Popper's philosophy of science appears to be at first glance diametrically opposed to Kuhnian picture of science. This surface opposition between Popper and Kuhn is clearly expressed in their debate between the role of criticism and consensus in the development of science. According to Popper criticism or critical testing of scientific hypotheses has a central role in the development and progress of science. Kuhn believes in the consensus on a dominant paradigm and so also thinks of the enterprise of science as a paradigmatic activity.

Both of them approaching the same problem i.e., the growth of scientific knowledge from two different perspectives. However, an indepth study of both, Popper and Kuhn, suggests that at a subtle level there are certain profound similarities between the two. These points of agreement may help us further to explain the two notions - consensus and criticism, from a different angle. Hence, let us have a brief account of these points of similarities.
Perhaps, a fundamental similarity between Popper and Kuhn is their common rejection of the empiricists' conception of science. Both disagree with the positivists, that a theory neutral observational language is possible and as such, they reject the view that the scientific knowledge can be acquired by providing a logical structure to the products of the scientific research. According to them, scientific knowledge is acquired by a dynamic process of conjectures and refutations. In order to have a clear picture of this dynamic process both of them have taken the help of history of science. In order to focus the history of science, they are more interested in the actual practice of science i.e., to both, Popper and Kuhn, the problem of actual growth of scientific knowledge carries more importance. Moreover, both of them conceive the growth of scientific knowledge occurring by a revolutionary overthrow of an accepted theory and its replacement by a better one; and thus, reject an accretive process of the development of science.

Kuhn, however, gives an equal importance to both the processes of normal scientific research and the revolutionary episodes. According to him, the normal research is necessary and essential for
preparing the grounds for a revolution. More importantly, in this normal research tradition, the young research scientists are socialized and trained. Popper on the contrary, emphasizes on the revolutionary overthrow alone, and rejects the normal research activity as non-critical and hence irrational. However, Kuhn has pointed out that even in Popper, there can be seen both these activities. Kuhn says that what Popper coins as testing of theory is always a revolutionary act. On the contrary, what Popper calls as a personal mistake is more or less like a puzzle. In case of mistakes, there is always a place to be corrected but in case of testing if a theory fails, there are more chances of being rejected and hence replacement of a theory or a revolution is needed. As such Kuhn refers to accept that Popper rejects the normal scientific tradition, and he shows instances of Popper's stressing it. Apart from such disagreements on particular points, there is a general agreement on the process of growth of scientific knowledge as a revolutionary episode. For such a development of science, both giving instances from actual history of science i.e., emphasize science as descriptive account rather than a normative one, as suggested by the positivists philosophers of science.
Another point of similarity between Popper and Kuhn is that both are anti-psychologistic. However, they approach this point from different routes. They do not agree on the primacy of the context of discovery. However, both arriving at the context of justification with different perspectives. According to Popper, the context of justification or rather a context of validation is more central. He gives a number of good reasons on basis of which theory choice is possible. But more importantly, Popper suggests that these criteria of theory choice provide an inter-subjective context for the validation of a theory. Hence, according to Popper, though the scientific theory is an individual credit, it is established only by an objective context of validation. The rejection of a theory and also the acceptance of a new one is possible only by an inter-subjective testing of the two. In Popper's framework, thus, the context of validation also provides an intersubjective context which Popper describes as a methodological psychologism.

Kuhn, on the other hand, suggests a different kind of antipsychologism. According to Kuhn, there are some shared criteria of theory choice. These criteria decide the relative weight of alternative
Theories. The superseding theory is selected as a new paradigm. Thus even Kuhn acknowledges the process of validation as important. But, more importantly Kuhn also suggests the way these criteria are grasped by the scientists. With the introduction of normal sciences, Kuhn has given an entry point for the socialization of a research scientist. He gives more emphasis on the training of a scientist by which a scientist is able to do actual practice of science and at the same time he also achieves an ability to apply these shared criteria, as the science pedagogy acquaints a scientist with the possible application of these criteria along with the research methodology. So, according to Kuhn, the socialization and formation of a scientist becomes central in the actual practice of science. This training itself enables a scientist to judge and share a paradigm along with the other members of his scientific community.

