

CHAPTER 5

POPPER ON SCIENTIFIC KNOWLEDGE AND ITS FOUNDATIONS

5.0 Introduction

Karl Popper was a philosopher who often adopts an unconventional point of view. He was always looking into problems from different angles that are uncommon to most philosophers and thus made him at odds with the current philosophical movements on a number of central issues. To take a simple example, while philosophers concentrate their efforts to think over the problem of how to maximise happiness in social-political life, Popper, on the contrary, argues the importance of minimising suffering in society (ISBW). The same is also true in the theory of knowledge: Popper puts forward his theory of critical rationalism, of falsifiability (LSD and CR), and objective knowledge (OK) that were peculiar to the prevailing traditional notion of human knowledge as justified true belief. Consequently, these views made him hardly known as an epistemologist, despite the fact that he repeatedly called himself an epistemologist (LSD: 8), and his name does not appear in any of the many anthologies on epistemology.¹¹⁰

Therefore, it is the proper aim and scope of the present chapter to explain and examine Popper's philosophical experiment in dealing with the problem of scientific knowledge and its foundations which shall consist of several sections as follow: Section One, in which I shall discuss his conception of knowledge which includes his views on the

¹¹⁰ Compare Popper's comment about Churchill's contribution to epistemology in his *Objective Knowledge* (1972: 42-3), wherein he regards him as an epistemologist but, "...his name does not appear in any of the many anthologies on epistemology..." This, to my mind, indirectly reflects his own position in the mainstream epistemology.

foundations of knowledge, his ideas of fallibilism and critical rationalism; Section Two in which I will discuss his views on Truth; Section Three wherein I shall attempt to reconstruct systematically the ethical foundation of his theory of knowledge; and lastly, Section Four will provide brief concluding remarks on the Chapter.

5.1 Popper on the Foundations of Knowledge

For Popper, knowledge is conjectural, and that it consists of guesses, hypotheses, rather than of final and certain truths (CR, 203). Given this definition, it seems obvious that knowledge in Popper's terms is different from the classical sense which equates knowledge with *certain knowledge*, and its foundationalist project of erecting an edifice of secure knowledge on those foundations of what appears to be the most certain or basic knowledge available. Given the above, it also signifies that the possibility of error is always present, even in what seems the most solid knowledge.

There is nothing novel about Popper's view of knowledge. Historically speaking, this view has been anticipated 2500 years ago by Xenophanes who was aware that knowledge is nothing more than guesswork and opinion—*doxa* rather than *episteme*—as we can see from his verses:¹¹¹

The gods did not reveal, from the beginning,
All things to us; but in the course of time,
Through seeking we may learn, and know things better.

But as for certain truth, no man has known it,
Nor will he know it; neither of the gods,
Nor yet of all the things of which I speak.

¹¹¹ Karl Popper. *Conjectures and Refutations: The Growth of Scientific Knowledge* (London & New York: Routledge, 2007b), 34; see also H. Diels and W. Kranz, eds., *Die Fragmente der Vorsokratiker* (B, 18 and 34), to which Popper refers.

And even if by chance he were to utter
The perfect truth, he would himself not know it;
For all is but a woven web of guesses.

The fact that knowledge is conjectural, however, was clear to Popper even before he read Xenophanes fragments. It was, as a matter of historical fact, through Einstein's theory of relativity that Popper realised that knowledge at its best is conjectural as he points out that Newton's theory of gravity is conjectural knowledge, despite its immense success previously (ISBW, 196). Popper even goes on further to say that knowledge in the classical sense of being secure and certain was proved to be impossible a long time ago by Einstein's revolutionary theory of relativity (ISBW, 37). He thus conceives that the problem of the foundations of knowledge, although very often repeated by the positivists and those philosophers who believe themselves to be in revolt against authority (CR, 34), is no more relevant to epistemology. But, the central problem of epistemology, in his mind, is the growth of knowledge. In the Preface to his *The Logic of Scientific Discovery*, Popper writes: "The central problem of epistemology has always been and still is the problem of the growth of knowledge. *And the growth of knowledge can be studied best by studying the growth of scientific knowledge*" (LSD, xix).

It is a well-established fact that one of the first and most important concerns that faces the epistemologists ever since Plato was not only to know more about knowledge, but also to contribute to the growth of knowledge. No one, I believe, would deny this fact. Yet, the above quotation may immediately give rise to a couple of questions, that is: first, and briefly, what Popper means by *scientific knowledge*? And, then, how does scientific knowledge grow? Needless to say, short answers will not settle either of these brief questions; thus, I must begin to answer them now.

To the first question, Popper's answer is clear and concise: 'scientific knowledge is merely a development of ordinary knowledge or common-sense knowledge' (LSD, xxii). It is therefore apt to say that scientific knowledge, as Popper understands it, is an extension of common-sense knowledge, and it has much in common with common-sense knowledge. It was preferable in the study of the growth of knowledge for two reasons: firstly, that it can be more easily studied than common-sense knowledge, for it is *common-sense knowledge writ large*, as it were; and secondly, that the most important and most exciting problem of epistemology to be the problem of the growth of scientific knowledge, for, as he puts it:

...the most important way in which common-sense knowledge grows is, precisely, by turning into scientific knowledge. Moreover, it seems clear that the growth of scientific knowledge is the most important and interesting case of the growth of knowledge. (LSD, xxii)

In the light of the above quotation from Popper, I venture to suggest that Popper equates epistemology with the theory of scientific method, scientific growth, and, generally, analysis of scientific knowledge, for in his view: 'epistemology, or the logic of scientific discovery, should be identified with the theory of scientific method.' (LSD, 27)

From that point of view, Popper raises an objection to those philosophers who wrongly think that common-sense knowledge is easier to analyse, and rejects their proposed approach to epistemology by way of an analysis of *ordinary language* for it is the language in which common-sense knowledge is formulated (LSD, xxi-ii). Popper rejects this approach from the fact that it would make us bound to miss the most interesting problems of epistemology as it centres attention upon the formulation of common-sense

knowledge¹¹² and neglect the problem of cosmology, in which consists of richly metaphysical ideas, and of which lies the most interesting problem of philosophy.

Immediately after this rejection, Popper declares his disagreement with those philosophers who accept the analysis of scientific knowledge, but instead aim at studying “the language of science” with the philosophical method of the construction of artificial model languages, that is, the models of “the language of science”. This disagreement is due to the fact that the models of the language that these philosophers construct have nothing to do with the language of modern science (LSD, xxiii-iv).

Now, one might surely ask: where does Popper belong, then? Popper takes his side with a group of epistemologists—in which are numbered all the great philosophers of the West including Kant, Peirce, and Russell—who never claim to advance any philosophical method but only to make use of the analysis of scientific problems, theories, and procedures, and, most important, scientific discussions. Most of them, as a matter of fact, agree that scientific knowledge is the result of the growth of common-sense knowledge. ‘But all of them’, says Popper:

discovered that scientific knowledge can be more easily studied than common-sense knowledge. For it is *common-sense knowledge writ large*, as it were. Its very problems are enlargements of the problems of common-sense knowledge. For example, it replaces the Humean problem of ‘reasonable belief’ by the problem of the reasons for accepting or rejecting scientific theories. (LSD, xxv-vi).

¹¹² Even more than that, they centre their energy on the analysis of the phrase such as ‘I see’ or ‘I perceive’, or ‘I know’, or ‘I believe’, ‘I hold that it is probable’; or perhaps by that of the word ‘perhaps’. See Popper (2007a, xxii).

This approach to the problem of epistemology helps Popper—as evidently be seen in his later work—to probe the objective aspects of knowledge as it gets rid of the pseudo-psychological or ‘subjective’ elements in scientific knowledge.

