that certain knowledge is possible. What he is primarily interested in, as a falsificationist, are true theories¹²⁶ and, thus he replaces the quest for certainty with a quest for truth (OK, 44); and rather than trying to justify his belief in some truths, he endeavours to devise better theories to solve the problems he is interested in (OK, 44).

Falsificationists propound theories and then try to falsify them. They focus their effort in criticising theories rather than trying to justify them conclusively. Yet sometimes their theories, if they are lucky, are generally accepted and become, at least for a time, part of the fabric of knowledge.

6.5 Descartes the Rationalist and Popper the Critical Rationalist

Nowhere can be found in his writings that Descartes characterises the view we call rationalism, nor does he claim himself as a rationalist. But, Descartes is traditionally regarded as a rationalist, and in fact as the founder of the school, at least, in modern times due to the fact that throughout his writings Descartes expresses his commitment to the rationalist doctrines of intuition or deduction, of innate knowledge and of innate concept.

¹²⁶ This however should be understood in terms of his idea of verisimilitude.

Cartesian rationalism is the view that knowledge is derived from the intellect of which its truth is guaranteed by God. Thus, one ought ideally to seek certain knowledge in the empirical sciences on the basis of good reasons in the sense of clear and distinct ideas, which includes beliefs arrived at by following certain error-avoiding steps of thought. And it is in this light that his rationalism can be associated with his foundationalism by which he believes that there are a small number of self-evident truths in the light of which all or most other truths are certain and evident, or from which other truths can be derived by self-evident reasoning.

From his own words, Popper is a rationalist, but “of sorts”. Before going further, I should firstly explain what Popper means by the word “of sorts”. Firstly, Popper is a rationalist in the sense that he accepts both rationalist theses of intuition and deduction. And secondly he cherishes rationalism by rejecting its dogmatic or uncritical attitudes and proposes a redefinition of rationalism in non-foundationalist terms that is critical rationalism. For Popper, uncritical rationalism must cheat to reach its goal and appeal to some unquestionable authority that acts as the foundation of rational discourse such as clear and distinct ideas for Descartes and *a priori* form of judgment for Kant (CR, 3-39). Thus, Popper attempts to eliminate all justificationist elements in his redefinition of rationalism as he views the traditional philosophical definition of rationalism, in which reason is seen as the agent of justification of knowledge claims, thus guaranteeing the rational status of knowledge, is flawed (OS II, 230). Therefore, his critical rationalism cannot be described merely as a promotion of criticism but as a new model of reason constituted by, and only by, the imperative of falsification (Parusniková 2009, 38).

But, in discussing the introduction of critical rationalism, Popper also faces a trilemma of justification and consciously makes a minimal concession to dogmatism as he puts it in the *Open Society*, 'being a critical rationalist is ultimately a matter of faith' (OS II, 231), of which needs no further justification.

Another point of difference between Descartes' rationalism and Popper's critical rationalism is their views on tradition. Popper accuses the rationalists, like Descartes, as being hostile towards tradition. This rational attitude is wrong since the rationalist himself is very much bound by a tradition. Popper suggests that we should deal with tradition in a critical manner which may result either in acceptance or in rejection, or in a compromise of tradition. From a thorough reading of Descartes writings, however, this accusation may seem not entirely true. For the way Descartes carried out his Method of Doubt can be understood as a critical examination of tradition from which he can derive opinions that are fully certain and indubitable. Thus, this also implies the same result as has been suggested by Popper through his critical rationalism. This can be clearly seen, for example, in his approval of the *scientia* which derived from the Aristotelian tradition, though he does not retain the Aristotelian conception in its entirety.

