Chapter – 3

The Aim of Progress and the Falsifiable Hypothesis

3.1 Nature of Falsifiable Hypothesis

Origin of Hypothesis

For Karl Popper, knowledge produced from any source can be scientific, if it is refutable and, in principle, amenable to appropriate or established procedures of testing. In other words, any theory can be considered a scientific theory if its claim can be subjected to critical evaluation. This theory may emerge from any source; myth, metaphysics, fiction etc. This view is anchored on the two-pronged realization, viz; (a) it is not clear and distinct that ‘truth is manifest’ and (b) induction cannot be the characteristic method of science.

The theory of ‘Manifest Truth’ is born out of the epistemological optimism inspired by Western Renaissance: a faith in man’s power of discernment and understanding leading to certainty of knowledge. At the heart of new optimistic view of the possibility of knowledge lies on he doctrine that ‘truth is manifest’. The view of ‘Manifest Truth’ is espoused by Descartes.

He says that truth may perhaps be veiled, but it may reveal itself. And if it does not reveal itself, it may be revealed by us. Removing the veil may not be easy, but once the naked truth stands revealed before our eyes, we have the power to see it, to distinguish it from falsehood, and to know that it is true. Truth is always recognizable as truth. Thus, truth has only to be unveiled or discovered. Once this is done, there is no need for further argument. We have been given eyes to see the truth, and the ‘natural light’ of reason to see it by. He mentions Bacon’s and Descartes’ view that ‘there was no need for any man to appeal to authority in matters of truth, for, each man carried the sources of knowledge in himself-- either in his power of sense perception which he may use for the careful observation of nature, or in his power of intellectual intuition which he may use to distinguish truth from falsehood by refusing to accept any idea which is not clearly and distinctly perceived by intellect.¹

According to Karl Popper, if truth is manifest, it need not be explained, rather it creates the need to explain falsehood. How can we ever fall
into error if truth is manifest? The Cartesian answer would be: through our own sinful refusal to see the manifest truth. Or, our minds harbour prejudices inculcated by education and tradition. Or, other evil influences which have perverted our originally pure and innocent minds. Ignorance may be the work of powers conspiring to keep us in ignorance, to poison our minds by filling them with falsehood, and to blind our eyes so that they can not see the manifest truth. This is called conspiracy theory of ignorance. The conspiracy theory of ignorance is well known in its Marxian form as the conspiracy of a capitalist press that perverts and suppresses truth and fills the worker's minds with false ideologies. However, such a conspiracy does not permit us to know the truth, otherwise truth is manifest.

However, Popper criticizes the view of manifest truth and says that 'manifest truth' is not manifest at all. In support of his contention, he forwards three reasons. Firstly, he argues that 'the simple truth is that truth is often hard to come by, and that once found it may easily be lost again. Erroneous beliefs may have an astonishing power to survive, for thousand years, in defiance of experience, and without the aid of any conspiracy. Thus the optimistic epistemology of Bacon and of Descartes cannot be true'. Secondly, epistemology of manifest truth has also led to disastrous consequences. The theory that 'truth is manifest' leads to every kind of fanaticism. For, it holds that only the most depraved wickedness can refuse to see the manifest truth. Only those who have every reason to fear truth can deny it, and conspire to suppress it. Thirdly, theory of manifest truth not only breeds fanatics but it may also lead to authoritarianism. This is so simply because truth is not manifest, as a rule. The allegedly manifest truth is therefore in constant need, not only of interpretation and affirmation, but also of reinterpretation and reaffirmation. An authority is then required to pronounce upon, and lay down, almost from day to day, what is to be the manifest truth. And it may learn to do so arbitrarily and cynically. 'Know thyself how little thou knowest' was swept away by 'truth is manifest' thesis. Therefore, manifest truth could only replace one authority—that of Aristotle and the Bible—by another. The new authority is the authority of sense and the authority of the intellect. However, he denies manifest truth and calls it false epistemology.
According to Popper, true epistemology must realize that all of us may and often do err, singly and collectively. However, this very idea of error and human fallibility involves another one—the idea of objective truth, the standard that we may fall short of. Thus, the doctrine of fallibility should not be regarded as a part of a pessimistic epistemology. This doctrine implies that we may seek for truth, for objective truth, though more often than not, we may miss it by a wide margin. And it implies that if we respect truth, we must search for it by persistently searching for our errors: by indefatigable rational criticism and self criticism. Therefore, we acquire knowledge from criticism, in other words, attempted refutation of the existing one. For Popper, knowledge is produced from critical examination of what is asserted, not by the tracing of its origins. Thus, the question, ‘what is the source of knowledge, is wrongly put. Similarly, the question, ‘what are the best sources of our knowledge?’ is also wrongly put. For, no such pure, untainted, certain, ideal source exists. There are all kinds of sources of our knowledge, but none has the overarching authority. We have to give up the idea of ultimate source of our knowledge and admit that all knowledge is human; and that it is mixed with our errors, our prejudices, our dreams, and our hopes. All we can do is to grope for truth even though it be beyond our reach. Therefore, Popper proposes to replace the question of the sources of our knowledge by the entirely different question: how can we hope to detect and eliminate error. The proper answer to this question is by criticizing the theories and guesses of others, and also by criticizing the theories and guesses of our own. Popper says, “I do not know what is source of our knowledge, what I want you to criticize my tentative assertion as severely as you can; and to design some experimental test which might refute my assertion. If you do , I shall gladly , and to the best of my powers, help you to refute it”. So, knowledge is an adventure of ideas. These ideas are produced by us, and not by the world around us.

Therefore, any production of human mind, such as myth, metaphysics, story, guess, whatsoever, may be the source of our knowledge; this is the first step of our knowledge adventure. The second step is to try to eliminate error from that product by criticism, and that criticism may be as severe as possible at any given time; for, we will try our best to eliminate the falsehood from our
product. Regarding the source of our knowledge there is a further question as to what is the method to produce a theoretical assertion? For Popper, it is _conjecture_ rather than _induction_ by which we obtain the initial assertions about the world.

What is the induction? Any inference, which passes from singular statements, such as accounts of the results of observations or experiments, to universal statements, such as hypotheses or theories, is called induction. According to a widely accepted view, the logic of scientific discovery would be identical with inductive logic. But it is easy to see that the method of science is 'conjecture and refutation' rather than induction. Popper says, it is far from obvious, from a logical point of view, that we are justified in inferring universal statements from singular ones, no matter how numerous. For, any conclusion drawn in this way may always turn out to be false: no matter how many instances of, say, white swans we may have observed, this does not justify the conclusion that 'all swans are white'.

Inductive method is strongly supported as a characteristic method of science by Reichenbach. He calls it the 'principle of induction'. For him, to eliminate it from scientific research would mean nothing less than to deprive science of its basic method of investigation. This is the principle by which scientists decide the truth or falsity of their theories. Without it science would no longer have the right to distinguish its theories from the fanciful and arbitrary creations of a poet's mind. For Popper, inductive logic cannot be deemed to be a principle. In case we accept induction as a principle, it would amount to accepting that such a principle would be the statement with the help of which we can put inductive inferences into a logically acceptable _form_. But the principle of induction cannot be a purely logical truth like a tautology or an analytic statement. If there were such a thing as a purely logical principle of induction, all inductive inferences would have to be regarded as purely logical or tautological transformations. But principle of induction is a synthetic statement, it has no such analytic property that is, a statement whose negation is self-contradictory, or logically not possible.

The so-called principle of induction is thus superfluous. Furthermore, such a principle can lead to inconsistencies as well. For, the principle of
induction must be a universal statement in its turn. Now, if we try to regard its truth as known from experience, then the very problems which occasioned its introduction will arise all over again. To justify it, we should have to employ inductive inferences; and to justify these we should have to assume an inductive principle of a higher order; and so on. Thus, to attempt to base the principle of induction on experience breaks down, since it must lead to an infinite regress. Hume says that truth of induction is a sheer belief based on human psychology. In fact, there are no necessary connections between inductive sequences of observations. As Born points out that no observation or experiment, however extended, can give more than a finite number of repetitions. Therefore, statement of law—B depends on A—always transcends experience. Yet this kind of statement is made everywhere and all the time, and sometimes from scanty material.

Popper further claims that observations too are not a source of scientific knowledge. He forwards three reasons to show that scientific theories generally claiming to be derived from observations, are actually not derivable from them:

Firstly, it is intuitively not credible,
Secondly, it is historically false,
Thirdly, it is logically impossible.

Firstly, he says that if we examine the character of a theories, and of relevant observational statements, we shall not be convinced of any kind of necessary relationship between them. Take, for example, Newtonian theory of gravitation. There are no observational statements which directly or indirectly validate or support his theory. In the first place, observations are always inexact, while theory makes the exact assertions. Not only this, it is a great triumph for Newtonian theory that it stood up to subsequent observations regarding precision far beyond what could be attained in Newton’s own time. Now it is incredible that more precise statements, let alone the absolutely precise statements of the theory itself, could be logically derived from less exact or inexact ones i.e. observations. Moreover, on the one hand, an observation is always made under very special conditions, and each observed situation is always a highly specific situation. While the theory claims to apply
in all possible circumstances, on the other. For example, a theory about planetary system applies not only to Mars or Jupiter, but to all planetary motions and all solar systems. Furthermore, observations are always concrete, while theory is abstract. For example, we can never observe anything like Newtonian force. Without the dynamical theory it is simply impossible to measure force. For all these reasons, it is intuitively not credible that the theory should be derivable from observations.