I shall now turn our attention to the second question. To such a question of how does scientific knowledge grow, Popper’s answer obviously is that, “by unjustified (and unjustifiable) anticipations, by guesses, by tentative solutions to our problems, by *conjectures*. These conjectures are controlled by criticism; that is, by attempted *refutations*, which include severely critical tests” (CR, xi). Or in other words, Popper believes that knowledge grows through *conjectures* and *refutations*; which is just another way of saying that it grows through *trial and error*. This is, in fact, very characteristic of Popper’s philosophy: the awareness of fallibility in our knowledge—that human beings and their scientific knowledge are inherently fallible and subject to error. Making mistakes, and learning from them. This is how we gradually become more and more acquainted with the world we live in and our knowledge of it. This process is endless, and it may go *ad infinitum*, as Popper aptly says that ‘our knowledge can only be finite, while our ignorance must necessarily be infinite’ (CR, 38).

In addition to the fallible character of knowledge, Popper also gives great importance to criticism of our conjectures. This is a position which he calls ‘critical rationalism’. Criticism and growth of knowledge are closely interconnected, and, indeed, criticism is the foundation of the growth of knowledge. For Popper believes that only by criticising our theories or guesses that we can detect and eliminate error (CR, 34). And that by observing and detecting our mistakes that we can understand the real difficulties of the

problem which we are trying to solve. This is how, according to Popper, we become better acquainted with our problem and able to propose more mature solutions (CR, xi-ii).

Once again: making mistake, learning from them, and our knowledge gradually grows—even though we never know for certain. At this juncture, Popper goes on to assert that ‘since we can never know for certain, there can be no authority here for any claim to authority, for conceit over our knowledge, or for smugness’ (CR, xii). Before going further, it is perhaps not futile to pause for a moment and recall some of the verses from Xenophanes quoted above, that reads:

But as for certain truth, no man has known it
Nor will he know it; neither of gods
Nor yet of all the things of which I speak.
And even if by chance he were to utter
The perfect truth, he would himself not know it:
For all is but a woven web of guesses.

These verses contain the theory of the uncertainty of knowledge. And even that when one proclaims the most perfect truth, he cannot know this with certainty (ISBW, 194). Now we can understand why Popper never demands any certainty from scientific knowledge, and what more to ground it upon ultimate foundations. He avers that the edifice of science does not rest upon solid bedrock, but plunges its piles into a swamp:

The empirical basis of objective science has thus nothing ‘absolute’ about it. Science does not rest upon solid bedrock. The bold structure of its theories rises, at it were, above a swamp. It is like a building erected on piles. The piles are driven down from above into the swamp, but not down to any natural or ‘given’ base; and if we stop driving the piles deeper, it is not because we have reached firm ground. We simply stop when we are satisfied that the piles are firm enough to carry the structure, at least for the time being. (LSD, 93-4)

Taken literally, this analogy illustrates the very reason for Popper claiming that our science is not knowledge (in the sense of *episteme=scientia=science*), and that: *we do not know: we can only guess* (LSD, 278). Later, in his 1960 lecture before the British Academy, he asserts that ‘our knowledge is guesswork, opinion—*doxa* rather than *episteme*’ (CR, 34). The best that can be obtained in the place of Knowledge (*episteme*) are the plausible but uncertain and prejudiced opinions of fallible mortals. Hence, he urges philosophers to abandon the quest for certainty, for a secure foundation of knowledge, and to admit that all human knowledge is human, and that it is mixed with our errors, prejudices, dreams, and hopes.

It is to be noted that Popper does not stop there. Pushing his analysis further, he reaches at the central epistemological debate of his time and argues against the traditional, but prevailing, notion of *justificationism*—the idea that justification is a necessary requirement for scientific knowledge. According to Popper, ‘scientific knowledge cannot and need not be justified at all.’¹¹³ Herein lies, in fact, the core epistemological outlook of Popper, as clearly expressed as possible. Yet, it seems that Popper surreptitiously adopts justification in his epistemological system when he says:

...we can, if we are lucky, rationally justify a preference for one theory out of a set of competing theories, for the time being; that is, with respect to the present state of the discussion. And our justification, though not a claim that the theory is true, can be the claim that there is every indication at this stage of the discussion that the theory is *a better approximation to the truth* than any competing theory so far proposed. (OK, 82)

Reading attentively the above quoted passage from his *Objective Knowledge*, it might be intelligible to us that justification of preference is in no way tantamount to the one that he

¹¹³ For his rejection of justificationism, see his *The Logic of Scientific Discovery*, pp. 22, 92, 281-2, and 317; and *Conjectures and Refutations*, pp. 28-31, 39, and 521; as well as *Objective Knowledge*, pp. 7, 13, 29-30, 44, and 82.

rejects as untenable—that is, to justify the claim of the truth of a theory. For he also says that ‘sometimes, if we are lucky, it may happen that our test statements may refute some—but not all—of the competing theories; and since we are searching for a true theory, we shall prefer those whose falsity has not been established’ (OK, 8). Thus, from the last sentence of his passage that I quote just now it can be said that our preference of a theory is justified in so far as its falsity is yet to be established, and not, on the contrary, its truth—since it is not possible to justify our belief in the truth of a theory.

Furthermore, in his “The Rationality of Scientific Revolutions” (1975), one might say that Popper enunciates an idea that on first sight indicates that he still admits the idea of justification in some ways when he comes to term with the problem of the rationality of scientific progress, when he says:

The important point about the two logical criteria which I have stated is that they allow us to decide of any new theory, even before it has been tested, whether it will be better than the old one, provided it stands up to tests. But this means that, in the field of science, we have something like a criterion for judging the quality of a theory as compared with its predecessor, and therefore a criterion of progress. And so it means that progress in science can be assessed rationally. This possibility explains why, in science, only progressive theories are regarded as interesting; and it thereby explains why, as a matter of historical fact, the history of science is, by and large, a history of progress. (“RsR”, 83)

From the lengthy quotation from his 1973 lecture, it is appropriate to say that Popper does admit the justification of scientific revolutions or changes. But it should also be borne in mind the fact that scientific revolutions is justifiable since it is rational in the sense that, in principle, it is rationally decidable whether or not a new theory is better than its predecessors. This does not mean, however, that we are free from error, since there are many ways in which we can make mistakes (“RsR”, 83). Elsewhere, Popper maintains that

we can never justify our new theory for we can never know whether they will not turn out to be false (ISBW, 54). Given this fact, it seems therefore apparently ungrounded to count Popper among the justificationists, who try to justify the truth of their knowledge claims.

As a matter of fact, even today, the idea of justificationism described here has given rise to many foundationalist projects of giving objective and rational justifications of knowledge. Yet, Popper contends that justification is not an aim in scientific knowledge, and that the quest for justification—in the sense of the justification of the claim that a theory is true—has to be given up, since all theories are hypotheses, and all may be overthrown (OK, 29). Or, in other words, it is not a sufficient reason to aim or try to build a firm edifice of knowledge on any foundation, either it is reason or experience, as the foundation itself incapable to withstand the fierce storm of criticisms. As also a matter of fact, the idea of justificationism has, indeed, led many philosophers to grapple with epistemological problems that are not germane to scientific knowledge. Justification of claims to knowledge is of no significance to epistemology. In this connection, Popper spells his ultimatum that ‘the central problem of epistemology has always been and still is the problem of the growth of knowledge’ (LSD, xix). As we have already seen, Popper argues that knowledge grows by conjectures and refutations, and in this process there is no room left for justification, rather than to rational criticism.

Hitherto I have explained Popper’s general epistemological views including his conception of scientific knowledge, and his non-foundationalist and anti-justificationist attitudes. And, in the course of my lengthy analysis it seems reasonable that I could go on further in classifying Popper’s epistemology, that is: it is evident from the foregoing

account that fallibilism and critical rationalism can be regarded as the core features of his theory of scientific knowledge. This is true, in fact, as he himself admits later in his *Postscript* that, fallibilism and critical rationalism are indeed the ‘real linchpins’ of his ideas about human knowledge (P1, xxxv). Thus, it follows that, their origins and features merit—indeed demand—further description: and so I undertake the task here to give one.