Popper has another criticism against traditional rationalism, especially Descartes, that if we eliminate all of our background knowledge in order to start afresh, there is no reason why we would advance any further than Adam and Eve. In his own words: '...you should study the *problem situation* of the day. This means that you pick up, and try to continue, a line of inquiry which has the whole background of the earlier development of science behind it; you fall in with the tradition of science. It is a very simple and a decisive

point, but nevertheless one that is often not sufficiently realized by rationalists—that we cannot start afresh; that we must make use of what people before us have done in science. If we start afresh, then, when we die, we shall be about as far as Adam and Eve were when they died (or, if you prefer, as far as Neanderthal man)” (CR, 173).

Descartes, of course, really wants to wipe the epistemic slate clean in order to write on it again with systematic, certain truths. But, as we have seen throughout his writings, any attempt to get rid of existing background knowledge—by the method of doubt—would do no harm to science and knowledge. Descartes’ response to Popper’s criticism might be that if a given scientific society were to start in the way in which Descartes suggests, then, in the beginning such a society might do as good as, or slightly better, than its ancestors. But in the long run, with each successive society adhering to the Cartesian principles and bequeathing certain truths to the next generation there would be no necessity for each generation to start afresh, in their knowledge development, for they would have started by inheriting the certified knowledge of the previous generation (Sarkar 2003, 54). But, this does not of course belittle Popper’s central criticism against rationalists, such as Descartes, that the quest for certainty is nothing more than an idol (LSD, 280).

6.6 Descartes’ Manifest Truth (*Veritas Dei*) and Popper’s Regulative Ideal of Truth

According to Descartes, the truth is that: ‘...every clear and distinct perception is without doubt something, and therefore it cannot be from nothing, but rather does it necessarily have God as its author: that most highly perfect God, I say, whom it contradicts to be a

deceiver. And therefore every clear and distinct perception is without doubt true” (MFP, 167). From this definition, Descartes refuses to accept any idea which is not clearly and distinctly perceived by the intellect. This conception of truth on which Descartes based his epistemology is called the theory of *vericitas dei*: that what we clearly and distinctly see to be true must be true for otherwise God would be deceiving us; and thus, the truthfulness of God must make truth manifest.

Popper rejects the manifest theory of truth—or *vericitas Dei*—based on several grounds: firstly, there is no such criterion of truth (OS II, 373; CR, 37); secondly, that truth is often hard to attain, and that once attained it may easily be lost again (CR, 10); thirdly, that the theory of manifest truth is the basis for almost all kind of fanaticism (CR, 11); fourthly, that it would lead to authoritarianism from the conviction that ‘all those who do not see the manifest truth must be possessed by the devil’ (CR, 11); and lastly, that an authority may tend to give interpretation and affirmation as well as re-interpretation and re-affirmation of what is to be the manifest truth in an arbitrary and cynical manner.

It should be noted that Descartes’ conception of truth, in the light of his philosophical context, is theological and metaphysical in character. Thus, it is incompatible with the secular conceptions of truth in contemporary philosophy. Popper is aware of this historical fact, but he also urges us to admit that our knowledge is purely a human affair, without human or super-human authority (CR, 21-39).

In contrast to the manifest theory of truth, Popper treats truth as a regulative ideal. He approves Tarski’s correspondence theory of truth which supplies him an account of

truth which is both absolute and objective, and so suitable as a regulative ideal for science. He also develops his own theory of verisimilitude, which aims to define, firstly, the sense in which, given two theories both of which are false, one may be nearer to the truth than the other, and secondly, the sense in which science may have reached the truth, without our knowing it.

It is interesting to note that truth, for both Descartes and Popper, is the goal of science. But, as we have seen above, both of them also have a different conception of truth. For Descartes, truth is “subjective” in the sense that it is based on some criteria of truth that is related to the individual knower such as certainty, clarity and distinct perception. While for Popper truth is objective in the sense that it is “mind-independent” and opened to inter-subjective criticism.

6.7 Scientific Method

Descartes and Popper agree that science is distinguished primarily by its methods. But their agreement about what those methods are, however, is only partial. According to Descartes, the scientific method consists of: (1) making arguments based on hypotheses; (2) grasping the truth of these hypotheses and the inferential connections between hypotheses; and (3) testing such hypotheses against experiment.