Secondly, it is historically false to believe that Newton’s dynamics was derived from observations. Popper says that this belief is widespread but that is merely a myth having no historical truth. To show this he refers to the part played by the most important precursor, Nicolas Copernicus. He says that Copernicus’ idea of placing the Sun rather than the Earth in the center of the universe was not the result of new observations but of a new interpretation of old and well-known facts in the light of semi-religious Platonic and Neo-Platonic ideas. The crucial idea can be traced back to the Plato’s Republic. There we read that the Sun plays the same role in the realm of visible things, as does the Idea of the Good in the realm of Ideas. The Idea of the Good is the highest in hierarchy of Platonic Ideas. Accordingly, the Sun, which endows things with their visibility, vitality, growth, and progress, is the highest in the hierarchy of the visible things in nature. This Platonic Idea, then, forms the historical background of the Copernican revolution. Popper claims that it does not start with observations, but with religious or mythical ideas. So looked at from a historical or genetical point of view observations were not the source of heliocentric thesis. Historically speaking, idea of heliocentricity preceded the observations thereof. The idea become indispensable for interpretation of the observations; they had to be interpreted in its light.

Thirdly, it is logically impossible to derive, for example, Newton’s theory from observations. This conviction follows intimately from Hume’s critique of the validity of inductive inference. Hume argues that if a theory follows from observations, no logically possible future observations can contradict the class of past observations. In other words, if B is a self-consistent observation- statement about a possible future event, and K is any class of pure observational statements about past events, then B can always be conjoined
with K without contradiction. Now if we add to this a theorem of pure logic, namely: ‘whenever a statement B can be conjoined without contradiction to a class of statements K, then it can also be conjoined without contradiction to any class of statements that consists of statements of K together with any statement that can be derived from K.’ Thus we can prove our point: if Newton’s theory could be derived from a class of K of true observation-statements, then no future observation B could possibly contradict Newton’s theory and the observations of K. But we can logically derive from Newton’s theory and past observations a statement that tells us whether there will be an eclipse of the sun tomorrow. Now if this derived statement tells us that tomorrow there will be no eclipse of the sun, then our B is clearly incompatible with Newton’s theory and the class K. It follows logically that it is impossible to assume that Newton’s theory can be derived from observations.  

J.M. Keynes in his *A Treatise on Probability* says that inductive inference, although not strictly valid, can attain some degree of reliability or of probability—inductive inferences are probable inferences. It is not given to science to reach either truth or falsity but scientific statements can only attain continuous degree of probability whose unattainable upper and lower limits are truth and falsity respectively. However, the idea of probability is again unsuitable for principle of induction. For, Popper says that, if a certain degree of probability is to be assigned to statements based on inductive inference, then this will have to be justified by involving a new principle of induction. And this new principle in its turn will have to be justified, and so on. Nothing is gained if the principle of induction is taken not as true, but only as probable. In short, like every other form of inductive logic, the logic of probable inference or probability logic leads either to an infinite regress, or to the doctrine of apriorism.  

According to Popper, there is another problem with probability. *The probability of statement is always the greater the less the statement says.* It is inverse to the content or the deductive power of the statement, and thus to its explanatory power. Accordingly, every interesting and powerful statement must have a low probability, and vice versa. A statement with high probability will be scientifically uninteresting, for, it says little and has no explanatory power. Although we seek theories with a high degree of corroboration, as
scientists we do not seek highly probable theories but explanations; that is to say, powerful and improbable theories.\textsuperscript{15}

Thereafter, Popper examine the positivistic dogma of meaning in inductive logic. He mentions that meaning in inductive logic is equivalent to the requirement that all the statements in empirical science must be capable of being finally decided, with respect to their truth and falsity. This means that their form must be such that to verify them and to falsify them must both be logically possible. In this connection he indicates Schlick’s view: a genuine statement must be capable of conclusive verification; and Waismann’s view: ‘if there is no possible way to determine whether a statement is true then that statement has no meaning whatsoever. For, the meaning of the statement is the method of its verification’. Popper says, ‘but there is no’, ‘such thing as induction. Thus, inference to theories, from singular statements which are ‘verified by experience’ is logically inadmissible. Theories are therefore never empirically verifiable’. In view of the same, he denies induction as sole method of science. Then what is the characteristic method of science, is a question which needs elaborate consideration.

In this regard, Popper holds that a system can be empirical or scientific only if it is capable of being tested by experience. This suggests that falsifiability rather than verifiability is the criterion of meaning of scientific discourse. In other words, it is not required that scientific system will be capable of being singled out once and for all in a positive sense; but it is required that its logical form will be such that it can be singled out, by means of empirical test, in a negative sense. It must be possible for an empirical scientific system to be refuted by experience. Thus, the statement ‘it will rain or not rain here tomorrow’ will not be regarded as empirical, simply because it cannot be refuted, whereas the statement ‘it will rain here tomorrow’ will be regarded as empirical.\textsuperscript{16}

It might be said that falsification is impossible, for any theoretical system should never be conclusively falsified. For, it is always possible to find some way of evading falsification. It is even possible without logical inconsistency to adopt the position of simply refusing to acknowledge any falsifying experience whatsoever. Popper says, on the contrary, that what
characterizes the empirical method is its manner of exposing theories to falsification. Its aim is not to save the lives of untenable systems but, on the contrary, to select that which by comparison is the fittest, by exposing them all to the fiercest struggle for survival.\textsuperscript{17} He says that there is a distinction between falsifiability and falsification. Falsifiability is the sole criterion of the empirical character of a system of statements. As to falsification, special rules must be introduced which will determine under what conditions a system is to be regarded as falsified. We say that a theory is falsified only if we have accepted a basic statement which contradicts it. This condition is necessary, but not sufficient. For, we have seen that non-reproducible single occurrences are of no significance to science. Thus a few strong basic statements contradicting a theory will hardly induce us to reject it as falsified. We shall take it as falsified only if we discover a reproducible effect, which refutes the theory. In other words, we only accept the falsification if a low level empirical hypothesis which describes such an effect is proposed and corroborated. This kind of hypothesis may be called a falsifying hypothesis. That the falsifying hypothesis must be empirical and so falsifiable, only means that it must stand in a certain logical relationship to possible basic statements. The hypothesis should be corroborated’ refers to tests which it ought to have passed—tests which confront it with accepted basic statements. Thus, the basic statements play two different roles. On the one hand, we have used the system of all logically possible basic statements in order to obtain the logical characterization of the form of empirical statements. On the other hand, the accepted basic statements are basis for the corroboration of hypothesis. If accepted basic statements contradict a theory, then we take them as providing sufficient grounds for its falsification only if they corroborate a falsifying hypothesis at the same time.\textsuperscript{18} Therefore, according to Popper scientific theories are in essence falsifiable hypotheses.

Popper says that a hypothesis may be metaphysical, mythical or the assertion of any sort, but it is scientific if it is refutable by the empirical. For him, in certain sense, science is myth making just as religion is. Nevertheless, it has been different from religion because the former is empirically open to criticism whereas the second is not. There are two possible attitudes towards
any tradition or the assertion. One is to accept the assertion uncritically, often even being aware of it. This is the first order attitude. The other possibility is a critical attitude, which may result either in acceptance or in rejection, or perhaps in a compromise. This is the second order attitude. This second order attitude is the critical or argumentative attitude. Any assertion, which adopts this second order critical attitude, does become different.¹⁹

Therefore, the man to whom a myth was handed on would take the myth and would apply it to various things which it was supposed to explain, such as the movement of planets. Then he would say: I do not think that this myth is very good, for, it does no explain the actual observable movement of the planets; or whatever it might be. Thus, it is the myth or the theory which leads to, and guides, our systematic observations - observations undertaken with the intention of probing into the truth of the theory or the myth.

From this point of view, Popper claims, the growth of the theories of science should not be considered as the result of the collection or accumulation of observations. On the contrary, the observations and their accumulation should be considered as the result of the growth of the scientific theories. This is what Popper calls the ‘searchlight theory of science — the view that science itself throws new light on things; that it not only solves problems but it creates many more; and that it not only profits from observations but leads to the new ones. In this way, we look out for new observations with the intention of probing into the truth of our myths; and the myths then become changed from their rough manner to the scientific theory; and in time they become more realistic and agree better with observable facts. In other words, under the pressure of criticism the myths are faced to adopt themselves to the task of giving us an adequate and a more detailed picture of the world in which we live. Scientific theories are not just the result of observations, they are, broadly speaking, the product of myth-making.²⁰

Krajewski, calls this view hypotheticism because according to it the investigation starts from a hypothesis. When scientists want to explain a set of phenomena, they create a hypothesis, which is a candidate for becoming a law. Next, they deduce different empirically testable consequences from it and test them in experiments. If the test gives positive result, the candidate is admitted
as a law, though this decision is never final. If the test gives negative result, the candidate is rejected. In this competition, the defeated and the defeater both are hypotheses.\textsuperscript{21}

They are myth-making, for, they are produced from the imaginative mind of the scientists—they are not the abstract from the observations. First myth is produced then we observe according to that myth. Without theory, in other words, myth, we could not orientate ourselves in the world; we could not live, because our observations are always interpreted; we observe the thing as our theory suggests. For instance, the Marxists literally observe class struggle everywhere, for, their theory suggests that history of mankind is the history of struggle between classes; The Freudian observe everywhere repression and sublimation; the Adlerian sees how feelings of inferiority expresses themselves in every action and every utterance; all observations are designed by their theory.\textsuperscript{22}