5.1.1 Fallibilism

Fallibilism, as I shall venture to suggest, is one of the basic convictions¹¹⁴ that lies deep in the structure of Popper’s mind that form his conscious thought from its very beginnings within his mind back to his formative period, and endlessly affected the development of his thought.¹¹⁵ This suggestion is not an arbitrary interpretation of his philosophy, but it, in fact, fits in with the whole structure of his philosophy from the fact that Popper himself extensively uses the term “conviction” as in the expressions ‘*I wish to reaffirm my conviction...*’ (CR, 90), ‘*It is my firm conviction that...*’ (CR, 365) ‘*It springs rather from my conviction that...*’ (OS, vii), as to pluck only three. Thus, I would like to underline that it is this basic conviction that Popper persistently insists on throughout the whole corpus of his philosophical works. And it is by looking at the idea of fallibilism from this specific vantage point (of basic conviction) that we can delineate its exact locus and thus appreciate its significance in the whole structure of Popper’s theory of scientific knowledge. It is suggested that fallibilism, as a basic conviction, may, on the one hand, spring from his life

¹¹⁴ Contrary to the suggestion made by Roberta Corvi in her book, *An Introduction to the Thought of Karl Popper*, wherein she views fallibilism as the leitmotiv of Popper’s whole gnoseology (1997, 135), I wish to suggest here that fallibilism is not only a recurrent theme throughout the whole works of Popper, but, even more than that, it is a basic conviction that affects throughout the development of his philosophy. Seen from this aspect it can make us understand why it recurs unceasingly throughout his writings.

¹¹⁵ I prefer to use the word “conviction” rather than “belief” as Popper himself always reluctant to use or accept any belief. Yet, it is interesting to compare this concept with the theory of *primary beliefs* that has been suggested by Reid and followed by Kant and Hamilton, and then reformulated by Richard Lowndes in his *An Introduction to the Philosophy of Primary Beliefs* (London: William and Norgate, 1865). And it has also been deployed by Maurice Mandelbaum in his “The History of Philosophy: Some Methodological Issues, *The Journal of Philosophy*, Vol. 74, No. 10 (1977), 561-72.

experience,¹¹⁶ and, on the other hand, is innate and part of the very nature of him as an intellectual being. Now, this suggestion brings me to a position that obliges me to trace the origins from which fallibilism has arisen in the very structure of Popper's mind.

But, I anticipate that there will be an immediate protest once I begin to describe its genealogy for at first glance this would seem to make our discussion sinking into the depths of psychobiography and it would divert our attention from our primary problem since it is a philosophical problem that we are dealing in this chapter. So I have to pause to meet the protest. To such protest, my answer is that: it is not necessarily the case. For sometimes we can find this basic conviction was clearly written on the leaf in a philosopher's work so that we can just simply identify this conviction and show how it has affected the way in which he had developed his thought. And if it is nowhere to be found explicitly stated in his work, we can still gauge this conviction from the perusal at his works since the self-image and life experiences of a philosopher may be more or less directly reflected in his work.

Given this fact, and as to avoid plunging into psychobiography, I shall therefore not try to explain here the whole reasons and causes that tentatively form the life experiences of Popper which gave rise to this basic conviction. It is for our purpose suffices to describe it, to describe Popper's fallibilist conviction, by its genealogy, and I shall adduce evidence in support of this conjecture. Then, I shall describe the ways that it has affected the way in which Popper develops his thought.

¹¹⁶ This experience consists of, among other things, the current philosophical, religious, moral and political problems of his time, conflicts between contemporary science and antecedent worldviews, or his attempt to grapple with some other aspects of his experience which led to the intellectual or emotional or moral conflict within his own life.

Fallibilism, as a basic conviction in the structure of Popper's mind, has emerged from two interconnected sources: firstly, from his experience of personal fallibility; and secondly, from awareness of human fallibility. For the former, we can draw it from the story of his encounters with Marxism, as well as his encounter with the theories of Adler and Freud, in 1919 (UQ, 30-9).¹¹⁷ Taken as a mere historical, or at least as a mere biographical fact, this event could be rightly considered—by some of us—as a sample of the useless mental archeology; but it becomes highly significant as soon as we begin to see his philosophical thoughts which he develops in, for example, *The Poverty of Historicism* and *The Open Society*. And for the latter, it can be said as an indubitable fact nowadays that fallibility characterises the history of human beings—from individual to society, from family to community, from economic to politics, and from pre-scientific to scientific knowledge. But, for Popper himself, he directly witnesses the scientific revolution which makes him fully aware of the fallibility of human intellectual endeavour when in 1919 Einstein's theory of relativity replaced a two hundred year-old Newtonian theory (UQ, 37).

Despite these two sources, I might feel tempted to resort to historical influences as possible explanation for the genealogy of fallibilist conviction in Popper's thought. The same conviction, historically speaking, can be found, as Popper himself admits, in the Socrates of the *Apology*, where Socrates believed that wisdom consisted in the awareness of our limitations; in knowing how little we know, every one of us (CR, 22). This idea of human fallibility, however, was obsolesced, due to the rise of Aristotle's *episteme*, but then revived again in the fifteenth century by Nicolas of Cusa and Erasmus of Rotterdam. And it was on this idea of fallibilism that the great thinkers in humanist tradition, such as Nicolas and Erasmus, Montaigne and Locke and Voltaire, then followed by John Stuart Mill and

¹¹⁷ See Chapter 4 above wherein I recounted this event in detailed.

Bertrand Russell, based their doctrine of tolerance. But, it was only in C. S. Peirce that Popper finds the appropriate name for this kind of conviction, that is, fallibilism; and it was Peirce who firstly used the term fallibilism as to denote the Socratic view of all human knowledge as uncertain (Corvi 2005, 135). Having exhibited the genealogy from which Popper's fallibilist conviction arose out, and adduced sufficient evidence in support of my conjecture, I shall now shift our attention to the discussion of the ways in which this conviction has affected in the development of his philosophical thought.

In the following discussion, I wish to suggest that Popper develops his theory of knowledge based upon, and within the perimeter of, his fallibilist conviction. This is true, in fact, if we are aware of his adherence to this conviction whenever he talks about knowledge where he maintains, for example, that 'we are always or almost always capable of error and that we therefore know nothing or only very little (in the classical sense 'knowledge')' (ISBW, 33). This awareness of human fallibility, in its turns, led Popper to devise an epistemological principle that emphasised the discovery of mistakes and the importance of learning from mistakes. At this point of fact, Popper writes:

We can learn from our mistakes (even in science). This fundamental insight is, indeed, the basis of all epistemology and methodology; for it gives us a hint how to learn more systematically, how to advance more quickly (not necessarily in the interests of technology; for individual seeker after truth, the problem of how to hasten one's advance is most urgent). This hint, very simply, is that we must search for our mistake—or in other words, that we must try to criticize our theories. (OS II, 376).

And, again he asserts: 'By bringing out our mistakes... And this is how we can learn from our mistakes' (CR, xi).

By plucking such phrases from two of his works, it is possible to suggest that Popper regards mistakes as absolute in the growth of scientific knowledge, and thus, in a logical sense, it makes him reject the idea of philosophical absolutism which combined with a dogmatic and authoritarian claim to possess the truth, or a criterion of truth and hence claims the mantle of infallibility. As oppose to the idea of philosophical absolutism, Popper advocates the idea of fallibilistic absolutism, where he says:

Merely asserts that our mistakes, at least, are absolute mistakes, in the sense that if a theory deviates from the truth, it is simply false, even if the mistake made was less glaring than that in another theory. Thus the notions of truth, and of falling short of the truth, can represent absolute standards for the fallibilist. (OS II, 377)

As he advocates the idea of fallibilism, Popper has been accused of being a sceptic and of encouraging relativism. But, to these accusations, Popper retorts that he is neither a sceptic nor a relativist. For being a fallibilist does not necessarily turn him into a sceptic since, as we have already seen, he admits the fact that knowledge can grow, and that science can progress just because we can learn from our mistakes. Furthermore, he is far from a sceptic as he asserts that he is never interested in doubt and uncertainty, since he regards these as subjective states and because he gives up as superfluous the search for subjective certainty (ISBW, 7). This is based on the fact that subjective knowledge is not opened to objective criticism (RMC, 1028), while the growth of knowledge, as we have seen earlier, is based on criticism and refutation. And so far as the accusation of instigating relativism is concerned, Popper retorts by saying the fact that we can make mistakes entails that the truth exists. Although he admits the statement, '*I may be wrong and you may be right*' (OS II, 225), this is not, however, tantamount to the banal relativism which holds that each point of view is equally true within its specific frame of reference (ISBW, 150). And Popper goes on to write:

nothing is more vital than to be able to view our own ideas critically; without however becoming relativists or sceptics, and without losing the courage and the determination to fight for our convictions, even though we realize that these convictions should always be open to correction, and that only through correcting them may we free ourselves from error, thus making it possible for us to grow in knowledge. (ISBW, 150)

Now, with the fallibilist epistemological principle in mind, Popper turns his task to develop fallibilism into a theory of knowledge which he designates as *falsificationism* which holds the idea of falsifying various theories which claim certain knowledge. This theory is construed as a rejection of the other competing theories of knowledge called: verificationism or justificationism; and irrationalism or scepticism (i.e. the disappointed verificationism). Now, it seems imperative to contrast between falsificationism or fallibilism with the other theories as to understand to what extent they differ with each other and what makes Popper reject them.