In short, both Popper and Kuhn suggest an anti-psychologistic point of view from different angles. Apart from these two points of similarities, there is another profound point of agreement between the two. In fact, it is underlying the above two points of agreement. i.e., both Popper and Kuhn
hold the view that the practice of science is a communal activity. Kuhn has given a more explicit account of the function of scientific community. But then, even Popper's emphasis on the context of validation is also ultimately communal in terms of accepted standards of a scientific community.

Now, taking into account these points of similarities, we may be able to focus the dichotomy between the two notions criticism and consensus from a different angle. There is a certain complementarity between, these two concepts i.e., for Popper the basic category seems to be the rational criticism. Therefore, an attempt can be made to show that in Popper's philosophy of science there is also a place for the notion of consensus. Similarly, an attempt can be made to show how critical rationality has its own place in the Kuhnian model of consensus. Such an attempt can help us to overcome the antithesis between the two and may enable us to show how the each implies the other.

Popper holds the view that there is a dichotomy between the observations and a theory. However, like positivists, he does not believe in the primacy of the observations or experiments. He does not agree
with the view that only that knowledge is valid which can be verified either by observations or by experiments. According to him, scientists first put forth a hypothesis and then test it by the possible observations or by the experiments. If, these observations or experiments do not go contrary to the given hypothesis, then it is said to be corroborated. But otherwise, if there are any evidences against it then the proposed hypothesis is likely to be falsified. Popper thus suggests a deductive method for the validation of scientific knowledge. Popper calls it a hypothetico-deductive method. There are two fundamental requirements of this method; they are:

1. The need for a hypothesis or conjecture,
2. The testing of this hypothesis.

In this hypothetico-deductive system, the testing of a theory is more important. The conjecture or hypothesis becomes scientific only after it has been tested. The testing of the conjectures is done by the possible observations and experiments. They can refute and falsify the conjectures. Hence, according to Popper, any scientific theory cannot be true for ever. These
theories can be true only for a finite time, i.e., only till they are not falsified. Hence, in Popper's philosophy of science testing or validation of conjectures have more important role than just putting it. Of course, putting forth a conjecture has also its own importance, since without a new conjecture, the scientists cannot refute the old one. Popper further says that by this method the scientist learns from his own mistakes. Whatever he first accepts as a given theory, he may have to reject, if there are some falsifying evidences. It means, that the scientist has to be critical not only towards the opponent's theory, but for his own theory as well. Thus, when science develops by the method of hypothetical deductive system, critical rationality is underlying such a developmental process. Criticism or the critical rationality is thus the heart of the process of putting conjectures and their refutations. Without a critical attitude towards one's own theory, a scientist cannot advance his own discipline. Popper, therefore, says that with the help of this method of growth of scientific knowledge, one can also see the progress of scientific knowledge.
The development and progress of science is conceived in terms of rejecting one theory and at the same time accepting another one. The new theory is better testable because it has more empirical content than the older one. The new theory solves those problems, which the older one has failed to solve. Similarly, it also solves those problems which the older theory has successfully solved. Hence, the new theory has more empirical and informative content and hence more testability. At the same time it has more chances of being falsified as well. The science, develops with more and more scope for criticism, with increase in testability, the chance of being criticized, thus also increases.

This means, Popper is also making a distinction between two contexts; i.e., between the context of discovery and the context of validation or testing of the discovery. The context of validation is more important in the development of science. The discovery achieves its due status only after it has been approved by rigorous testing. A critical attitude towards a scientific discovery is more necessary. However, the emphasis on the
context of validation poses some important questions, such as who are the validators? Why they validate some particular conjecture rather than any other? These questions need to be solved.

It is obvious that, the context of discovery is private. It is always creditable to the individual scientist. However, the nature of the context of validation is different from that of discovery. Along with the discoverer, the hypothesis is tested by the other scientists. After putting forth a hypothesis, it is open for a critical examination. The decision of either accepting or rejecting it is taken by all the scientists. It is a collective decision. One can therefore say, that the method Popper suggests for the growth of scientific knowledge demands a group activity or a collective research work. But Popper has not explicitly mentioned about such a group or community of the scientists. The context of validation cannot be private as that of the context of discovery. Science cannot develop in isolation, by an individual scientists. It has to be a group or communal activity. But then, the second question becomes more important. How there is always either agreement or disagreement about a particular hypothesis? Why the scientists
try to save a theory from its possible refutation?