Therefore, theory is not produced by abstraction from observations: Observation, itself, cannot operate without theory. For Popper, nothing can be built on pure data, because there is nothing as pure data; there is nothing simply ‘given’ to us uninterpreted. All our knowledge is interpretation in the light of our expectations, our theories.\textsuperscript{23} Observation is very important; but its function is not that of producing theories. It plays its role in rejecting, eliminating, and criticizing theories; and it challenges to produce new myths, new theories which may stand up to these observational tests. Thus, scientific myths under the pressure of criticism become so different from religious myths. But, in their origin, remain myths or inventions just like the others.\textsuperscript{24}

**Hypothesis as Conjecture**

For Popper, such myths are conjectures, and criticism of such myths refutation. For him, interplay of such ‘conjectures and refutations’ is the source of scientific knowledge. This is at once both the method and the source of knowledge. This method is nothing but a critical discussion of a problem under consideration. For Popper, critical discussion often relies upon a considerable amount of common background knowledge. This does not mean that background knowledge is a priori, and cannot be critically discussed in its turn. It only means that criticism never starts from nothing.\textsuperscript{25}
For him, if a teacher tells a young scientist, "Go round and observe," he is badly advised. But he is well advised if his teacher tells him, "Try to learn what people are discussing nowadays in science. Find out where difficulties arise, and take an interest in disagreements. These are the questions which you should take up." In other 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.\footnote{26}

Popper says that the world is infinitely complex and we do not know where and how to start our analysis of this world. There is no wisdom to guide us; even a scientific tradition does not tell us as to where the point of departure is. It only tells us where and how other people started and where they got to. It tells us that people have already constructed in this world a kind of theoretical framework—not perhaps a very good one, but one which more or less works. It serves us as a kind of network, as a system of coordinates to which we can refer the various complexities of this world. We use it by checking it over, and by criticizing it. In this way, we make progress.

The crucial question regarding conjecture is as to how we make it. According to Popper, our conjecture starts always from problems—either from practical problems or from a theory, which has run into difficulties. Once we are faced with a problem, we may begin to work on it. We may respond to such a situation in two ways: Firstly, we may proceed by attempting a guess or conjecturing a solution to our problem, and secondly, we may attempt to criticize our usually somewhat feeble guess. Such a guess or a conjecture may withstand our criticism and experimental tests, for some time. But as a rule, we soon find that our conjectures can be refuted, or that they do not solve our problem, or that they solve it only in part. We also find that even the best solutions—those able to resist the most severe criticism of the most brilliant and ingenious minds—soon give rise to new difficulties leading to new problems. Thus, we may say that the growth of knowledge proceeds from old problems to new problems by means of conjectures and refutations.\footnote{27}

However, we may agree that our conjecture starts from problems, but we may still think that our problems must have been the result of observations and experiments. For, there can be nothing in our intellect which has not
entered it through our senses. That is, observation precedes problems. But the actual course happens to be fully different. Popper says that every animal is born with some expectations or anticipations, which could be framed as hypothesis - a kind of hypothetical knowledge. We have a measure of innate knowledge from which we may begin, even though it may be quite unreliable. This innate knowledge, this inborn expectation, will, if disappointed, create our first problems. And the ensuing growth of our knowledge may be described as consisting throughout of corrections and modifications of previous knowledge. That observation cannot precede all problems may be illustrated by a simple experiment. ‘This experiment consists of asking you to observe, here and now. You are all cooperating, and observing! However, at least some of you, instead of observing, will feel a strong urge to ask: ‘what do you want me to observe?’ If this is your response then the experiment is successful. What we are trying to illustrate is that, in order to observe we must have in mind a definite question, which we might be able to decide by observation.\(^{28}\)

Popper says that observation is always selective. Popper asked some physics students in Vienna to take a pencil and a piece of paper and after careful observation write down what they have observed. They asked, of course, what he had wanted them to observe. The instruction ‘observe’ is absurd. So, it needs a chosen object, a definite task, an interest, a point of view, a problem. And its description presupposes a descriptive language; it presupposes similarity and classification, which in turn presupposes interests, point of view, and problems.

For Katz, even animals cannot do without selection. He says that an animal according to his needs, divides the environment into edible and inedible things. Popper says that this rule applies not only to animals but also to scientists. For an animal, a point of view is provided by its needs, the task of the moment, and its expectations. For the scientists the point of view is provided by his theoretical interests, the special problems under investigation, his conjectures and anticipations, and the theories which he accepts as a kind of background: his frame of reference, his horizon of expectation. For him, scientific knowledge is produced from observations and observations are produced from some hypothesis, in other words, from some conjecture in
response to a felt problem and an urge of resolving the problem in expected manner. The paradox ‘which comes first, hypothesis or observation?’ is responded to by Popper by maintaining the priority of hypothesis. It is quite true that any particular hypothesis we choose will have been preceded by observations—the observations, for example, which it is designed to explain. But these observations in their turn presuppose the adoption of a frame of reference, a frame of expectation, a frame of theory. Popper says, if they were significant, if they created a need for explanation and thus gave rise to the invention of hypothesis, it was because they could not be explained within the old theoretical framework, the old horizon of expectation. In this way, if we go back to more and more primitive theories and myths we shall in the end find unconscious, or ‘inborn expectations’ operating behind them.

According to Popper, it does not mean that the expectations are ‘inborn ideas’ but rather every organism has inborn ‘reactions’ or ‘responses’, and among them, responses adopted to impending events. These responses we may describe as ‘expectations’. The newborn baby ‘expects’ in this sense to be fed. He says, ‘inborn expectations’ may quite reasonably be called ‘inborn knowledge’ as well. This knowledge is not, however, valid a priori, for an inborn expectation, no matter how strong and specific, can be mistaken. Such expectations or knowledge may be valid a priori, only on psychological or genetic grounds, i.e. prior to all observational experiences. One of the most important of these expectations is the expectation of finding regularity. It is connected with an inborn propensity to look out for regularities, or with our need to find regularities.29

However, the expectation of finding regularities is not only psychologically a priori but also logically a priori. It is logically a priori to all observational experiences, for, it is prior to any recognition of similarities; and all observations involve the recognition of similarities. But in spite of being logically a priori in this sense the expectation is not valid a priori. We can easily construct an environment, which is so chaotic that, we completely fail to find regularities.30

However, we start with a problem, a difficulty. This problem may be practical or theoretical. Whatever it may be, when we first encounter the
problem we do not know much about it. At best, we have only a vague idea as to what our problem really consists of. How, then, can we produce an adequate solution? Obviously, we cannot. We must first get better acquainted with the problem. But how? Popper answers that we can do so by producing an inadequate solution, and by criticizing it. He says that only in this way can we come to understand the problem. For, to understand a problem means to understand its difficulties; and to understand its difficulties means to understand why it is not easily soluble-- why the more obvious solutions do not work. We might therefore produce additional more obvious solutions. These solutions must be criticized in order to find out why they do not work. In this way we become acquainted with the problem and may proceed from bad solutions to better ones—provided that we have the creative ability to produce new guesses, and more new guesses.31

Another prerequisite for starting our research, according to Popper, is 'background knowledge'. For, to recognize some event as problematic we must have some preconceptions; be it mythical, metaphysical, fictional, or anything else, with which the event disagrees and is thereby considered as problematic. Moreover, to produce some solution or its criticism we must need some preconceptions that will regulate us. Without any connection, we cannot say anything. Popper says that while discussing a problem we always accept (if only temporary) all kinds of things unproblematic. These accepted things do constitute what Popper calls background knowledge. This background knowledge may operate as the starting point for the discussion of a problem under consideration. Few parts of this background knowledge will appear to us in all context as absolutely unproblematic, and any particular part of it may be challenged at any time, especially if we suspect that its uncritical acceptance may be responsible for some of our difficulties. But almost all of the vast amount of background knowledge, which we constantly use in any informal discussion will, necessarily remain unquestioned.32 We need it because we cannot start from nothing, we always start from some previous knowledge. We conceive of truth and approach to truth within the content of available background knowledge. According to our method 'growth of knowledge' consists in modification of previous knowledge—either it is alternation or is large scale rejection.33
According to Popper, initially when our tentative solution is discussed and criticized, everybody tries to find a flaw in it and refute it. Whatever the result of these attempts may be, we certainly learn from them. If the criticism of our friends or opponents is successful, we shall have learnt much about our problem. We shall know more about its inherent difficulties than we do before. And if even our most acute critics do not succeed, if our hypothesis is able to resist their criticism, then again, we shall have learned much; both about the problems and about our hypothesis, its adequacy and its ramifications. And as long as it does better, in the face of criticism, than its competitors, it may temporarily and tentatively be accepted as part of current scientific teaching.34

He says, “without waiting passively for repetition to impress or impose regularities upon us, we actively try to impose regularities upon the world. We try to discover similarities in it, and to interpret it in terms of laws invented by us. Without waiting for premise, we jump to conclusion. These may have to be discarded later, should observation show that they are wrong”.35 We jump first to any theory and then while testing it try to find whether it is good or not; i.e. by repeatedly applying the critical method, we eliminate many bad theories and invent many new ones.36

This kind of discovery is quite metaphysical. Brody says, ‘While we regard a physical theory as a hypothetical explanation of material reality, we make it dependent on metaphysics”.37 Here metaphysics, as opposed to analytic philosophy, is considered to be perfectly meaningful. Falsifiability is the criterion which makes metaphysics quite meaningful for science. If metaphysics is meaningful for science then we feel reassured that there is no context of discovery. The theory may come from any source. The only criterion is that such theories must be falsifiable or refutable.38

This view is called by Popper ‘critical rationalism’. This position is in between Descartes’ ‘truth is manifest’ and Bacon’s ‘nature is open book’. Its essential difference from them is that it strongly restricts our claim to knowledge. There is no ultimate source of knowledge. Every source, every suggestion is welcome; and every source, every suggestion, is open to critical examination and can be subjected to interrogation, examination and criticism. Clarity and distinctness are not criteria of truth, but obscurity and confusion do
indicate error. Therefore, science must begin with myths and with the criticism of myths; in other words, science does begin with 'conjecture and refutation'.