In both his *Météores* and *Dioptrique*, Descartes begins by making certain suppositions, assumptions or hypotheses by which we can know the nature of particular things. He writes, ‘and I have called them “suppositions” simply to make it known that I

think that I can deduce them from the primary truths I have expounded above...’ (AT VI, 76). But, then, what kind of deduction does Descartes have in mind here?

Deduction is defined in terms of intuition: it is a chain of intuitions, the intuitive grasping of a connection between one proposition and another. In the *Rules*, the method of Descartes can be said to consist of a reduction of obscure propositions, followed by an intuition, and then followed by a construction, that is, a deduction of the answer to the question originally posed, starting from the intuition that we have attained (HR 1, 14-19). The goal of his method is to attain certain knowledge, that is to say, a science deduced from intuitively known premises. The method also gives a procedure for discovering an appropriate intuition, one from which the answer to the hypothesis posed can be deduced, and it shows the path that deduction must follow (Garber 2001, 90). This procedure is the reduction of a hypothesis to more and more basic hypotheses that can be identified as hypotheses whose answers are presupposed for answering the hypothesis originally posed. Descartes thinks that this reduction both leads us to an intuition and shows how we can go from that intuition back to the hypothesis originally posed (HR I, 14-19). Thus, a completed science is supposed to be deductive for Descartes in a rather strict sense, that is derivative and more complex propositions are supposed to be deduced in his sense from propositions simpler and more basic, and grounded ultimately in intuition.

In Part VI of the *Discourse*, Descartes attempts to explain the use of experiment in his thought. And he even laments the fact that he has neither the time nor the resources to perform all the experiments crucial to complete his scientific system. This fact, of course, seems a bit puzzling to one who knows Descartes as the philosopher of reason, who

rejected the dependence on the senses. In short, how can Descartes be both a rationalist, who sees knowledge as deriving from the intellect, and an experimentalist who sees experiment and observation as essential to the enterprise of knowledge?

Although it is obvious that Descartes wants to proceed deductively, but it is also clear that experience and experiments have a significant role to play in his scientific enterprise. In light of his major works such as the *Rules*, the *Discourse*, and other writings where he discusses his natural philosophy, it is well known by now that Descartes was a dedicated experimenter, observer, and dissector, and that the empirical investigation of nature is given significant attention in his scientific thought. But one might surely ask how the appeal to experience is consistent with the apparently deductive structure of Descartes' scientific inquiry? A reasonable answer to this question can be found in a passage from Part VI of the *Discourse*, where Descartes attempts to explain to the reader the use of experiment in his thought. The passage begins with a lengthy account of where experiment is not really necessary. Descartes reports that he began his investigations with "the first principles of first causes" of everything, which can be discovered from "certain seeds of truth which are naturally in our souls." From this Descartes derived "the first and most ordinary effects that one can deduce from these causes," the heavens, stars, the earth, water, air, fire, and so on. (DM, 89).

At this stage, experiment seems not to be important in investigation, but it does become important, as Descartes indicates, when we move from the very most general things and descend to particulars. There, he says, the direct deduction from first principle

must stop, and we must ‘arrive at the causes through the effects and that one make use of many particular observations’ (DM, 89).

From this passage in the *Discourse*, experiment is somehow supposed to help us find the right deductions, the ones that pertain to our world and to the phenomena that concern us. In this way, experiments seem not to replace deductions, but to aid us in making the proper deduction. In this stance, science remains deductive for Descartes. Now, I shall turn to Popper’s scientific method.

According to Popper, scientists proceed by: (1) conjecture of hypotheses to explain scientific problems; (2) deduction of consequences from these hypotheses; and (3) testing these consequences against experience by observation and experiment, with the result either that the hypothesis is refuted, or (4), if it is not, that it is, to that extent, corroborated.