The verificationists or justificationists believe that if a theory cannot be supported by positive reasons it should not be believed, or even to be seriously considered. But, on the contrary, the falsificationists or fallibilists hold that:

What cannot (at present) in principle be overthrown by criticism is (at present) unworthy of being seriously considered; while what can in principle be so overthrown and yet resists all our critical efforts to do so may quite possibly be false, but is at any rate not unworthy of being seriously considered and perhaps even of being believed—though only tentatively. (CR, 309)

As a falsificationist, Popper believes that the programme of the verificationist to justify belief by positive evidence cannot be carried out. ‘We can never give positive reasons,’ he says, ‘which justify the belief that a theory is true’ (CR, 310). Unlike the irrationalists,

however, Popper claims that the falsificationists have discovered the way to realize the old ideal of distinguishing rational science from various forms of superstition, in spite of the breakdown of the original inductivist or justificationist programme. This ideal of distinguishing science from superstition can be realised by:

Recognizing that the rationality of science lies not in its habit of appealing to empirical evidence in support of its dogmas—astrologers do so too—but solely in the *critical approach*: in an attitude which, of course, involves the critical use, among other arguments, of empirical evidence (especially in refutations). (CR, 310)

Given this fact, fallibilists hold that science has nothing to do with the quest for certainty or probability or reliability. Contrary to the verificationists, they are not interested in establishing scientific theories as secure, or certain or probable. To err is human. And all human knowledge is fallible and therefore uncertain. But, conscious of human fallibility, they are only interested in criticising them and testing them, hoping to find out where we are mistaken, and learning from our mistakes, and thus proceeding to better theories.

Although the verificationists are eager to uphold the most important tradition of rationalism that is the fight of reason against superstition and arbitrary authority, yet Popper rejects verificationism since it implies that we must appeal to some ultimate authoritative source of true knowledge, which still leaves open the character of that authority, that is observation. For, according to Popper, anything can be the sources of human knowledge, but none has authority (CR, 32), and that we cannot justify scientific theories with a priori reason because it is fallible, and we cannot justify them with sense experience because it is fallible as well.

From this point of fact, Popper rejects the traditional questions of epistemology such as ‘How do you know?’, ‘What is the source or the basis of your assertion?’ and ‘What is the ultimate sources of knowledge: the intellect or the senses?’ for these questions are clearly authoritarian in spirit, and therefore demand for authoritarian answers. As a matter of fact, these questions are accepted by most people as perfectly natural, and their legitimacy never ever been challenged or disputed. Even worse, Popper bemoans that these traditional questions of the authoritative sources of knowledge are repeated up to this day by positivists and other philosophers who believe themselves to be in revolt against authority. Thus, as to dispute both the questions and those people who repeat them, Popper contends that no such ideal sources exist and that all sources are liable to lead us into error at times (CR, 33). Furthermore, he boldly proposes a brand new question as to replace the question of the sources of our knowledge, that is: ‘How can we hope to detect and eliminate error?’

This modified question has its roots in the view that such pure, untainted and certain sources of knowledge do not exist, and that questions of origin or of purity should not be confounded with questions of validity, or of truth (CR, 34). Historically speaking, this view is not new, and, in fact, it is nothing more than an echo of what has been said by Xenophanes thousand years ago.¹¹⁸

Now, one may ask, what is the answer to Popper’s question, ‘How can we hope to detect and eliminate error?’ The proper answer, as Popper believes it, is: ‘By criticizing the theories or guesses of others and—if we can train ourselves to do so—by criticizing our own theories or guesses’ (CR, 34). This view is designated as ‘critical rationalism’—and it

¹¹⁸ See the above quoted verses of Xenophanes (DK, B, 18 and 34).

is a view, an attitude, and a tradition which we owe to the Greeks. And it is upon this view that I shall delve in the next section.

5.1.2 Critical Rationalism

Apart from the suggestion that critical rationalism is a view or attitude that is closely related to fallibilism,¹¹⁹ I shall venture to suggest here, that from the perusal of the works of Popper it is indeed appropriate to regard critical rationalism as a logical, necessary consequence of the idea of fallibilism. This suggestion needs, however, to be qualified. In the first place, the fact that human beings are fallible obliges us to take a critical attitude towards our conjectures or guesses or theories, and that it is through critical attitude that we can search for our mistakes and learn from them. And, in the second place, awareness of human fallibility would prompt us to take the side of rationalism. But, it should be noted that, rationalism with ‘critical’ as its adjective is totally different from comprehensive rationalism, of which Popper regards as logically untenable since it is based on a logically inconsistent principle. In his *Open Society*, Popper describes comprehensive rationalism as:

The attitude of the person who says “I am not prepared to accept anything that cannot be defended by means of argument or experience.” We can express this also in the form of the principle that any assumption which cannot be supported either by argument or by experience is to be discarded. Now it is easy to see that this principle of an uncritical rationalism is inconsistent; for since it cannot, in its turn, be supported by argument or by experience, it implies that it should itself be discarded... Since all arguments must proceed from assumptions, it is plainly impossible to demand that all assumptions should be based on argument. (OS II, 230)

¹¹⁹ See for example Stefano Gattei, *Karl Popper’s Philosophy of Science: Rationality without Foundations* (Routledge: London & New York, 2009) and Roberta Corvi, *An Introduction to the Thought of Karl Popper* (Routledge: London & New York, 1997).

Now it is an obvious fact that comprehensive rationalism is untenable because it is rationally inconsistent since neither logical arguments nor experience can establish the rationalist attitude. Still more obvious, perhaps, is the fact that this attitude is uncritical and dogmatic and thus becomes not too good once it comes to reflect on itself. On the contrary, what Popper means by rationalism is that:

...attitude or readiness to listen to critical arguments and to learn from experience. It is fundamentally an attitude of admitting that *‘I may be wrong and you may be right, and by an effort, we may get nearer to the truth’* [...] In short, the rationalist attitude, or, as I may perhaps label it, “the attitude of reasonableness,” is very similar to scientific attitude, to the belief that in the search for truth we need co-operation, and that, with the help of argument, we can in time attain something like objectivity. (OS II, 225)

Elsewhere he asserts what he meant when talking about reason or rationalism is that:

nothing more than a conviction that we can learn through criticism, that is, through critical discussion with others and through self-criticism: that we can learn from our mistakes. A rationalist is a person who is willing to learn from others, not simply by accepting their opinions, but by allowing them to criticize his ideas and by criticizing theirs: in other words by critical discussion. (ISBW, 205)

Seen from these definitions, I find that Popper identifies rationalism with critical attitude, which he regards as a tradition of free discussion of theories with the aim of discovering their weak spots so that they may be improved upon (CR, 67). Or, in other words, whenever we propose a theory, we should try as best as we can to overthrow it by means of criticism, rather than defend it; and if we fail to do this, others will do it in our stead anyway. Thus, it follows that if we uphold a theory dogmatically—by believing that it is our duty to defend it—we are then adopting the very reverse of that critical attitude (LSD, 28). It should also be pointed out, from these definitions, that rationalism requires a complementary attitude of reasonableness, that is, “an attitude of *readiness* to listen to

critical arguments and to *learn* from experience” [italics are mine]. And in his *Unended Quest*, Popper reinforces that, ‘one of the best senses of “reason” and “reasonableness” was openness to criticism—readiness to be criticized, and eagerness to criticize oneself; and I tried to argue that this critical attitude of reasonableness should be extended as far as possible’ (UQ, 132). On closer reading, it would thus be appropriate to say that critical rationalism not only prompts us to be fully prepared to modify, or to correct, and even to give up, our theories or guesses by way of correcting our mistakes in order to get nearer to the truth, but it also makes us admit doubt about our theories. The process of doubting, however, must be a conscious attitude of openness to criticism, and we are required to get ready to listen to criticism, to be able to accept criticism, to practise self-criticism, and to engage in mutual criticism with others (Gattei 2009, 81).