3.2 Scientific Progress through Falsification

*Trial and Error*

If science advances by the way of changing its traditional myths, then we need something with which to start. If we have nothing to alter and to change, we can never get anywhere. Thus we need two beginnings for science: new myths, and a new tradition of changing them critically.

‘Conjecture and refutation’ as the procedure of scientific knowledge makes it possible to understand that scientific theories are not the digest of observations but are inventions—conjectures boldly put forward for trial to be eliminated if they clash with observations. There is a question here if observation cannot be free of theory then how could the observation be the test of the theory. It is true that observations are rarely accidental. But as a rule observations are undertaken with the definite intention of testing a theory, by obtaining, if possible, a decisive refutation.

For him, every test of theory, whether resulting in its corroboration or falsification, must stop at some basic statement or other, which we decide to accept. If we do not come to any decision, and do not accept some basic statement or other then the test will have led nowhere. However, considered from a logical point of view, the situation is never such that it compels us to stop at this particular basic statement rather than at that, or else give up the test altogether. For any basic statement can, again in turn, be subjected to tests. This procedure has no natural end. Thus, if the test is to lead us to anywhere, we have to stop at some point or other and say that we are satisfied, for the time being.

Therefore, basic statement is a primitive statement, because this is the statement located at the starting point of our investigation. We do not make any investigation for its truth. In this sense, it is conventional also, for it is the statement which is taken for granted on the basis of agreement. ‘They are accepted as the result of decision. And accepted basic statements are the basis
for the corroboration of a hypothesis, and thus indirectly for falsification. Popper argues against the view that basic statements can be justified by reference to perceptions, which he regards as a kind of psychologism. He admits that the decision to accept a basic statement is causally connected with our experiences, but we do not attempt to justify a basic statement by these experiences. Experiences can motivate a decision and acceptance or rejection of a statement, but a basic statement cannot be justified by them—no more than by thumping the table. However, we need basic statements in order to decide whether a theory is to be called falsifiable, i.e. empirical. And we need them for the corroboration of a falsifying hypothesis, and thus for the falsification of theories. Therefore, corroboration of a theory by any test premised on basic statements would be tentative, for, we do know that this test is not the only test, there may be many other tests that would lead to the falsification of the theory. But falsification of the theory would be final, for, we know that at least this very test falsifies the theory. Beside, there may be many other tests of this kind.

The role of the basic statement in the method of ‘trial and error’ is established on the position of observation: although theories cannot logically be derived from observations, they can clash with observations, they can contradict observations. This makes it possible to infer from observations that a theory is false. The possibility of refuting a theory by observations is the basis of all empirical tests. Therefore, a theory is empirical not when it is produced through conjecture, but when it is tested by the observations. The test of a theory is always an attempt to show that the competitor theory is mistaken, that is, that theory entails a false assertion. From a logical point of view, all empirical tests are therefore attempted refutations. Such an attempted refutation can be made only on the basis of observation. Therefore, conjecture gives us theory and observation gives us empiricability of theory.

Now the question is as to why do we put forward our theory to the trial? We need to do so because our theory which is mainly conjecture created by us may be constructed wrongly. Our conjecture is produced from the expectation of a solution—expectation for regularities. We have the propensity to look out for regularities, and to impose laws upon nature. Popper says that this propensity leads us to the psychological phenomenon of ‘dogmatic
thinking’. He says that we expect regularities everywhere and attempt to find them even where there are none. And we stick to our expectations even when they are inadequate. In this situation, without a trial, our theory will remain a myth. Only a critical discussion can make the conjecture a proper scientific theory. This dogmatism is to some extent necessary. It is demanded by the situation, which can only be dealt with by forcing our conjecture upon the world. Moreover, the dogmatism allows us to approach a good theory in stages, by way of approximation. Dogmatic attitude makes us stick to our first impressions, which is indicative of strong belief.

According to Popper, a theory needs to be under trial to be a scientific theory, as dogmatism is never a scientific attitude. What we call ‘science’ is differentiated from the myths not by being some thing distinct from a myth, but by being accompanied by a tradition of critically discussing the myth. The application of this tradition results in the acceptance or the rejection of the theory or perhaps in a compromise. This tradition is the critical or argumentative attitude. In a certain sense, sciences are myth-making just as religion is; but they are different from myth only because they adopt the critical attitude. As a result, the myth changes and changes in the direction of giving a better and better account of the world. And they change us to observe things, which we would never have observed without these theories or myths. Critical attitude is ready to modify its tenets; it admits doubt and demands tests. This is indicative of our uncertainty with regard to the theories under consideration. For, the attitude is clearly related to the tendency to test them, to refute them. The attempt to sort out error through critical discussion is the characteristic of science. For Popper, this is the method of ‘trial and error’. This is also called the method of falsification; for, in this method we try to discover a mistake in a theory to falsify or eliminate it.

Conjectures may be considered as dogmatic rather than rational, but the ‘trial and error’ method makes them scientific. There is nothing irrational if we tentatively accept some theory with an eagerness to revise it with experiment. Popper says that if this is our task, then there is no rational procedure other than the method of ‘trial and error’. The method is not simply identical with the scientific method; this is applied not only by Einstein but
also, in a more dogmatic fashion, by the amoeba. The trial and error method fundamentally is the method used by any living organism in the process of adaptation. So, this is very natural to the human intellectual process. Men seem inclined to react to a problem either by putting forward some theory or by fighting against such a theory, once they detect its weakness. This struggle of ideologies, which is obviously explicable in terms of the method of ‘trial and error’, seems to be characteristic of any thing that may be called a development of human thought.  

Popper says that in this method we first boldly propose a theory then try our best to point out its possible errors. If our critical efforts do not succeed then we accept them tentatively. From this point of view, all laws, all theories, are essentially tentative, or conjectural or hypothetical, even when we feel unable to doubt them any longer. For, before a theory has been refuted we can never know in what way it may have to be modified. This method can easily by-pass the logical problems that arise against induction. The first is Hume’s discovery that it is impossible to justify a law by observation and experiment, since it ‘transcends experience’. In trial and error method, we may reject a law or theory on the basis of new evidence, without necessarily discarding the old evidence which originally led us to accept it. Secondly, the principle of empiricism which asserts that in science only observation and experiment may decide upon the acceptance or rejection of scientific statements, including laws and theories does not cut much ice. There are many historical examples when a theory has not been rejected even in the face of contradiction with the experimental facts. Newton’s theory had no complete experimental support. It appeared to be in disagreement with natural phenomena, yet it survived for centuries until Einstein’s theory appeared. According to the method of trial and error, a theory can be rejected only by that experiment which at the same time corroborates the falsifying hypothesis—the hypothesis that is presently competing.

By this method, we also can by-pass the question, which arose against induction: ‘why is it reasonable to believe that the future will be like the past’? In this method it is perfectly reasonable to act on the assumption that future will, in many respects, be like the past, and that well-tested laws will continue
to hold; but it is also reasonable to believe that such course of action will lead us at times into severe trouble, since some of the laws upon which we heavily rely may easily prove unreliable.\(^{50}\)

In the ‘trial and error’ method, we consciously attempt to make our theories or conjectures suffer in the struggle for the survival of the fittest. Our corroboration may be uncertain, but our falsification would be certain. However, the fittest theory is not fittest in pragmatic sense. “There are many false theories which often serve well enough: most formulae used in engineering or navigation are known to be false, although they may be excellent approximations and easy to handle, and they are used with confidence by people who know them to be false”.\(^{51}\) On the contrary, they are fittest in the spirit of truth. In this method, we search for truth and the falsified theories are known or believed to be false while the non-falsified theories may still be true. The success of this method depends very largely on the number and variety of the trials: the more we try the more likely it is that one of our attempts will be successful.\(^{52}\) In this method, scientists ought to take into account less probable hypothesis at first and expose them to the most severe test. If a hypothesis is falsified it must be rejected. If it is not falsified it is corroborated, and temporarily persists. But this does not mean that it is true or even probable true; further tests sooner or later usually falsify it. The falsification is complete and conclusive, the corroboration is never so.\(^{53}\)

The physicist J.E. Wheeler uses the word ‘mistake’ in Popperian spirit when he comments about the learning process in science viz; “our whole problem is to make the mistake as far as possible”.\(^{54}\) Since “truth is hard to come by out of mistakes, it needs both ingenuity in criticizing old theories, and ingenuity in the imaginative invention of new theories”.\(^{55}\)

Illustrating ‘trial and error’ method Popper says that faced with a certain problem, the scientist offers, tentatively, some sort of solution—a conjecture or theory. Science accepts this theory only provisionally. Then criticism and testing go hand in hand; the theory is criticized from very many different points, which may be vulnerable. Theories are put forward tentatively and trial out. If the outcome of a test shows that the theory is erroneous, then it is eliminated; the method of ‘trial and error’ is essentially a method of
Furthermore, 'it is the critical procedure, which contains those choices, those rejections, and those decisions, which show that we have learnt from our mistakes, and thereby added to our scientific knowledge'. Its success depends mainly on three conditions: one, sufficiently numerous ingenious theories should be offered; two, the theories offered should be sufficiently varied and, three, sufficiently severe tests should be made. In this way we may, if we are lucky, secure the survival of the fittest theory by elimination of those which cannot compete in the struggle for survival.