Popper consistently emphasises that our theories are at best conjectural, and that we should aim rather for highly testable than for highly probable hypotheses. For Popper regards testability as a kind of constraint upon the kind of hypothesis appropriate to science. According to Popper, a hypothesis, to be even a candidate for scientific conjecture, must be falsifiable. This means that a hypothesis is scientific which is capable of being tested experimentally, where tests of a hypothesis comprise attempts to refute it. Popper also argues that learning from experience is the very act of overthrowing a theory with the help of that experience: we learn from experience by repeatedly positing explanatory hypotheses and refuting them experimentally.

The method of (critically) testing theories, and then selecting them according the results of tests, proceeds as follows: firstly, conclusions are drawn from a hypothesis or theories by means of logical deduction; and secondly, these conclusions are then compared with each other and with other relevant statements as to find the logical relations between them (LSD, 9). Testing a theory against experience takes place through the deduction of predictions—that is using previously accepted statements deduced from a theory—and ‘if the singular conclusions turn out to be acceptable, or *verified*, then the theory has, for the time being, passed the test: we have found no reason to discard it. But... if the conclusions have been *falsified*, then their falsification also falsifies the theory from which they were logically deduced’ (LSD, 9-10). But, there is another important point here: ‘a positive decision can only temporarily support the theory, for subsequent negative decisions may always overthrow it. So long as a theory withstands detailed and severe tests and is not superseded by another theory in the course of scientific progress, we may say that it has “proved its mettle” or that it is “*corroborated*” by past experience’ (LSD, 10).

A theory may be taken as corroborated to the extent that it stands up to testing. Of course, there are various degrees of corroboration that make a theory more or less desirable, more or less reliable, but contrary to what one might think, the number of corroborating instances does not count for very much. The most important factor, however, is that: ‘the severity of the various tests to which the hypothesis in question can be, and has been, subjected. But the severity of the tests, in its turn, depends upon the degree of testability, and thus upon the simplicity of the hypothesis: the hypothesis which is falsifiable in a higher degree, or the simpler hypothesis, is also the one which is corroborable in a higher degree’ (LSD, 266)

Having generally discussed their scientific method, I shall now attend to another question of what we should do if a hypothesis fails a test? For Descartes, the answer is simple: the hypothesis should be totally demolished and to begin again from the first principles. Whereas for Popper, he believes that a refuted hypothesis should be always be rejected outright, though he suggests that sometimes a hypothesis be abandoned only if there are alternatives available, and after a fruitful discussion of the distinction between content-increasing and content-decreasing modifications of refuted hypotheses has ensued.

From the discussion of Descartes' and Popper's scientific method it shows how narrow the scheme of classification between rationalism and empiricism really is. For both reason and experience are important in their scientific methodology, though in different ways. The genius of Descartes lies in the way he sees how experience and experiment might play a role in acquiring knowledge without undermining his commitment to a picture of a grand system of certain knowledge, grounded in the intuitive apprehension of first principles. While for Popper, although he believes that the rationalist tradition is the only practicable way of expanding our knowledge, he does not deny that an experiment may add to our knowledge in a most important manner through its role as falsifying evidence. But neither rationalism nor empiricism in itself can be an ultimate foundation of knowledge, or provide us with certain knowledge.

This also shows how the discussion on methodology is related to epistemology, i.e., that we arrive at sound knowledge through the methods used. In other words methodology serves as a means to an end, the end being epistemic virtues such as truth etc.

6.8 Epistemology and Ethics

From the discussion in the previous chapters it seems clear that there is a genuine and important link between epistemology and ethics in the philosophies of Descartes and Popper. Both of them, however, are somewhat reluctant to publish their opinion on morals—since for Descartes, his aim throughout his career is to be ‘a spectator rather than an actor in all the comedies of life’ (DM, 47), and that ‘it is the proper function of sovereigns and those authorised by them, to concern themselves with regulating the behaviour of others’ (CSMK, 326); while for Popper, the reason for not developing a system of moral philosophy is out of his deep-rooted distrust of modern philosophical moralists, who usually preach water and drink cognac (Kiesewetter 1995, 275).