At this stage, it must be noted that critical rationalism is “fundamentally, an attitude,” not a theory of rationality. It is a disposition, a readiness to listen to each other’s critical arguments, to search for one’s own mistakes, and to learn from them, following the best argument in a critical debate. In contrast to the theory of rationality, it therefore transcends the consideration of being true or false (Gattei 2009, 81-82). This attitude, according to Popper, cannot be grounded on rational argument. Being a critical rationalist is ultimately a matter of faith:

Whoever adopts the rationalist attitude does so because he has adopted, consciously or unconsciously, some proposal, or decision, or belief, or behaviour; and adoption which may be called ‘irrational’. Whether this adoption is tentative or leads to a settled habit, we may describe it as an irrational *faith in reason* (OS II, 225).

Popper’s concession to irrationalism, however minimum it may be, seems reasonable if we view critical rationalism in the light of necessary consequence of fallibilism—or, to put it

another way, if we accept the suggestion that critical rationalism is a derivative conviction of fallibilist conviction. This is true, in fact, if we pluck another phrase from his work in which he maintains that: 'My rationalism is not dogmatic. I fully admit that I cannot rationally prove... My rationalism is not self-contained, but rests on an irrational faith in the attitude of reasonableness' (CR, 480); provided that we understand reasonableness in the sense that it is, as I have argued before, a result of the awareness of our fallibility.

Furthermore, it must be noted that Popper equates critical or rational attitude with scientific attitude for such attitude is not only the most important feature of science (CR, 260), but, above all, critical attitude is requisite in the pure scientist (CR, 153). Science, according to Popper, must begin with myths, and with the criticism of myths, and the duty of a scientist thereby is to critically discuss myths, and of magical techniques and practises. Therein lies, in fact, the difference between the scientific tradition and pre-scientific one, in which theories are passed on, not as dogma, but rather with the challenge to discuss them and improve upon them (CR, 67). As a matter of historical fact, this tradition is especially Hellenic. For it was the pre-Socratic philosophers who were the first to begin the tradition of critical discussion through arguments and criticisms (CR, 200-2); and for scientific attitude was born when the Greeks introduced a new attitude towards myths, by which they replaced the dogmatic transmission of the doctrine with critical discussion of the doctrine (OK, 347-8). What is truly remarkable about ancient philosophy is that, from Thales to Plato, it witnesses a succession of new philosophies and new cosmologies of staggering originality and profundity. This was possible because 'in this rationalist tradition bold changes of doctrine are not forbidden. On the contrary, innovation is encouraged, and is regarded as success, as improvement, if it is based on the result of a critical discussion of its

predecessors' (CR, 203). And, indeed, the very boldness of an innovation is nothing to be afraid of as it is highly admired for it can be controlled by the severity of its critical examination. Unfortunately, after two or three centuries this tradition was lost, perhaps, according to Popper, due to the rise of the Aristotelian doctrine of *episteme*, of certain, demonstrable knowledge, which emphasised the idea that knowledge can and should be justified, and not a mere guesswork. Fortunately, it was rediscovered in the Renaissance and consciously revived thanks to Galileo and others.

This view of science begins with myths and with criticism of myths and its roots in pre-Socratic philosophies brings us face to face with another yet crucial distinction between critical rationalism and comprehensive (or uncritical) rationalism: the place of tradition in the growth of knowledge. As a matter of historical fact, there is a long-established hostility between comprehensive rationalism and traditionalism. Rationalists are too well accustomed to claim the right of reason and of empirical science over tradition, so well that they would never hesitate to adopt the attitude: 'I am not interested in tradition. I want to judge everything on its own merits; I want to find out its merits and demerits, and I want to do this quite independently of any tradition. I want to judge it with my own brain, and not with the brains of other people who live long ago.' On the contrary, as a critical rationalist, Popper regards tradition—apart from inborn knowledge—as the most important source of knowledge (CR, 36; ISBW, 49). In this stance, he aptly says that the rationalist who claims to reject tradition is himself very much bound by a rationalist. From this point of view, the fact that most of the sources of our knowledge are traditional demonstrates that opposition to tradition can be condemned as futile. Tradition can be of myriad value for it enables us to structure a 'world of thought' without having to start from scratch; for their

ideas are largely the product of the culture in which we have developed (OS II, 289). It should not, however, be construed that Popper supports traditionalism: “for every bit, however small, of our traditional knowledge (and even of our inborn knowledge) is open to critical examination and may be overthrown if need be” (ISBW, 49).

Once more, it should not be understood here that critical approach could be deployed arbitrarily to all kind of knowledge at the same time. While examining one idea, we must accept at least provisionally a number of other unproblematic ideas that constitute what Popper call our ‘background knowledge’—of which may in turn be critically examine at any time. But almost all of the vast amount of background knowledge which we constantly use in any informal discussion will, for practical reason, necessarily remain unquestioned; and the misguided attempt to question it all—that is to say, *to start from scratch*—can easily lead to the breakdown of critical debate (CR, 323). One might surely question the validity of this view given that Popper claims himself a fallibilist. Here Popper’s answer is clear and decisive:

The fact that, as a rule, we are at any given moment taking a vast amount of traditional knowledge for granted (for almost all our knowledge is traditional) creates no difficulty for the falsificationist or fallibilist. For he does not *accept* this background knowledge; neither as established nor as fairly certain, not yet as probable. He knows that even its tentative acceptance is risky, and stresses that every bit of it is open to criticism, even though only in a piecemeal way. We can never be certain that we shall challenge the right bit; but since our quest is not for certainty, this does not matter. (CR, 323)

But, what is remarkable about critical approach, compared to uncritical one, is that it gives way for a reconciliation between rationalism and traditionalism. This statement has a couple of things going for it. The critical rationalist, on the one hand, can appreciate traditions, albeit his beliefs in truth, he does not believe that he himself is in certain

possession of it. And, on the other hand, he can appreciate every step, every approach towards it as either valuable or invaluable; and that through this process it seems to him that our traditions often help to encourage such steps, and also that without an intellectual tradition the individual could hardly take a single step towards the truth (CR, 505).

Furthermore, Popper continues to maintain that:

What the future will bring us, we do not know. But the achievements of the past and of our own time show us what is humanly possible. And they can teach us that although ideas are dangerous we may learn from our mistakes how to handle them; how to approach them critically, how to tame them, and how to use them in our struggles, including our struggle to get little nearer to the hidden truth. (CR, 505)

Up to this point, we often find that, on the one hand, Popper speaks of truth and the efforts to get nearer to the truth, while, on the other hand, as already has been seen before, he claims that there is no such criterion of truth. Now, it seems imperative to ask what does Popper mean exactly by Truth? And how can we get nearer, and know that we are nearer, to Truth? Both the questions, for the time being, lie beyond the scope of the present section, and I shall now enter into the following section as to attempt to answer them.

5.2. Popper on Truth

It should be clear to us by now that for Popper the aim of science is the search for truth. Justification or certainty or probability is, for sure, not an aim. The search for truth in science, for Popper, is the search 'for true theories (even though as Xenophanes pointed out we may never get them, or know them as true if we get them)' (CR, 311). Thus, our aim in science is to search for the most pressing problems, and then we should try to solve them by way of proposing true theories (or true statements, or true propositions), or it may also

happen by proposing theories which come a little nearer to the truth than those of our predecessors (OK, 44). Or, in other words, science is not simply looking for trivial truth. What we look for is '*interesting and enlightening* truth, which is hard to come by, and which offers solutions to our interesting problems' (CR, 311; OK, 55).