These questions suggest an important point, i.e., if the scientists agree on some particular decision, then there should be some common grounds, some common criteria according to which the scientists either accept or reject the given hypothesis, or replace it by a new one. There has to be some sound basic for theory choice. Popper gives six criteria by which the scientists decide that the new theory supersedes the old. The following are the six criteria.  

1) The new theory makes more precise assertions than the old which stand up to more precise tests.
2) The new theory takes account of and explains more facts than the old.
3) The new theory describes or explains the facts in more details than the old.
4) The new theory has passed tests which the old one has failed to pass.
5) The new theory has suggested new experimental tests, not considered before it was designed.
6) The new theory has unified or connected various hitherto unrelated problems.
These are the criteria for comparing two rival hypotheses. When a hypothesis is about to be placed instead of some other, there are some fixed procedures or methods to make a critical comparison between the two. But then the question is how the scientists are acquainted with these criteria? For this, it should be institutionally governed process, where the scientists are trained. With this training the scientists are able to understand where and how to look. Without such a training a scientist is unable to make critical comparison between two competing theories. The development of science therefore, should be an institutionalized process. Moreover, this institutional training is always given in accordance with some particular discipline or branch of science. Along with this institutional training, a research scientist also acquires a kind of consensus on the prevalent scientific theory. Without a consensus on some scientific theory further validation or testing of that theory is never possible. However, Popper has not given an account of this pedagogic training. He assumes the ability of a scientist but does not question how this ability is achieved.
This becomes subtle in respect of another important aspect of this procedure, i.e., though the decisions are taken collectively, yet the individual scientist has the freedom of choice. The individual scientist can compare and criticize the competing theories with his own abilities. This decision, Popper says, is a conventional decision. All the scientists agree on a particular decision, still there can be a disagreement about the purpose to arrive at that particular decision. The purpose is always personal and hence it differs in each individual case, i.e., the scientists may agree on a particular decision, for example, whether to refute the old hypothesis and to accept the new one. But each scientist may give a different purpose to accept that decision. There can be disagreement about the purpose, but the ultimate result is an agreement on that decision. Without such an agreement or consensus, science cannot develop as a group of collective activity.

This conventional characteristic of the testing of scientific theories suggests that the validation or testing of theories is a context of intersubjectivity. But then the question is how
the scientific theories can be validated intersubjectively? This point needs to be clarified and it can be clarified by giving an account of the notion of falsification itself.

A fundamental characteristic of any scientific theory or hypothesis is that it is liable to falsify. This feature of falsification suggests that any scientific theory or hypothesis cannot stand as an ultimate truth or as an ever verified one. On the contrary, it is always in a shadow of being falsified. Popper thus suggests that in science there cannot be any ultimate or, as positivists say, protocol sentences. Rather, there are some basic statements. These statements, the scientists can deduce from the theory. Popper says that these are the basic observable statements. Being observable or experimental, every scientist can test them independently. i.e., the test of these basic statements are not bound specio-temporally. This suggests that Popper gives a very different account of sense experience or observations. It is totally different from what is usually understood. The sense experience or the observations are often regarded as subjective. Being individualistic they are treated as private. Popper, however, does not
agree with the privacy of the sense experience. He argues that in the natural sciences, sense experience functions in a peculiar way, i.e., though it is an experience of an individual, at the same time may other scientists can share the same. In the natural sciences the experience or observations can never be so private as they are supposed to be. The main reason is that it needs some specific training in order to observe. The institutional training enables a scientist to make certain observations. Without the training he cannot adopt certain methods and techniques to experience something, nor can he make certain decisions as to where and how to look. This means, the sharability of scientific experience is hidden in the nature of scientific knowledge and in the process of its development itself, i.e., for Popper, the origin of the enquiry of any hypothesis is, thus, always intersubjective. There are some common grounds which all the scientists share.

Another important aspect of the scientific theories is that they are centered around problems. In the course of refutation, the new theory is more acceptable because it solves many more problems which the earlier theory fails to solve. In addition,
it solves even those problems which the older theory has successfully solved. This does not mean that the new theory is complete in itself; that it has solved all possible problems. There still remains some problems which need some further research in order to be solved. Moreover, with the new theory, some new problems may arise, about which the old theory has not even thought. Therefore, there are many requirements of a new theory. It needs further research to solve these unsolved problems. The validation of a new theory also depends on the success of these problems. So, even according to Popper, the scientific enterprise is always problem oriented. The development and progress of science is always from one problem to some other. These problems provide a common ground for the scientists. Without such a common ground the success of science is not possible. Even the history of science suggests the same, i.e., science develops from one problem to another.