According to Popper, this is like dialectic method of the development of human thought. Dialectic is a theory, which maintains that development is characterized by what is called the dialectic triad: thesis, antithesis and synthesis. First there is some idea, theory, or movement, which may be called a thesis. Such a thesis will often generate opposition, because, like most things in this world, it will probably be of limited value and will have its weak spots. This opposing idea or movement is called the antithesis, because, it is directed against the thesis. The struggle between the thesis and antithesis goes on until some solution is reached which, in a certain sense, goes beyond both thesis and antithesis by recognizing their respective values and by trying to preserve the merits and avoid the limitations of both. This solution, which is a third step, is called the synthesis. Once attained the synthesis in its turn may become the first step of a new dialectic triad. In this case opposition will be aroused again which means that synthesis can then be described as a new thesis, which has produced a new antithesis. The dialectic triad will thus graduate to a higher level, and it may again negotiate a higher level when a second synthesis has been attained.

For Popper, such a dialectic development may be explained by showing that it operates in conformity with the method of 'trial and error'. But it is not exactly the same as the development of a theory by trial and error. The trial and error method deals only with an idea and its criticism, i.e. thesis and antithesis. And the struggle between an idea and its criticism or a thesis and antithesis leads not to a synthesis but to the elimination, and the competition of theories would lead to the adoption of a new theory only if enough theories are at hand and are offered for trial. In dialect, only one thesis is offered to start
with and the one is opposed to the other. But trial and error method is slightly
taller and not confined to one idea and criticism.\textsuperscript{59}

Popper says that dialectic is slightly different from the trial and error
theory in some other respect also. For, the trial and error theory will be content
to say that an unsatisfactory view will be refuted or eliminated. On the other
hand, a dialectician emphasizes that although the view may have been refuted,
there will most probably be an element in it, which is worthy of preservation.
For a dialectician—a thesis produces an antithesis leading to synthesis. For
trial and error theory, it is only our critical attitude, which produces the
antithesis. Criticism is, in a very important sense, the main motivating force of
any intellectual development. Without contradiction, without criticism, there
would be no rational motive for changing our theories. There would be no
intellectual progress. Contradiction is fertile only in so far as we are determined
not to put up with contradictions, and to change any theory which involves
contradictions. If we put up with contradictions, it will no longer be productive
of intellectual progress. Criticism is a self-corrective and open-ended process.
It ought to or it does invite counter-criticism with gusto. While dogmatism may
refuse to be criticized by asking as to ‘why’, criticism will have to respond to
counter-criticism by ‘why not’. Otherwise scientific progress will come to a
standstill or dead end.\textsuperscript{60}

\textit{Growth of Science}

However, there is no real danger that the growth of science will come
to an end. Popper holds that our infinity of ignorance and our trial and error
process of learning together ensures that science can never complete its task.
Such a danger may be in authoritarianism of a criterion, but in our process of
learning, there is no place for such an attitude. Here every theory is welcome
but none has the final authority. Every theory must come under the severe
pressure of criticism, for, it is the criticism which makes a theory scientific.
There may be another danger from faith in formalization and precision, but
since our producing theory starts from the expectation of some solution of the
problem-situation and making the conjecture of the solution, there is no place
for formalization. Conjecture being mainly metaphysical, there can never be
any structural limitation as such. Conjecture opens up all kinds of possibilities
for imagination; so, danger lies only in the lack of imagination, which is attributable not to the science but to the scientists. This is not likely to happen that human being as a whole will become bereft of imagination; someone or the other does take a critical stand against an existing theory or prevailing orthodoxy.

Therefore, infinity of imagination or growth in the process of conjecture and refutation inseparably characterize the project of scientific research. Growth is of seminal significance in science. Apart from having vital social and political implications, scientific growth basically signals onward march of intellectual progress. The continued growth is essential to the rational and empirical character of scientific knowledge. If science ceases to grow it looses that character. It is the way of its growth which makes science rational and empirical, the way in which scientists differentiate amongst available theories and choose the better one or the way they give reasons for rejecting all the available theories thereby suggesting some of the conditions with which a satisfactory theory should comply.

However, Popper maintains that growth in the process of ‘conjecture and refutation’, is not the accumulation of observations but rather the repeated overthrow of scientific theories and their replacement by better or more satisfactory ones. So “it is not like a library, as more and more books accumulate so more and more knowledge accumulates. But scientific growth is by criticism: it grows by a method more revolutionary than accumulation—by a method which destroys, changes, and alters, the whole things including its most important instruments, the language in which our myths and theories are formulated”. The critical examination of theories of this sort leads us to subject them to further tests and, if we deem it necessary to overthrow them. This leads us to further experiments and observations of a kind which nobody would ever have dreamt of without the stimulus and guidance provided both by our theories and our criticism of them.

If there is competition of the sort stated just above between the existing and falsifying hypotheses, the competing theories become incomparable. How, then, will we understand the growth among the competing theories? According to Popper, “the case is that not only are all the theories
conjectural but also all appraisals of theories, including comparison of the theories, and including the observational tests. All appraisals of theories are appraisals of the state of their critical discussion.” 64 This condition in the long run leads either to dogmatism or to an infinite regress or to the relativistic doctrine of rationality; consequently, we are caught amongst a phethora of incommensurable frameworks. A rational and fruitful discussion is impossible unless the participants share a common framework of basic assumptions, or at least, unless they have agreed on such a framework for the purpose of the discussion. A discussion among participants who do not share a common framework may be difficult. A discussion will also be difficult if the frameworks have little in common, and it will be the easier the greater the overlap between the frameworks. 65 In this context, popper says that we should logically distinguish between a mistaken method of criticizing, and the correct method of criticizing. The mistaken method of criticizing is what starts from the question: how can we establish or justify our theories? By contrast, the correct method of critical discussion starts from the question: what are the consequences of our theories? Are they all acceptable to us? Thus it consists in comparing the consequences of different theories and tries to find out which of the competing theories or frameworks has consequences that seem preferable to us. It is thus conscious of the fallibility of all our methods and it tries to replace all our theories by better ones. 66

We may say that more the fruitful discussion, more the participants learn from it. The more interesting questions and difficult questions they are asked, the more new answers they are induced to think of. Consequently, more they are shaken in their opinions, the more their intellectual horizon is extended. Fruitfulness in this sense will almost always depend on the original gap between the opinions of the participants in the discussion. The greater the gap, the more fruitful can the discussion be provided that such a discussion is not altogether impossible owing to incommensurability of frameworks. 67

However, even without a discussion there is also a possibility of a fruitful confrontation amongst people deeply committed to different frameworks. 68 It is understandable that two ways of life and two ways of looking at the world are incommensurable. Yet, two theories, which try to
solve the same family of problems, including their offspring, need not be incommensurable. It is possible for us to transcend the two different frameworks—psychologically, socially and genetically or physiologically—by critical method. We can understand even a bit of the language of the bees. Admittedly, this understanding is conjectural and rudimentary. But almost all understanding is conjectural, and the deciphering of a new language is always rudimentary to start with. It is the method of science, the method of critical discussion, which makes it possible for us to transcend not only our culturally acquired but even our inborn frameworks. This method has made us transcend not only our senses but also our partly innate tendency to regard the world as a universe of identifiable things and their properties. Critical thought can challenge and transcend a framework even if it is rooted not only in our conventional language but also in our genetics. Revolution does not produce a theory incommensurable with its predecessors; the very task of the revolution is to explain the old category of thing-hood by a theory of greater depth.^^

The myth of the framework is clearly the same as the doctrine that one cannot rationally discuss anything that is fundamental; or that a rational discussion of principles is impossible. This doctrine is logically an outcome of the mistaken view that all rational discussion must start from some principles. This is mistaken, for, behind it there is the tacit assumption that a rational discussion must have the character of a justification or of a proof or of a demonstration, or of a logical derivation from admitted premises. But the kind of discussion which is going on in the natural science might have taught us that there is also another kind of rational discussion: a critical discussion, which does not seek to prove or justify or establish a theory.^^

Though in the method of ‘trial and error’ we do not and cannot justify a theory, we can, through this method, have a criterion, the criterion of criticism, to choose the better among the competing theories. This possibility eventuates scientific change into progress. For Popper, the history of science, like the history of all human ideas, is a history of irresponsible dreams, of obstinacy, and of error. But science is the one of the very few human activities in which errors are systematically criticized and fairly often corrected. We do make mistakes, but by recourse to continuous criticism, we often learn from
our mistakes. And this is why we speak clearly and sensibly that we can make progress in scientific endeavours. We have the criterion of criticism to choose among the competing theories and we can, as well, gradually eliminate errors. While scientific change signals progress, the process of change does not entail any loss. In almost all human endeavors, there is change, but rarely the progress, for, the gain is balanced by some loss. Given that elimination of the error is the result of progress, there is no loss in science. Such progress without incurring any loss is possible in science thanks to the criterion of criticism.