In the first glimpse this aim would seem to be self-contradictory from the point of view of his fallibilist conviction. But, on closer examination, they are not only consistent, but obviously true, since it is through this aim that we can hope to learn from our mistakes, as Popper writes:

It is only the idea of truth which allows us to speak sensibly of mistakes and of rational criticism, and which makes rational discussion possible—that is to say, critical discussion in search of mistakes with the serious purpose of eliminating as many of these mistakes as we can, in order to get nearer to the truth. (CR, 310).

Besides this fact, the very idea of fallibility itself implies that there is the idea of an objective truth. It should be pointed out here that what Popper means by 'objective truth' is that truth that is in correspondence with the facts (CR, 304). As a matter of historical fact, Popper prefers to avoid any discussion on the concept of truth in his 1934 *Logik der Forschung*, although he accepts the traditional notion of truth as correspondence to the facts, as it then seemed very difficult to him to comprehend this elusive idea of a correspondence between a statement and a fact (UQ, 111-13; LSD, 273-82; and CR, 302). But this was changed immediately after his encounter with Tarski in 1935 where he did not hesitate any more to talk about Truth. For Tarski had showed him convincingly that the much-disputed correspondence between the *description of a statement* and the *description of a fact* can be solved by establishing this correspondence based upon another different statement (than that of the first), which belongs to meta-language (language at a higher-

level that speaks of itself), rather than to first-level language (the language that speaks of objects, or of reality) (Corvi 1997, 41).

This notion of truth as correspondence to the facts indeed varies from three other theories of truth, that is, the coherence theory which mistakes consistency for truth, the evidence theory which mistakes 'known to be true' for 'true', and the pragmatic or instrumentalist theory which mistakes usefulness for truth. These theories, as Popper claims, are all essentially subjective in the sense that they *stem from the fundamental subjectivist position which can conceive of knowledge only as a special kind of mental state, or as a disposition, or as a special kind of belief*, characterised, for example, by its history or by its relation to other beliefs (CR, 304). These notions of truth suppose that one who knows something for certain is he who knows the truth, while truth in objective sense admits the possibility, as it often happens, that someone conjectures something without knowing it for certain, although his conjecture is indeed true since it corresponds to the facts. Thus, the objective theory of truth leads to a very different attitude towards our theories in the light of the following assertion: a theory may be true even though nobody believes it, and even though we have no reason for accepting it, or for believing that it is true; and another theory may be false, although we have comparatively good reasons for accepting it (CR, 305). As a matter of historical fact, the very same idea of objective truth was also construed by Xenophanes by which he asserted that it is also possible that there are many truths which no one knows for certain, though they may be conjectured by some, and that there are also truths which lie beyond our conjecture (ISBW, 194-5).

The idea of objective truth can also be fully understood in the sense of objective knowledge that Popper construes in contrast with the common conception of subjective knowledge. For Popper, knowledge in subjective sense presupposes the existence of a knowing subject, that is, it is the subjective self who knows. Thus, knowledge in this sense can be characterised as a special kind of belief or opinion or special state of the mind; and it therefore requires that the believer should be in possession of sufficient reasons for establishing that the item of knowledge is *true with certainty*. On the contrary, Popper argues that knowledge in objective sense consists of the logical content of our theories, conjectures, and guesses. Objective knowledge is essentially conjectural or hypothetical in character; it is open to criticism, testing, or revision, and there are no sufficient reasons whatsoever for claiming this knowledge to be true, let alone certainly true (OK, 72-5). Furthermore, objective knowledge does not only transcend the subjective knowledge, but it indeed advances very rapidly so much so that the subjective knowledge is incapable of keeping up with it save for in small areas, and thus within a short period of time it renders subjective knowledge, in the main, obsolete (ISBW, 198). From this point of view, it is appropriate to say that it is only through knowledge in the objective sense that makes philosophy or epistemology capable of developing parallel with, or at any rate explaining, the advancement of science—in contrast to what has been suggested by Wittgenstein and the Logical Positivists where they view philosophy as nothing more than a handmaiden of science.

Thus, Popper maintains that our aim in science is objective truth, although the fact that we may fall short of it and that it is hard to come by (CR, 310-11). But, as a matter of fact, truth is not only hard to come by but also hard to define as he also argues that there is

no criterion of truth. What we only have at our disposal is the criteria which, *if we are lucky*, may allow us to recognise error and falsity. The criteria, among others, are: clarity and distinctness are not criteria of truth, but such things as obscurity or confusion may indicate error; coherence cannot establish truth, but incoherence and inconsistency do establish falsehood (CR, 37). This, however, does not mean that the idea of truth is of no significance for Popper as he contends that an erring man may seek truth even though he has no criterion for it (OS II, 373). Given the absence of the criterion of truth, Popper then treats the classical idea of objective truth as a *regulative ideal* (as Kant or Peirce might have said), that is, truth as a standard that we may fall short of (P1, 26)—or, in other words, it is the idea that we always search for but never sure of obtaining it, and if we are so lucky to obtain the most perfect truth, we cannot know with certainty that we have obtained it. As to render it more intelligible, Popper makes an analogy of the status of objective truth and its role as a regulative idea with a mountain peak which is permanently, or almost permanently, wrapped in clouds. He writes:

The climber may not merely have difficulties in getting there—he may not know when he gets there, because he may be unable to distinguish, in the clouds, between the main summit and some subsidiary peak. Yet this does not affect the objective existence of the summit, and if the climber tells us ‘I have some doubts whether I reached the actual summit’, then he does, by implication, recognize the objective existence of the summit. The very idea of error, or of doubt (in its normal straightforward sense) implies the idea of an objective truth which we may fail to reach. (CR, 306)

Then, he goes on to write:

Though it may be impossible for the climber ever to make sure that he has reached the summit, it will often be easy for him to realize that he has not reached it (or not yet reached it); for example, when he is turned back by an overhanging wall. Similarly, there will be cases when we are quite sure that we have not reached the truth. Thus while coherence, or consistency, is no criterion of truth, simply because even demonstrably consistent systems may be false in fact, incoherence or

inconsistency do establish falsity; so, if we are lucky, we may discover inconsistencies and use them to establish the falsity of some of our theories. (CR, 307).

Now, if we look at the history of scientific knowledge, we can say that its growth is marked by a succession of theories—and even the best theories available today are very likely to be replaced by others in a more or less distant future—shows that, albeit our ignorance of how near or how far we are from truth, we can, and often do, approach more and more closely to the truth. Thus, this fact leads us to another problem of how to assess the growth of scientific knowledge. In order to solve this problem, Popper introduces, in two lectures delivered in part in the early 1960s and later published in full as Chapter 10 of his *Conjectures and Refutations*, the notion of verisimilitude or truthlikeness, that is: the growth of science is measured by its ever better approximation to the truth. For Popper, verisimilitude as an aim of science has a greater advantage than merely aim at truth since the search for verisimilitude is a clearer and a more realistic aim than the search for truth (OK, 57). Thus, Popper defines the idea of verisimilitude as:

maximum verisimilitude would be achieved only by a theory which is not only true, but completely comprehensively true: if it corresponds to all facts, as it were, and, of course, only to *real* facts. This is of course a much more remote and unattainable ideal than a mere correspondence with *some* facts. (CR, 317-8)

From this definition, it follows that one theory may be truer than another theory if it corresponds more to the facts. Besides this, Popper also gives the simplest definition of this concept by means of a formula:

$$Vs(a) = Ct_T(a) - Ct_F(a)$$

Where $Vs(a)$ indicates the verisimilitude of a theory a , $Ct_T(a)$ is a measure of the truth-content of a , and $Ct_F(a)$ is the falsity-content of a (CR: 317). It is obvious that the truth-likeness of a theory is greater if $Ct_T(a)$ increases but not $Ct_F(a)$, or if $Ct_F(a)$ decreases while $Ct_T(a)$ does not.