An important aspect of this kind of development is that with the new problems the scientific enterprise are assured by more and more approximation of truth. According to Popper the observations
perform two important functions. Firstly, the observations are in accordance with a theory. These can be called the positive observations. They help to have corroboration of the theory with facts. Secondly, some observations go contrary to the given theory. These can be called the negative observations, as with the help of these observations it is possible to falsify the given theory. This means that Popper holds the view that the observability of scientific knowledge does not provide any ultimate or certain knowledge. The scientific knowledge is always in a possibility of being falsified and hence changable. The scientific theories can stand only till there are no chance of getting refuted. They are uncertain and hence temporal. But Popper further explains that this does not mean, scientific theories are probable. On the contrary Popper develops a different theory of truth. He calls it an objective theory of truth, which is again an outcome of the development of scientific knowledge.

Science develops from one theory to another and with that from one problem to another. The new theory is always rich in empirical informative
content as compared to its predecessors. Hence, science develops with ever increasing content. Increase in the informative content means increase in its testability. Hence, the new theory can have more possibility of being either corroborated with facts or being falsified. Though, there are some counter evidences the theory is not abandoned immediately. The scientists try to save the theory from its possible refutation. They try to put forth some auxiliary hypothesis in order to support the main and to save it from its refutation. On the contrary, if the scientific research is smooth enough to have corroborated with facts then it leads towards the truth. It is more truth seeming or nearer to the truth than the old theory. The development of science, from the old theory to a new one, means more assurance of being truth seeming. This characteristic of truth seemingness or truth likeness, Popper has coined as the verisimilitude of the theory. That means, along with the new theory the scientists also share the common approximation of truth. The approximation of truth is an outcome of the acceptance of a new theory. Hence, along with the new theory the scientists also have to agree on the relative truth seemingness
of the new theory. In short, we can say that though, Popper has not given much attention to the notion of consensus, the consensus, has its own role in his philosophy of science. In the beginning, while discussing the affinities between Popper and Kuhn, we have shown that though Popper does not talk of any scientific community, the way he describes the actual scientific practice, implies a need of a communal or group activity. Practice of science as a group or communal activity needs some commitments towards the practicing science itself. Such commitments naturally lead to some kind of consensus or agreement on the prevalent theory. Hence, if the function of consensus is not considered, some questions remain unanswered, such as, how the scientists acquire the methods and techniques of testing a hypothesis? What is it that makes a scientist believe in a particular hypothesis or why a particular hypothesis is tried to be saved from its possible refutation? These and such questions remain unsolved in the framework of Popper's theory of growth of scientific knowledge. In order to answer these questions one has to focus the dimension of consensus.
More importantly, such a consensus is acquired only through a peculiar kind of training within a discipline. Hence, it is an aspect of science which requires some institutional base. However, we have already seen that Popper agrees on the institutional base of science. It, therefore, leaves room to argue for the scientific practice as confined to some or the other scientific community and then it automatically leads to the significance of the notion of consensus. In a nutshell we can summarise our argument that in Popper's philosophy of science, one cannot treat consensus and criticism as two alternatives. Rather, they seem complementary to each other. Criticism or critical rationality gives us only a one sided picture of the process of growth of scientific knowledge. While consensus is, of course, the other side of the same process.

On the other hand, if Kuhnian framework of growth of scientific knowledge is viewed, one can easily say that he gives more emphasis on the aspect of consensus or agreement on paradigm. But, we have seen in the earlier chapters that Kuhnian model of consensus fails at the time of theory choice. Similarly we have also seen that how it may lead to an over socialized concept of science. However, in earlier works, Kuhn has not given any good reasons
for theory choice, but it is also the case that without any such criteria, theory choice is not possible. In his later works, 4 Kuhn agrees with this and gives some good reasons or criteria for theory choice. With these criteria of theory choice we may focus upon Kuhnian theory of paradigm change with a new perspective. We can examine the Kuhnian model in order to see how scientific activity is functioning at the time of paradigm choice. i.e., if consensus fails to function at paradigm choice then what is it that dominates the extraordinary research activity? Let us, therefore, have a brief account of the Kuhnian framework in the light of these questions. It may help us to see whether in Kuhnian model as well, we can see a complimentary view of consensus and criticism. It may enable us to see whether the notion of criticism is functional along with consensus within the process of growth of scientific knowledge itself.