Although the world at any moment’s necessarily conjectural or theory impregnated, this does not prevent us from progressing to better theories. How do we do it? The essential step is the linguistic formulation of our beliefs. This objectifies them; and this makes it possible for them to become targets of criticism. Thus, our beliefs are replaced by competing theories, by competing conjectures. And through the critical discussion of these theories we can progress and continuity graduate to better theoretical positions.

According to Popper, we may be able to say, by the criterion, whether it would be an improvement on other theories with which we are accounted. We have criterion of relative potential satisfactoriness, which can be applied to a theory even before we know whether or not it will turn out. This criterion of relative satisfactoriness is extremely simple and intuitive. It characterizes as preferable the theory which tells us more, 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. All these properties, which we desire in a theory, can be shown to amount to a higher degree of empirical content or of testability.

For him, all these properties can be stated as three requirements for the theory to get nearer to truth. The first requirement is that the new theory should proceed for some simple, new, powerful and unifying idea about some connection between hitherto unconnected things or facts or new theoretical entities. This requirement is called 'simplicity'. It seems to be intimately connected with the idea that our theories should describe the structural properties of the world—an idea which it is hard to think out fully without
getting involved in an infinite regress. Secondly, we require that the new theory should be independently testable, that is to say, apart from explaining all the explicanda, which it was designed to explain, it must have new and testable consequences. It must lead to the prediction of phenomena which have not so far been observed. If the second requirement is satisfied then the new theory will represent a potential step forward, whatever the outcome of the new tests may be. For, it will be better testable than the previous theory. Moreover, we will be confronted by the new problems to be solved by the new explanatory theories. And to some extent, it will be fruitful as an instrument of exploration. Thirdly, we require that the theory should pass some new, and severe tests. Some of the most interesting and most admirable theories ever conceived can be refuted at the very first test. For, even the greatest physicist can not anticipate the secrets of nature: his inspiration can only be guesses, and it is no fault of his or of his theory, if it is refuted. Even Newton’s theory was in the end refuted; and we hope that we shall in this way succeed in refuting, and improving upon every new theory.

However, Popper offers a simple and obvious idea about the content of a theory and shows how science makes progress. He argues that ‘the informative content of the conjunction, \( ab \), of any two statements, \( a \) and \( b \), will always be greater than, or at least equal to, that of any of its components. Let \( a \) be the statement ‘it will rain on Friday’; \( b \) the statement ‘it will be fine on Saturday’; and \( ab \) the statement ‘it will rain on Friday and it will be fine on Saturday’. It is then obvious that the informative content of this last statement, the conjunction \( ab \), will exceed that of its component \( a \) and also that of its component \( b \). And it will also be obvious that the probability of \( ab \) will be smaller than that of either of its components.

Let us suppose that \( \text{Ct}(a) \) is ‘the content of the statement \( a \)’, and \( \text{Ct}(b) \) is ‘the content of the statement \( b \)’, and \( \text{Ct}(ab) \) is ‘the content of the conjunction \( a \) and \( b \)’. we have

\[
(1) \quad \text{Ct}(a) \leq \text{Ct}(ab) \geq \text{Ct}(b)
\]

This contrasts with the corresponding law of the calculus of probability.

\[
(2) \quad P(a) \geq P(ab) \leq P(b)
\]
These two laws, (1) and (2), together state that with increasing content, probability decreases, and vice-versa. In other words, content increases with increasing improbability. Thus if our aim is the advancement or growth of knowledge, then a high probability (in the sense of probability calculus) cannot possibly be our aim as well; these two aims are incompatible.

Popper says that this head-on collision would be avoidable if people were not so generally inclined to assume uncritically that a high probability must be an aim of science. What is more important, one merely has to recognize that the property which we cherish in theories and which we may perhaps call ‘verisimilitude’ or ‘truth likeness’ is not a probability in the sense of the calculus of probability of which ‘P(a) ≥ P(ab) ≤ P(b)’ is an inescapable theorem. If we aim, in science, at a high informative content—if the growth of knowledge means that we know more, that we know \(a\) and \(b\), rather than \(a\) alone, and that the content of our theories thus increases — then we have to admit that we also aim at a low probability, in the sense of the calculus of probability. And 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. So, the criterion of potential satisfactoriness is thus testability or improbability. Only a highly testable or improbable theory is worth testing, and is actually satisfactory if it withstands sever tests. However, it is possible to compare the severity of a test objectively and to admit the explanatory power and the degree of corroboration of a theory.76

This criterion can easily be illustrated with the help of historical examples. The theories of Kepler and Galelio were unified and superseded by Newton’s logically stronger and better testable theory, and similarly Fresnel’s and Faraday’s by Maxwell’s. Newton’s theory and Maxwell’s’ in turn, were unified and superseded by Einstein’s. In such a case, the progress was towards a more informative and therefore logically less probable a theory. A theory which is not in fact refuted by testing those new and bold and improbable predictions, to which it gives rise can be said to be corroborated by these severe tests. Galelio’s discovery of Neptune, Hertz’s discovery of electromagnetic wave, Edington’s eclipse observations can well remind us the fact. There are
other important discoveries, which lead not to corroboration, but to its refutation. For instance, Lavoisier's classical experiments do not establish the oxygen theory of combustion; yet they tend to refute the phlogiston theory.77

Therefore, every refutation should be regarded not as a failure but as a great success; not merely a success of the scientist who refuted the theory, but also the scientist who created the refuted theory and who thus in the first instance suggested the refuting experiment. Even if a new theory should meet an early death, it should not be forgotten; rather its beauty should be remembered and history should record our gratitude to it—for bequeathing to us new and perhaps still unexplained experimental facts and new problems, and for services it has thus rendered to the progress of science during its successful but short life. The refuted theory is always important. For, our aim as scientists is to discover the truth about the problems and we must look at our theories as serious attempts to find the truth. If they are not true, they may be important stepping-stones towards the truth, instruments for further discoveries.78

History of science may say that the individual scientist wishes to establish his theory rather than refute it. But from the point of view of progress in science, this wish can easily mislead him. Moreover, if he does not himself examine his favorite theory critically, others will do so for him. The only result, which will be regarded by them as supporting the theory, will be the failure of interesting attempts to refute it; failure to find counter examples where such counter examples would be most expected, in the light of the best of the competing theories. Thus, it need not create a great obstacle to science if the individual scientist is biased in favor of a pet theory. However, Cloude Bernard's comment viz; 'those who have an excessive faith in their ideas are not well fitted to make discoveries'79 deserves our serious attention and consideration.

Popper holds that we need not only successful refutations, but also positive success. We must manage reasonably often to produce the theories that contain new predictions, especially predictions of new effects, new testable consequences suggested by the new theory and never thought of before. 'If we should only succeed in refuting our theories but not in obtaining some verifications of predictions of a new kind, it means that our problem has
become so difficult that the structure of the world is beyond our powers of comprehension. So, we need two kinds of successes: success in refuting our theories, and success on the part of some of our theories in resisting at least some of our most determined attempts to refute them. In this way we make the progress in science.

The above lines suggest that science progresses from theory to theory by eliminating the false theory. And this consists of a sequence of better and better theory, in other words, better deductive systems. However, a scientific theory is an attempt to solve a scientific problem, which is connected or concerned with the discovery of an explanation. Therefore, science should be visualized as progressing from problems to problems—to problems of ever increasing depth. The conscious task before the scientists is always the solution of a problem through the construction of a theory, which solves the problems, for example by explaining unexpected and unexplained observations. Thus science always starts from and ends with problems—problems of an increasing depth, and an ever increasing fertility in suggesting new problems. So science grows from problem to problem; science progresses towards the increasing depth of the problems by gradual elimination of errors. Every change renders progress, for in every refutation we eliminate our mistakes, thus enriching our knowledge.

3.3 The Problem of Realism with Falsification

**Truth as Regulative Principle**

If science progresses from problem to problem, what about truth that is most interesting about progress? Before discussing the question, we should see what is the truth we expect in progress. It is very simple and obvious that we expect the objective truth. However, Tarski re-established a theory of absolute or objective truth, which shows that we are free to use the intuitive idea of truth as correspondence with the facts. The highly intuitive character of Tarski’s ideas seems to become more evident if we first decide explicitly to talk ‘truth’ as a synonym for ‘correspondence with the facts’, then we proceed to define the idea of ‘correspondence with the facts’. There are two formulations, each of
which states very simply under what conditions a certain assertion corresponds to the facts.

(1) The statement, or the assertion, ‘snow is white’ corresponds to the facts if, and only if, snow is, indeed, white.

(2) The statement, or the assertion, ‘Grass is red’ corresponds to the facts if and only if, grass is, indeed, red.