Now, if we are given two theories, t_1 and t_2 , with comparable truth-content and falsity-content, we can say that t_2 is more closer to the truth, or corresponds better to the facts than t_1 if: (a) the truth-content but not the falsity-content of t_2 exceeds that of t_1 , or (b) the falsity-content of t_1 , but not its truth-content, exceeds that of t_2 . Unfortunately, this definition would seem unsatisfactory when we compare two false theories based on their relative truth and falsity contents. As has been showed independently by David Miller¹²⁰ and Pavel Tichy¹²¹ in the 1970s, verisimilitude fails to establish, between two false theories, which has greater degree of verisimilitude, or is closer to the truth—since for any two distinct false theories A and B , it is false that A has less verisimilitude than B , and it is also false that B has less verisimilitude than A (Newton-Smith 1981, 57-8). As his response to both critics, Popper modifies his original definition simply by stating that:

Theory t_2 is closer to the truth than t_1 if and only if the (relative) truth content of t_2 exceeds the truth content of t_1 , and some of the false consequences of t_1 can no longer be derived from t_2 . (P1, xxxv-xxxvii)

Although it has been showed that his formal definition of verisimilitude is mistaken and contains logical difficulties, Popper never renounces his adherence to this notion of approximation to the truth, considering its all-important—albeit not essential—to his theory

¹²⁰ See David Miller “Popper’s Qualitative Theory of Verisimilitude,” *The British Journal for the Philosophy of Science* 25 (1974), 166-77; “On the Comparison of False Theories by their Bases,” *The British Journal for the Philosophy of Science* 25 (1974), 178-88; and his “Verisimilitude Redeflated,” *The British Journal for the Philosophy of Science* 27 (1976), 363-81.

¹²¹ See Pavel Tichy “On Popper’s Definition of Verisimilitude,” *The British Journal for the Philosophy of Science* 25 (1974), 155-60; “Verisimilitude Redefined,” *The British Journal for the Philosophy of Science* 27 (1976), 25-42, and his “Verisimilitude Revisited,” *Synthese* 38 (1978), 175-96.

of science (Gattei 2009, 45). This, I think, is due to his concerns to obliterate the confusion between the idea of verisimilitude (approximation to the truth) and the idea of probability which arises since the beginning of Western Philosophy. If we are to comprehend the significance of the idea of verisimilitude in Popper's theory of knowledge and its difference with the idea of probability, the beginning of this age-old confusion between them thus merit—indeed demand—description: and so I undertake a detour here to give one.

Etymologically speaking, there were two of the earliest pre-Socratic philosophers who used “*eoikota*” in the sense of “like the truth” or “similar to the truth”, that is: Xenophanes when he said, ‘These things, let us suppose, are like the truth’ ; and Parmenides when he wrote, ‘Now of this world thus arranged to seem wholly like truth I shall tell you...’: from which it is clear enough that what they meant was verisimilitude or truth-likeness, rather than probability or degree of incomplete certainty. In the same generation, there was Epicharmus who, in his criticism of Xenophanes, used the word “*eikotōs*” in the sense of “plausible”, or “something like it”—though there was a possibility that he may have used it in the sense of “like the truth”. But it was Aristotle who, in his *Metaphysics*, read it in the sense of “plausible” or “likely”. Then, in some three generations later, the word “*eikos*” is used quite unequivocally in the sense of “likely” or “probable” (or may be of “more frequently than not”) by the sophist Antiphon when he wrote, ‘If one begins a thing well it is likely to end well’. Since then, verisimilitude or “like the truth” has been misinterpreted as “uncertain and at best of some fair degree of certainty”, which is to say, “probable”.¹²²

¹²² For more detail explanation on the history of this confusion see, Karl Popper, *Conjectures and Refutations* (London & New York: Routledge, 2007b), 320-1.

Therefore, Popper suggests that it is very important to return to Xenophanes as to re-introduce a clear distinction between *verisimilitude* and *probability* (in the sense of calculus of probability) as Xenophanes himself has distinguished clearly between degrees of certainty and degrees of truthlikeness (CR, 321). Both ideas are, however, closely related to the idea of truth, and both of them introduce, in their turns, the idea of an approach to truth by degrees. But, what makes them different is that [logical] probability denotes the idea of approaching logical certainty, or tautological truth, through a gradual diminution of informative content,¹²³ while Verisimilitude represents the idea of approaching comprehensive truth. In contrast to the idea of probability that combines truth with lack of content, Popper combines both ideas of truth and content into single theory, that is to say, he combines the idea of a degree of better (or worse) correspondence to truth and greater (or less) likeness or similarity to truth or the idea of (degrees of) verisimilitude (CR, 315). Whereas what he aims to achieve (on a lower level of precision) for verisimilitude is something similar to what Tarski achieved for truth, that is:

the rehabilitation of a commonsense notion which has become suspect, but which is in my opinion much needed for any critical commonsense realism and for any critical theory of science. I wish to be able to say that science aims at truth in the sense of correspondence to the facts or to reality... And I wish to be able to say these things without fearing that the concept of nearness to truth or verisimilitude is logically misconceived, or 'meaningless'. In other words, my aim is the rehabilitation of a commonsense idea which I needed for describing the aim of science, and which, I assert, underlies as a regulative principle (even if merely unconsciously and intuitively) the rationality of all critical scientific discussions. (OK, 59).

Seen from its specific vantage-point, Popper argues that verisimilitude, in which the concepts of truth and logical content are combined together, can shed much light on the advancement of science (CR, 313). But, he argues further that in science there is another

¹²³ According to Popper, informative content of a theory is inversely proportional to its logical probability.

criterion of progress by which we can know even before a theory is put to the test, provided it passes certain number of crucial tests, it will be better than some other theory (CR, 293-4). From this point of fact, it follows that we have a criterion of relative satisfactoriness, or potential progressiveness, of a scientific theory. For Popper, this criterion is extremely simple and intuitive since:

It characterizes as preferable the theory which tell us more; that is to say, the theory which contains the greater amount of empirical information or *content*; which is logically stronger; which has the greater explanatory and predictive power; and which can therefore be *more severely tested* by comparing predicted facts with observations. In short, we prefer an interesting, daring, and highly informative theory to a trivial one. (CR, 294)

Now, this idea of the informative content a theory can be illustrated as follows: Writing $Ct(a)$ for the content of the statement a , 'It will rain on Friday', and $Ct(b)$ for the content of the statement b , 'It will be fine on Saturday': then, it is apparent that the informative content of the conjunction ab , 'It will rain on Friday and it will be fine on Saturday', will be greater than that of either of its components a and b ; and thus, we have:

$$Ct(a) \leq Ct(ab) \geq Ct(b)$$

While from the law of the calculus of probability, it will be clear that the probability of ab (or, what is the same, the probability that ab will be true) will be smaller than that of its components a and b alone:

$$p(a) \geq p(ab) \leq p(b)$$

Now, the two relations have inverted inequality signs. But, if these two laws taken together, they state 'that with increasing content, probability decreases and *vice versa*; or in other

words, that content increases with increasing improbability' (CR, 295). This fact is no doubt trivial. But, Popper shows that, it leads to inevitable remarkable consequences: firstly, if growth of knowledge means that we operate with theories of increasing content, it must also mean that we operate with theories of decreasing probability (in the sense of the calculus of probability); secondly, if our aim is the advancement or growth of knowledge, then a high probability (in the sense of the calculus of probability) cannot possibly be our aim as well (CR, 295). These two aims, according to Popper, are incompatible 'since a low probability means a high probability of being falsified, it follows that a high degree of falsifiability, or refutability, or testability, is one of the aims of science—in fact, precisely the same aim as a high informative content' (CR, 297).

Therefore, Popper contends that mere truth is not an aim of science. What we look for in science is *interesting truth* which consists of a high degree of explanatory power, which indicates that it is initially logically improbable. He also then goes on to write: 'Mere truth is not enough; what we look for are *answers to our problems*. Only if it is an answer to a problem—a difficult, a fertile problem, a problem of some depth—does a truth, or a conjecture about the truth, become relevant to science' (CR, 311).