The accepted paradigm is never complete nor is perfect. There are some issues which are still unsolved, which Kuhn has coined as puzzles. In order to solve these puzzles some further research is needed. The accepted paradigm is ready with the methods and techniques useful to solve these puzzles.
Moreover, there are some exemplary solved puzzles according to which the scientists can model their own puzzles. In case of some puzzles, though readymade material is available, the scientists fail to solve them. If there are repeated failures the puzzles become anomalous. The normal scientific activity becomes problematic. This situation Kuhn calls as crisis. As there are repeated failures, the scientists have first to check their own grounds. They have to question their own paradigms. If, a trial for a way out, within their own paradigm is hardly possible, the scientists may now look for a new way. The need for a new paradigm thus emerges in response to the failure of the old one. Even in the normalcy of the existing paradigm, there had been some new discoveries. But the domination of the existing paradigm does not allow these discoveries to enter in the field. But when there are some unavoidable failures, as in the crisis period, the scientists look for such new discoveries or try to discovery totally new ones to come out of this critical situation.

The new paradigm is thus accepted as a response to the old one. The new paradigm basically
deals with three types of problems or phenomena. The following are those three types:

1) Phenomena already well explained by existing paradigm.

2) Those phenomena whose nature is indicated by existing paradigm but whose details can be understood only through further theory articulation.

3) Those phenomena whose characteristic feature is their stubborn refusal to be assimilated to existing paradigm.

That is along with the unsolved problems of the old paradigm, the new paradigm also solves those problems which the old one has successfully solved. It also solves those other problems which cannot be thought of within the domain of the old paradigm. Moreover, the crucial problems of the old paradigm may become totally irrelevant within the scope of the new one.

This means that even for Kuhn, science develops from one problem to another, viz., from one paradigm to another. Thus, the new paradigm does have some
continuity from the old one. More importantly, the replacement of the old paradigm by a new one is a necessity of the development and the progress of the science or any discipline of science.

But, though the old problems, both solved and unsolved have a place in the new framework, it does not mean that the old paradigm can be deduced from the new one. The new paradigm has its own way, its own methods and techniques to solve the old problems. It is neither correct nor possible to see such a deduction. Even if both the paradigms use some common terms, what they mean by them is different. They use these terms differently. Kuhn therefore, says that there cannot be any commonalities within two and hence these paradigms are incommensurable, and incompatible too. A question then may arise, that if the two theories are so incommensurable and also incompatible, how theory-choice or paradigm-choice is possible? How a comparative study of the two paradigms is possible? Can such a paradigm change be called rational? How a critical evaluation between these two alternatives is possible.

On this point of critical rationality, Kuhn has been immensely criticized. Particularly, Popper has
charged his theory of paradigm change as irrational as the domination of the paradigm lacks any critical attitude. According to Popper the nature of paradigm itself makes the scientific activity mechanical. It does not allow an individual scientist to think beyond the boundaries of existing paradigm. The scientific activity within the domain of a paradigm does not give any scope to individual originality or individual spontaneity. Even if there are some new discoveries, they are often suppressed by the domination of the existing paradigm.

Moreover, the acceptance of the new paradigm can also be said to be a decision taken by the dogma of a new paradigm. Kuhn does not give any good reasons for either rejecting the old paradigm or for accepting the new. However, this decision of replacing the old paradigm by a new one is not a decision of an individual scientist. It is a decision of a scientific community. At the beginning, all the members of the community may not agree upon the decision. But Kuhn says that a rational persuasion of these scientists is easily possible. Here, he compares the act of persuasion with the experience of religious conversion. At the beginning some scientists may still be under the control of the
old paradigm. But, with the increasing success of the new paradigm, these scientists also join it sooner or later. The persuasion is invisible. In fact, the visibility of the capacities and abilities of the new paradigm can persuade the rest of the scientists with a greater ease. Thus the persuasion and hence the actual process of paradigm change is invisible, i.e., it cannot be located in a particular period. It is very difficult to say when and how the decision of accepting a new paradigm is taken. Similarly, when and whether the persuasion of each and every scientist is possible.