This is an objective notion of truth. There are many other notions of truth that are subjective in their character. The coherence theory holds ‘consistency’ for truth, the evidence theory holds ‘known to be true’ for truth, and the pragmatic or instrumentalist theory holds ‘usefulness’ for truth. These are all subjective or epistemic theories of truth. They are subjective in the sense that they all 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, characterized, for example, by its history or by its relation to other beliefs. Whereas, Tarski’s is objective or metaphysical theory of truth. The objective theory of truth leads to a very different attitude. This may be seen from the fact that it allows us to make assertions such as the following: 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. A similar assertion, which the correspondence theory would make quite naturally, is this: even if we hit upon the true theory, we shall, as a rule, be merely guessing, and it may well be impossible for us to know that it is true. On the other hand, a theory may be false, although we have comparatively good reasons for accepting it.82

This is the theory of objective or absolute truth. The question is do we achieve this kind of truth in scientific progress through the method of ‘trial and error’? We in science seek for highly informative theory, while the highly informative theory has the low probability to be true. In other words, if our new theory is more informative than the old one, it means that the new would, in contrast to the old, have low probability to be true. From this point of view, we do obviously not obtain the truth or approach the truth. Then, how will we conceive of the theory as progressing to achieve the truth stated above? So far.
we have seen our learning process ‘conjecture and refutation’, it is obvious that by our method, we seek truth, and to do that we eliminate falsity. Thus, it is also obvious that science allows us to say that we search for truth. Scientific change, occurred by our constant attempt to falsify the existing theory, is a change for real.\textsuperscript{83}

In this context we need to analyze our learning process to find out what do we obtain through it? However, one great advantage of the process of ‘conjecture and refutation’ is that it allows us to say that we carry on search for truth, though we may not know when to have found it. According to Popper, this method does not give us any criterion of truth but we are nevertheless guided by the idea of truth as a regulative principle. He further says that though there is no general criterion by which we can recognize truth, there is something like criterion of progress towards the truth. According to him, the status of truth in the objective sense, as correspondence to the facts, and its role as a regulative principle, may be compared to that of a mountain peak, which is permanently, or almost permanently, wrapped in clouds. The climber may not merely have difficulties in getting there—he may not know when he gets there, for, he may be unable to distinguish, in the clouds, between the main summit and some subsidiary peaks. 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 doubt implies the idea of an objective truth which we may fail to reach. He says that 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 recognize 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. Coherence may not be a criterion of truth — for even a demonstrably consistent system may be false in fact—incoherence does establish falsity. So, for him, if we are lucky, we may discover inconsistencies and use them to establish the falsity of our theories.\textsuperscript{84}

Verificationists demand that we accept a belief only if it can be justified by positive evidence; that is to say, shown to be true. However, as
falsificationists we believe that we never give positive reasons justifying the belief that a theory is true. Therefore, science has nothing to do with the quest for certainty or probability or reliability. In our theory of falsification, we are not interested in establishing scientific theories as secure, or certain, or probable. Conscious of our fallibility we are only interested in criticizing them and testing them, in the hope of finding where we are mistaken; in the hope of learning from our mistakes; and if we are lucky, we hope also of proceeding to better theories. Popper, therefore, calls falsificationist the negativist.\(^8\)

Though negativists, we follow a 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 truth. So truth here is a regulative principle, for, all our scientific activities are conducted in the hope of getting nearer to truth but actually at every step of theory change, we just liberate ourselves from the falsity rather than obtaining the truth. This kind of truth is a ‘formal’ or ‘procedural’ truth. There is the concept of ‘substantive truth’ but that is independent of the method. In other words, the substantive truth being beyond method regulates it.\(^9\)

In view of the same, Popper says, we will have to accept that the task of science is the search for truth—for true theories. And since our search for truth starts from the expectation for some solution of the some relevant and interesting problems, our research is thus for the relevant and interesting truth. Therefore, we stress that truth is not the only aim of science. We want more than mere truth. What we look for is interesting truth—truth which is hard to come by. And in the natural sciences what we look for is truth which has a high degree of explanatory power. Mere truth is not enough; what we look for is answer to our problems — a difficult, a fertile problem, a problem of some depth. Popper says that we are as much interested in truth as the member of a court of justice. When the judge tells a witness that he should speak ‘the truth, the whole truth, and nothing but the truth’, then what he looks for is as much of the relevant truth as the witness may be able or willing to offer. A witness who likes to wonder off into irrelevancies is unsatisfactory as a witness, even though these irrelevancies may be truisms, and thus part of ‘the whole truth’. It is quite obvious that what the judge—or anybody else—wants when he asks for
'the whole truth' is as much interesting and relevant true information as can be got. And many perfectly candid witness have failed to disclose some important information simply because they were unaware of its relevance to the case. And we are interested in bold conjectures due to the methodological conviction that only with the help of such bold conjectures can we hope to discover interesting and relevant truth.  

From Truth to Verisimilitude

Scientific research aims at the objective truth. It also conjectures the interesting truth that is relevant in the context of human epistemological and methodological struggle. Then, how does the conjectural and human truth make sense in the context of scientific search for objective truth? How does conjectural and human truth approach to objective truth? We see a solution of the question in Popper's method of trial and error. He says that the idea of 'approach to truth' is based on the assertion that 'one theory corresponds better to the facts than the other.' But can we really speak of better correspondence? Is there such a thing as degree of truth? If an earlier theory is $T_1$ and a later theory is $T_2$, then has $T_2$ superseded $T_1$, or progressed beyond $T_1$, by approaching more closely to the truth than $T_1$? He says that 'there is no doubt whatever that we can say of a theory $T_2$ that it corresponds better to the facts; or that as far as we know it seems to correspond better to the facts, than another theory $T_1$. To clarify the issue Popper mentions the following list of six types of cases in which we should be inclined to speak of better correspondence.

1. $T_2$ makes more precise assertions than $T_1$, and these more precise assertions stand up to more precise tests.
2. $T_2$ takes account of, and explains, more facts than $T_1$.
3. $T_2$ describes, or, explains, the facts in more detail than $T_1$.
4. $T_2$ has passed test which $T_1$ has fail to pass.
5. $T_2$ has suggested new experimental tests, not considered before $T_2$ was designed and $T_2$ has passed these tests.
6. $T_2$ has unified or connected various hitherto unrelated problems.
If we reflect upon this list, we can see that the content of the theories \( T_1 \) and \( T_2 \) plays an important role in it. For, in our list of six cases, the empirical content of theory \( T_2 \) exceeds that of theory \( T_1 \). This suggests that we combined here the idea of truth and the idea of content into one. Therefore, every statement or theory is not only either true or false but has independent of its truth value—some degree of ‘likeness’, which is defined in terms of truth and falsity content. Popper calls this ‘likeness’ ‘verisimilitude’. The idea of degree of better correspondence to truth is therefore the degree of greater ‘likeness’ or verisimilitude to truth.  

But how is it possible for ‘truth and falsity content’ to define the ‘degree of likeness’, in other words, degree of truth? Popper has offered a solution of this question in his book *Logic of Scientific Discovery*. He says that the content of a statement \( a \) is the class of all the logical consequences of \( a \). If \( a \) is true, then this class can consist only of true statements, for, truth is always transmitted from a premise to all its conclusions. But if \( a \) is false, then its content will always consist of both true and false conclusions. For example, ‘it always rains on Sunday’ is false, but its conclusion that ‘it rained last Sunday’ can happen to be true. Thus, there may be more or less truth in a statement in so far as its content consists of a greater or lesser number of true statements. 

Popper calls this class of the true logical consequences of \( a \) the ‘truth-content’ of \( a \); and the class of the false consequences of \( a \) the ‘falsity-content’ of \( a \). Assuming that the truth-content and the falsity-content of two theories \( T_1 \) and \( T_2 \) are comparable, we can say that \( T_2 \) is more closely similar to the truth, or corresponds better to the facts, than \( T_1 \), if and only if either:

(a) The truth-content but not the falsity content of \( T_2 \) exceeds that of \( T_1 \),

(b) The falsity-content of \( T_1 \), but not its truth-content, exceeds that of \( T_2 \).

If we now work with the assumption that the falsity-content and the truth-content of a theory \( a \) are in principle measurable, then we can go slightly beyond this definition and define a measure of the verisimilitude or truthlikeness of \( a \), in symbol \( V_s(a) \). The simple definition will be:

\[
V_s(a) = C_{t_f}(a) - C_{f_t}(a)
\]

where \( C_{t_f}(a) \) is a measure of the truth content of \( a \), and \( C_{f_t}(a) \) is a measure of falsity content of \( a \). It is obvious that
Vs(a) satisfied our two demands, according to which Vs(a) should increase, if and only if either:

(a) If Ct₁(a) increases while Ct₂(a) does not, and
(b) If Ct₂(a) decreases while Ct₁(a) does not.