I have considered, up to this point, some elements into which we may have understood the conception of knowledge in Popper's epistemology, especially his view on the problem of the foundations of knowledge. Now, I could go on from this to discuss his ethical principles and their role throughout the development of his theory of scientific knowledge.

5.3 The Ethical Underpinnings of Popper's Theory of Scientific Knowledge

Much has been discussed about the ethical foundations of Popper's philosophy¹²⁴ that it seems at the first glance there can be nothing of value to add, approvingly or disapprovingly, on it. Yet, I should like to add some remarks on the origin of Popper's ethical principles, to explain their relations with his ideas of fallibilism, of critical rationalism and of approximation to the truth (verisimilitude), and to affirm that they affect the development of his theory of scientific knowledge. It should be noted at the outset, before I begin to analyse some of these ethical principles, that Popper never wrote an extensive work on ethics, while all his famous books do not expound, so to speak, a systematic moral philosophy, and it is only in his talks and occasional papers that he speaks, to a somewhat greater extent, about the ethical principles of his philosophy. Given this fact, it should be the task here to reconstruct the ethical system that governs the development of his philosophy, especially his theory of scientific knowledge, by gathering all the fragments—that express his ethical views—from some of his works at my disposal.

Now, I would like to begin my analysis of Popper's ethical principles by, firstly, proposing the following statement: it is from his fallibilist conviction that Popper develops his ethical principles and that these principles, in their turn, govern the development of his theory of scientific knowledge. This statement, however, need to be qualified. First, as we have already seen, Popper firstly elaborates his fallibilist conviction into an epistemological doctrine from which he expounds his epistemic principles such as fallibilism, critical

¹²⁴ See for example, Hubert Kiesewetter, "Ethical Foundations of Popper's Philosophy," in *Karl Popper: Philosophy and Problem*, ed. Anthony O'Hear, (Cambridge: Cambridge University Press, 1995), 275-90; Stefano Gattei, "The Ethical Nature of Karl Popper's Solution to the Problem of Rationality," *Philosophy of the Social Sciences*, Vol. 32 (2002), 240-66; Noretta Koertge, "The Moral Underpinnings of Popper's Philosophy," in *Rethinking Popper*, eds. Zuzana Parusniková and Robert S. Cohen, (Boston: Springer, 2009), 323-38; Jeremy Shearmur, "Critical Rationalism and Ethics," in *Rethinking Popper* (Boston: Springer, 2009), 339-56; and Nilson Guimarães Doria, "No more than Conjectures: Popper and the Ethics of Scientific Enterprise," *Integrated Psychological Behavior*, Vol. 43 (2009), 116-25.

rationalism, and approximation to the truth. Secondly, despite their epistemological purports, all these principles are out-and-out ethical principles. As to make this statement more sensible, I would like to restate such epistemic principles in conjunction with the ethical principles: (1) the principle of fallibilism indicates that: ‘perhaps I am wrong and you are right, but perhaps both of us could easily be wrong’; (2) the principle of critical rationalism allows us to try to assess our reasons for accepting or rejecting a theory, i.e., a theory that is definite and criticisable; and (3) the principle of approximation to the truth suggests that we can always come nearer to the truth in a discussion which avoids personal attacks—thus, it can also help us to attain a better understanding even in those cases where we do not come into an agreement (ISBW, 199).

These principles can be viewed as both epistemological and ethical principles from the fact that they imply the most important moral demand, that is, toleration. Thus, based upon these principles Popper develops his theory of intellectual toleration, where he writes:

If I hope to learn from you, and if I want to learn in the interest of truth, then I have not only to tolerate you but also to recognize you as a potential equal; the potential unity and equality of all men somehow constitute a prerequisite of our willingness to discuss matters rationally. Of importance also is the principle that we can learn much from a discussion, even when it does not lead to agreement: a discussion can help us by shedding light upon some of our errors. (ISBW, 199)

This forceful statement makes explicit the deep moral significance of his theory of scientific knowledge, and it thus provides a set of moral tenets from which science is based upon, and by which we are guided in carrying out our scientific enterprise: ‘Ethical principles form the basis of science. The idea of truth as the fundamental regulative principle—principle that guide our search—can be regarded as an ethical principle’ (ISBW, 199). But, what is truly remarkable about Popper’s epistemic principles and their practical

consequences is the fact that they are not only confined to the domains of science and ethics, but also apply to politics. It is on this ground that Popper seems to side with Kant and Russell. Indeed, he shares the same view with Russell that both epistemological relativism, which believes there is no objective truth, and epistemological pragmatism, that equates truth with usefulness, are closely connected with authoritarian and totalitarian ideas (CR, 5-6, OS II, 373-4). This of course illustrates the connection between epistemology and ethics. But, unfortunately, I cannot delve any further into the discussion on the relationship between Popper's epistemic principles and his political philosophy for it would drag us to the problem that lies beyond the scope of the present study, which is concerned especially with his theory of scientific knowledge. Therefore, it suffices to remark that Popper regards toleration as the utmost responsibility for intellectuals, be it in epistemology, in science or even in politics, where, in his lecture entitled "Toleration and Intellectual Responsibility" (ISBW, 188-203), he freely translates Voltaire's formulation:

Toleration is the necessary consequence of realizing our human fallibility: to err is human, and we do it all the time. *So let us pardon each other's follies.* This is the first principle of natural right. (ISBW, 190)

It may seem clear to us that this formulation consists the idea of intellectual honesty and toleration, that is firstly to admit our fallibility and secondly to pardon the fault of others. Now, based upon these concepts of intellectual honesty and toleration, Popper proposes a new professional ethics as to replace the traditional codes of ethics. His new ethics which is based upon the idea of objective knowledge and fallible knowledge renders the old ethics obsolete since it was founded upon personal knowledge and certain knowledge which implies the idea of authority. The old ideal was the possession of the truth, or certain truth, where an authority is regarded to be free from mistakes, which eventually brings about the

intellectual dishonesty, as Popper asserts: ‘it leads (especially in medicine and in politics) to covering up of mistakes for the sake of protecting authority’ (ISBW, 200). On the contrary, the new ethics suggests that there are no authorities and that it is impossible to avoid all mistakes although we are obliged to avoid unnecessary mistakes through learning from our mistakes. Thus, it requires us, and in fact it is a duty, to search for our mistakes, and we must learn to accept gratefully when others show us our mistakes since we cannot afford to discover and correct our mistakes alone without others’ help (ISBW, 201-2).

Popper also talks about an extra responsibility for the scientist in his essay, “The Moral Responsibility of the Scientist” (MF, 121-9), where he says that scientists in the past had a special responsibility to search for the truth without any need to bother about how their discoveries would be applied. This is not our privilege anymore as he remarks that, ‘this happy situation belongs to the past. Today not only all pure science may become applied science, but even all pure scholarship’ (MF, 121). Since scientists are now directly involved in the application of science from the fact that they are privy to relevant information, it is imperative for them to take on the additional responsibility of trying to foresee any dangerous unintended consequences of their work and work to counteract them. Popper sums up this view with the phrase *sagesse oblige* (obligation of the scholars) (MF, 128).

5.4 Concluding Remarks

As to recapitulate, Popper’s theory of scientific knowledge is one of the most striking philosophical experiment ever undertaken in the history of Western philosophy—and no

doubt that he made a contribution of lasting importance to the theory of knowledge. Looking specifically from the point of view of its relation to the problem of the foundations of knowledge, it implies that if we uphold the notion of justificationism in the sense of justifying the truth of our knowledge claims, there remains no other choice but to grapple with the problems of no significance to epistemology, which hamper the growth of scientific knowledge.¹²⁵ And the failure to maintain the objectivity of scientific knowledge gives no other implication than to arrest criticism, which entails the loss of scientific knowledge. Now, I shall proceed to the next chapter in which I discuss in comparative manner both Descartes' and Popper's philosophical experiments in the specific problem of the foundations of knowledge.

¹²⁵ For Popper, justificationism does not help in the growth of scientific knowledge since it focuses on justifying the truth of knowledge claims but not trying to detect errors in knowledge through criticism, and then replace them with better theories (LSD: xviii-xxvi).