The process of decision making and also the process of persuasion is often charged as mob psychology, particularly by Imre Lakatos. Kuhn is not providing any concrete grounds or precise criteria for the paradigm choice. Hence the question is on what basis can one claim, that acceptance of a new paradigm is a rational persuasion. It is quite possible that the decision of some leading scientists may be followed by the rest. It can, therefore, be described as mob-psychology or collective wisdom.

While answering all these questions, Kuhn says that these critics have misunderstood him. He
claims that all of them have been misled by what he has called the text-book science or science pedagogy. According to Kuhn, science pedagogy is an essential factor of any scientific research. The training in a particular discipline is necessary. With this training, research scientists are acquainted with what Kuhn calls as a scientific activity. Pedagogy is important and essential as far as formation and making of an individual scientist is concerned. Kuhn further explains that the critics have, however, equated the process of science pedagogy with that of decision making. The science pedagogy channelises the outlook makes him capable of judging his own paradigm as well as the other alternative paradigms. The decision making capacity is, thus, acquired by this training within a paradigm. Kuhn, therefore, claims that his critics have misunderstood him, as the context of science pedagogy differs almost as much from the context of justification as it does from that of the context of discovery. It is certainly true that the context of science pedagogy is different from that of context of justification of discovery. But still some questions remain e.g., what are the plus points of a new paradigm that attract the scientists? What are the criteria by
which a critical appraisal of a new paradigm is possible? What are those characteristics of a new paradigm by which persuasion is so easily possible?

Kuhn agrees with his critics and in his later works he considers and develops this point. He gives five such criteria of theory choice, they are accuracy, consistency, scope, simplicity and fruitfulness. These five are the criteria by which a theory choice is made possible. The scientist learns how these five criteria are functional. He also learns how to use and apply these criteria i.e., the training of a scientist enables him to decide the relative weight of a theory. The same training is useful when he has to make a theory choice. At the time of theory choice every scientist is free to take his own decision. He is free to apply these criteria. Hence, it is quite possible that two scientists may come to the same conclusion. Yet may differ in the reasons for accepting a particular decision, e.g., the criteria such as accuracy, scope are rather ambiguous in their application. Here, the scientists may agree upon the decision that the new paradigm is more accurate or broader in scope than the old one. Yet, they may disagree with the relative accuracy or scope of the
new paradigm. But, since there is no disagreement about the relative weight of a new paradigm, they agree on the decision of accepting the same paradigm. Similarly, it is also quite possible that for some the new paradigm may be more accurate, but for some it may have a wider scope than the other alternative paradigms. Here, again, the scientist concludes the same. They ultimately arrive at the same decision.

With the help of these five criteria of theory-choice, a critical comparison of the alternative paradigms is possible. There may be many paradigms, along with the old one, struggling to be established. But not all of them can serve as a new paradigm. Hence to choose one from these alternative paradigms the scientists have to be more critical. They have to be as perfect as possible while applying these criteria.

This surely means that in Kuhnian perspective of philosophy of science, the notion of criticism has its own place. Particularly at the time of paradigm change its functions with this full force. At this time, the criticism is the most essential. It is the crucial period when the decision of the acceptance of a new paradigm is taken by the scientific community. This step, thus, has its own importance as both the old
and new traditions are concerned. On the one hand it breaks the old tradition, while on the other, it is the beginning of the new one. The decision of accepting a new paradigm is therefore, an important mode as far as development and progress of science is concerned. Hence, the scientists have to be more and more alert and also critical at this point.

Another important aspect of these five criteria of theory choice is that they function as the values of any theory. In the later works, Kuhn has discussed at length, how these criteria of theory choice can function as values of any theory. More importantly, when introduced as values, they make the theory choice a judgement of values. Theory choice becomes an evaluative, judgmental activity.

These value judgements have a very peculiar kind of rationality. In the earlier chapter, we have already seen that these judgments have a kind of practical rationality. Richard Bernstein has shown that the value judgments which Kuhn describes are of the similar kind that Aristotle describes as Phronesis or practical reasoning. An advantage of a value judgment is that these judgments are of an individual scientist. Though there is disagreement about
relative values one can argue for his own position. That means a possible discussion even in case of disagreement is possible. This possibility of further argumentation leaves room for another important possibility i.e., the possibility of rational persuasion. One who does not first agree on some particular value, may later on agree on the same value.