This is the approximation to truth, or verisimilitude. However it also has the same regulative character as the absolute truth. According to our learning process, 'conjecture and refutation' everything is conjecture. Producing theory, falsifying hypothesis, observational test, and even our knowledge about the approximation to the truth and everything else undergoes attempted refutation. So our knowledge of approximation is only a guess. But we can examine our guess critically, and if it withstands severe criticism, then this fact may be taken as a good critical reason in favour of it (approximation to truth).^89

Popper says that verisimilitude so defined, the maximum verisimilitude would be achieved only by a theory, which is not only true, but also completely comprehensively true. It means it would correspond to all facts, as it were, and only to real facts. He concedes this to be a remote and unattainable ideal than a mere correspondence with some facts. But all this holds only for the maximum degree of verisimilitude, and not for the comparison of theories with respect to their degree of verisimilitude. The idea of higher or lower degree of verisimilitude seems less remote and more applicable and therefore perhaps more important for the analysis of scientific methods than the idea of absolute truth itself.\footnote{89}

Popper mentions another role of verisimilitude. Even after T₂ has been refuted in its turn, we can still say that it is better than T₁. For although both have been shown to be false, the fact that T₂ has withstood tests which T₁ did not pass, may be a good indication that the falsity content of T₁ exceeds that of T₂, while its truth content does not. Thus, we may still give preference to T₂, even after its falsification, because we have reason to think that it agrees better with the facts than did T₁. Similarly, a theory T₂ that is more precise than T₁ has a higher degree of verisimilitude than T₁. Newton’s dynamics, for example, even though we may regard it as refuted, has of course, maintained its superiority over Kepler’s and Galileo’s theories. The reason is its greater
content or explanatory power. Newton’s theory continues to explain more facts than did others, continues to explain them with greater precision and unify the previously unconnected problems of celestial and terrestrial mechanics.⁹¹

In the final analysis, we should not be confused about the difference between ‘verisimilitude’ and ‘probability’, because ‘likely’ is the other word for ‘probability’ which comes originally from ‘like the truth’ or ‘verisimilar’. However, progress in science means progress towards more interesting and less probable theories, and this means, as a rule, progress towards less familiar and less comfortable or plausible theories. So, theory of greater verisimilitude is totally different idea of ‘probability’. Both they are different in an important respect. The logical probability represents the idea of approaching logical certainty, tautological truth, through a gradual diminution of informative content. Verisimilitude, on the other hand, represents the idea of approaching comprehensive truth. It thus combines truth and content while probability combines truth with lack of content.⁹² Popper says that if we take the word ‘probable’ in any of the many senses which satisfies the calculus of probability, then it can never be shown to be ‘probable’.⁹³ Moreover ‘Probability statements are not falsifiable’.⁹⁴ Thus we should not attribute truth, or probability to our theories. The use of such standards as truth, and approximation to truth, plays a role only within our criticism. We may reject a theory as untrue; and we may reject a theory as being less close or approximate to truth than one of its predecessors or competitors.⁹⁵

Therefore, verisimilitude is neither ‘truth’ nor ‘probability’, it is kind of truth at the level of our interest. It is comprehensive truth. On the other hand, absolute truth is regulative of this comprehensive truth or verisimilitude. Our gradual achievement of verisimilitude at its highest reach will still remain the verisimilitude, for, it is essentially verisimilitude, not truth. Our theory being conjectural, producing theory and its criticism is an endless process. In the learning process, we always find a refuting hypothesis and no hypothesis has the authority not to undergo criticism. The issue of empirical science in this way appears fully agnostic.⁹⁶

Then what do we do when we search for truth? According to Popper, we search, then, for greater verisimilitude only. He explains this position as
following: Let us take a square as representing the class of all statements, and divide it into two equal sub areas, the true statements (T), and the false ones (F):

\[ \begin{array}{c|c}
\text{T} & \text{F} \\
\end{array} \]

Now the task of science is to cover by hits as much as possible of the target (T) of the true statements, by the method of proposing theories or conjectures that seem promising, and as little as possible of the false area (F). It is very important that we try to conjecture true theories but truth is not the only property of our conjectural theories. For, we are not particularly interested in proposing trivialities or tautologies. ‘All tables are tables’ is certainly true—it is more certainly true than Newton’s and Einstein’s theories of gravitation, but it is intellectually unexciting. That is why scientific research is least interested in such tautological, sure and certain trivialities.

According to Popper, we are after interesting and enlightened truth, we are after theories that offer solutions of interesting problems. If at all possible, we are after deep theories. When we speak about approach to truth, it means ‘the whole truth’ that is, the whole class of true statements, the class T. A false theory may appear to be nearer to truth than other false theory. For example, ‘it is now 9.45 p.m.’ seems nearer to truth than ‘it is now 9.40 p.m.’ if in fact it is 9.48. Therefore, the idea of higher or lower verisimilitude is applicable both to false and true statements. Their truth content is essential in our context. In this sense we can say that the aim of science is the better approximation to truth, greater verisimilitude.⁹⁷

Newton never believed, Popper says, that his theory was really the last word, and Einstein never believed that his was more than a good approximation to the true theory. This is because the truth, in other words, the class of all true statements is unattainable. What we can do is to increase the truth content and decrease the falsity content. Now, will our long struggle of increasing truth content and decreasing the falsity content at some time end up in the attainment of all true statements or will verisimilitude ever culminate into the absolute truth? Such a situation is impossible of attainment as our theory in its’ essence is conjectural. A conjectural theory is characterized by two things: (a) there is
no restriction to produce another conjecture better than the first; every previous knowledge makes the scientists more competent to produce the competent theory to refute previous ad infinitum and (b) Our theory being mere conjecture we cannot be certain for any assertion to be true. As a result, there always is the scope for any other conjecture to be shown better by any trick of the imagination or creativity. In that case, we may regard, with our capacity at the time, the truth as falsehood and vice-versa, because the conjecture does not possess any absolute criterion of truth. Our method says that no corroboration is conclusive. And if every previous theory is false according to the method, then meta-induction allows us to say that every future theory, when it is past by other, will also be false. At this point, Popper says, scientific community ought to be, and to a considerable degree actually is, an open society in which no theory, however dominant and successful is ever sacred.

There may arise another question that if truth is illusive as considered in our learning process and if our theory is the creation of our imaginative mind, then is it not that scientific knowledge is essentially subjective? For Popper, it would be so if our method had claimed to know the reality. For, theory of knowledge has a certain essential subjectivity. The question such as 'How do I know?' and 'what do I know?' start inevitably from personal experience. Its data are egocentric. But in our method of 'trial and error', we admit that our knowledge is guesswork. Therefore, the question 'How do I guess?' and 'what do I guess?' are not analogous at all. Popper says that this question is psychological; it has no epistemological impact. The difference between 'How do I know? What do I know?' and 'How do I guess? What do I guess?' is as to the former 'I do know' but to the latter 'I do not know'. In our method, we do not prove that our guesses are correct, but we are most anxious to have them criticized in order to replace them if possible by better guesses. The moment we replace the idea of knowledge by that of guesswork, the apparently 'essential subjectivity' of the theory of knowledge disappears. Guesses, as opposed to this, are proposals, and as such may be met by anybody's counter-proposals.

The shift from 'knowledge' to 'guess work' necessitates that all laws and theories be deemed to be hypothetical or conjectural. We must regard them
to be guesses. Therefore, from a rational point of view, we should not rely on any theory, for, no theory has been shown to be true, or can be shown to be true. Nevertheless, we have reason to prefer as basis for action the best-tested theory. The shift from ‘truth’ to ‘verisimilitude’ and from ‘know’ to ‘guess’ gives us a middle position. For, in relation to truth we cannot speak of the subjective part of theorizing, when producing a conjecture. The idea of verisimilitude we can incorporate both parts:-- subjective and objective. In our method of ‘conjecture and refutation’ the subjective part is in conjecture, because we are allowed here to use our creative imagination, to use myth; and the objective part is in the process of refutation, because our criticism is always directed by the regulative idea of truth, and any body can propose his counter-proposal for severe criticism. Although the work of rejection, in other words, the work of criticism by severe test gives us objective result, the result may not correspond to reality, because our criticism too is the conjecture of another sort. In this method, we know what is false but we do not know what is true.

To summarise the above discussion, we can say that for Popper fundamental scientific theories are by nature hypothetical. We have analysed the process of scientific change with a view to understand whether such a change as conceived by Popper entails the progress or not, and also whether such progress entails the gradual attainment of truth or not. For Popper, although hypotheses are falsifiable, every falsification culminates into progress, and every step of progress aims at truth.

However, all these issues chiefly depend on the nature of fundamental scientific theories which Popper calls falsifiable hypotheses. For Popper hypotheses may originate from myth, metaphysics, fiction whatsoever, but they can be scientific if they are falsifiable. They are myth-making, for they are produced from the imaginative mind of the scientists – they are not abstracted from the observations. This position denies induction as the method and verification as the criterion of a scientific statement. Rather, falsifiability is the criterion which, to begin with, accords scientific status to such hypothesis. Falsifiability is the criterion which makes metaphysics quite meaningful or relevant for science.
For Popper, only a critical discussion can make any conjecture a proper scientific theory. What we call ‘science’ is differentiated from the myths not by being something distinct from a myth, but by being accompanied by a tradition of critically discussing the myth. Conjectures may be considered as dogmatic rather than rational, but the ‘trial and error’ method makes them scientific. There is nothing irrational if we tentatively accept some theory with an eagerness to revise it with experiment. Popper maintains that growth in the process of ‘conjectures and refutations’ is not the accumulation of observations but rather the repeated overthrow of scientific theories and their replacement by better or more satisfactory ones. So it is not like a library, as more and more books accumulate so more and more knowledge accumulates. But scientific growth occurs in a way that is more revolutionary than accumulation. In its growth science destroys, changes and alters everything including its most important instruments and language. Yet science makes progress, for if a hypothesis falsifies the other, the falsifying hypothesis is better than falsified one. Therefore, every falsification is considered as growth.

Popper holds that in such a growth we gradually get closer and closer to truth. For him, when we falsify a theory by another one, it means that we eliminate some mistakes from our previous knowledge. The elimination of falsity - content of knowledge logically entails increase in truth-content. However truth attained in such a progress is ‘regulative truth’, for we do not achieve truth directly, but it is conceived only through eliminating falsity. For Popper, we may mistakenly falsify a true theory and corroborate a false one. So we do not have such a criterion by which truth could be sorted out categorically. Yet the ongoing process of falsification is directed towards truth. So, truth in science is regulative truth, which is assessed through a mutual calculation of truth-content and falsity-content, a degree of truth which Popper calls verisimilitude. Verisimilitude is not just truth, but truth-likeness. So through scientific progress as conceived by Popper we do not attain the absolute truth, rather something like truth.
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