Despite his radically new approach to philosophy, Descartes resoundingly declares in the preface to the French edition of his *Principles* that the construction of a perfect moral system was to be the ultimate aim of his philosophy (PP, xxiv). Yet, the context in which Descartes firstly propounds his morality appears at first glance to have a merely minor importance where in order for his epistemological project to proceed, it will be necessary to articulate a ‘provisional moral code’ designed to keep him out of trouble while he withdraws from the world in order to establish the foundations for the new science. But, in his later works, Descartes views morals as one of the most important branches of his philosophical system because of its status as the final stage of Wisdom.

This can be seen from his *Passions* where he shows the importance of morals in his philosophy, and especially in his epistemology, through his optimism about human nature.

It is an optimism both about man's capacities and about man's inclination to make good use of these capacities. It asserts that if science is applied by a Cartesian wise person, happiness will increase also in the realm of morals. Or, in other words, Descartes views scientific knowledge as the means to increase happiness. Given these facts, it seems that morality emerges as both the initial and the final level of Descartes' philosophical enterprise.

Popper rarely provides a greater discussion of his moral views, but he frequently makes remarks about the relation between his epistemology and his ethics. His epistemology really has a deep moral significance as it provides the methodology by which we can carry out self-emancipation: 'Ethical principles form the basis of science. The idea of truth as the fundamental regulative principle... can be regarded as an ethical principle' (ISBW, 199). He also thinks that, in general, our bad conduct is a result of stupidity, not a deficient moral sense (ALPS, 111). This view, of course, shows the link between his epistemology and the moral project of avoiding cruelty, from the fact that his ideas of fallibilism and critical rationalism entail intellectual and political toleration, which negates violence.

Moreover, there is a correspondence between his scientific method and his ethical views as Popper claims exist in his *Logic of Scientific Discovery*: 'There is some kind of analogy between this view of ethics and the view of scientific methodology which I have advocated in my *The Logic of Scientific Discovery*. It adds to clarity in the field of ethics if we formulate our demands negatively, i.e. if we demand the elimination of suffering rather than the promotion of happiness. Similarly, it is helpful to formulate the task of scientific method as the elimination of false theories (from the various theories tentatively proffered)

rather than the attainment of established truths' (OS I, 285). This passage, of course, establishes the connection between his epistemology (or scientific method) and ethics in the project of avoiding suffering through a better understanding of the physical and social world.

Furthermore, in this passage also lies the difference between Popper's and Descartes' conception of ethics. Unlike Descartes, Popper does not conceive philosophy, or epistemology, or even ethics as a way of attaining happiness, but rather as a way of minimising suffering. With Descartes, Popper shares a strong commitment to a form of individual ethics or ethical individualism which becomes one of the fundamental principles of western liberal democracy. And he also shares with Descartes a belief in the power and necessity of reason, but at the same time he differs from him by ascribing reason an ethical dimension when he says 'to choose reason is a moral decision' (OS II, 232).

6.9 Concluding Remarks

In this chapter I have provided a brief comparative account of the philosophical experiments of Descartes and of Popper through their views on the problem of the foundations of knowledge and on some of their important theoretical and practical ramifications. Throughout the discussion I have stated the essential analogical pattern in their views and elevated their important specific differences. From this discussion I identified in a way the structural correlation within the Western philosophical tradition and presented how philosophers from different periods (i.e., Descartes and Popper) developed their own distinct tools, concepts and methods in dealing with the same perennial problem

of the foundations of knowledge. It can be aptly said that some of their tools, concepts and methods are almost similar. But I should not be understood here as to imply a false conviction that all schools of philosophy are essentially the same since I have also brought to light their essential differences.