In a nutshell we can summarise that, though Kuhn has not given much emphasis to role criticism in his earlier works, in the later part he himself elaborates in detail the notion of critical rationality. Hence, we can say that in the Kuhnian model of paradigm change the notion of criticism performs an important role which, later on, Kuhn also accepts. It is functional mainly at two crucial stages. These are:

1) In the normal research period when the existing paradigm repeatedly fails to solve the unsolved puzzles, the scientists have to be critical towards their own paradigm.
Secondly, and more importantly, when there are some alternative paradigms, the scientists have to critically evaluate them, in order to choose a new paradigm.

A clue for critical rational attitude is found in the five criteria of theory choice and more specifically when these criteria function as values of any theory.

However, when both, Popper's and Kuhn's accounts are taken into consideration, one can conclude that the concept of change itself may not be discussed without concerning the two important principles, i.e., the consensus and the criticism. Any theory of progressive change cannot be solely explained in terms of either of them, totally excluding the other. It is possible that in some cases more emphasis may be given on either of them, but that does not mean that the other notion does not come into the picture. Though one of the notions is dominating, the other has its own place in the same framework. The same is true with both Popper's and Kuhn's frameworks of growth of scientific knowledge. Popper emphasizes more on critical rationality while Kuhn gives importance to consensus. But however, both consensus and criticism are functional in each case.
With this point of complementarity between criticism and consensus, we can go back to our distinction between two types of consensus i.e., imposed consensus and achieved consensus. As far as Kuhn's thesis of paradigm change is concerned both these types of consensus are functional within it. We know that Kuhn gives much emphasis on the peculiar way in which scientists are trained and disciplined within a particular discipline. With this process of socialization, the scientists are acquainted with the methodological as well as the metaphysical commitments of that particular paradigm. This means, the scientists learn not only the methods and techniques to solve the puzzles, but also the beliefs and values of the respective paradigm. By such a type of training what a scientist internalizes can be very well called as an imposed consensus. At the same time, the same kind of training and practice in science enables him to make decisions on differing grounds. Such an ability of taking decisions is useful especially at the time of theory choice. By accepting a new paradigm a scientist achieves a consensus on the new paradigm. Hence, this later type of consensus can be called as an achieved consensus which he acquires on his own.
However, the link between the imposed consensus and the achieved consensus is found in the critical examination of alternative paradigms. It means that the achieved consensus is a result of a revolutionary episode. What enables to take this step is of course, the imposed consensus. Further, we can say that the process by which a consensus is achieved is of critical evaluation of rival theories.

Now, as far as Kuhnian framework is considered, we have seen in the above discussion how critical evaluation functions centrally, in terms of imposed consensus and the achieved consensus. Kuhn, in his later works, agrees with the view that for a progressive paradigm change, both consensus and criticism are necessary. Hence, he further elaborates his theory.

On the other hand, as far as Popper's framework is concerned he emphasizes on the critical rational attitude. However, we have seen above, that even Popper accepts the institutional base of scientific knowledge. The way he describes the critical appraisal of a new hypothesis requires the scientific activity, as a group or communal one. He accepts the requirement of intersubjective context. But, still he seems to be silent about the consensus part of a theory of
progressive change. Hence, some questions remain unanswered in his framework, i.e., the questions such as how does a young scientist is acquainted with a scientific theory or hypothesis? How he learns and shares the criteria of theory choice, because according to Popper it is an inter-subjective activity. More important question is how a critical attitude is developed. These and such questions can be answered in terms of the imposed and achieved consensus. However, Popper's framework does not provide such account, though in his framework the notion of consensus does have its own important role and function.

With the help of this discussion of the two notions, consensus and criticism, one can say that the hermeneutical interpretation helps us to see both the sides of a coin simultaneously. That is, the consensus, and criticism are not two rival thesis, on the contrary are seem to be complementary to each other, as any framework of scientific change is concerned. Such a point of view can soften the dichotomy between criticism and consensus or in other words the dichotomy or debate between Popper and Kuhn. It thus gives us a possible hermeneutical
interpretations of some concepts in the field of philosophy of natural sciences.

If the method of hermeneutical interpretation is stressed further, it may open a new and novel possibility i.e., the possibility of the hermeneutical interpretation of sciences of nature in general. However, the field of hermeneutics is supposed to be restricted to the human sciences alone. Hence, to show possible hermeneutical interpretation of sciences of nature in general, one should first, have the understanding of the hermeneutics of human sciences. Such an understanding may provide us to look for the possibility of the hermeneutics of natural sciences.
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