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A criticism of Popper's argument against induction and justificationism in science (Karl Popper).

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A Criticism of Popper's Argument Against Induction And Justificationism In Science

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ABSTRACT

An overall depreciation of scientific thought is the converging point of almost all the trends in post-positivist and post-modern philosophy. However, the lowering of scientific methodology and scientific modes of thinking in general, along with the scientific ideals of objective truth, progress and development, is no hidden issue in the post-modern philosophy: it thrives on such criticism and openly declares its discontentment with scientific modes of thinking and criteria of reasoning.

But the strategy adopted by at least some of the post-positivist trends, is somewhat misleading. These trends launch attack on science under the guise of demolishing the positivist conception of science. Presenting themselves as the real champions and saviours of science and enemies of positivism, they attempt to dislodge the very premise on which scientific knowledge rests.

Karl Popper can be considered as the originator of one such trend in Post-positivist philosophy of science. He sought to establish the impossibility of justification in scientific knowledge through and on the basis of his criticism of induction.

This thesis is a little effort to consolidate the fact that the justification of the truth of scientific theories is no trivial affair that can be tossed overboard without serious afterthought. An effort has been made to show that Popper's criticism of induction and his dismissal of justificationism from the realm of science, is without foundations.

Nadia Ali! It's for you.

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The other person who deserves a note of heartful appreciation is my one and only brother, Dr. Umar Murad. Without his taking charge of my pecuniary affairs, not only this thesis but my stay in the city of Windsor as a full-time student would have been practically impossible. And I am all the more grateful to him, because unlike the usual lot of benefactors he never asked for anything in return for his favours and, indeed, saved me from variety of embarrassments. That the gems of brotherly advice he bestow upon me from time to time and which is perhaps the prerogative of all elder brotherhood, always fall upon deaf ears, only adds to the irony of the situation.

I would like to thank Professor Baylis of the Physics Department, who read my thesis meticulously and gave some useful advice. And my heart goes out to the most respected Dr. R. C.

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"Listen not to me but to the logos" (Heraclitus)

INTRODUCTION

One of the central tasks of the philosophy of science had been to account for the process of the growth of scientific knowledge, to establish the validity of the knowledge acquired by different sciences and to provide an overall, rational explanation of the scientific enterprise as a whole. The search for a true scientific method through which scientific knowledge can be attained and established was also considered a necessary component of any philosophy of science. Kant's attempt to validate and establish the claims made by Newtonian science and Francis Bacon's discovery of the inductive method as the only true method of empirical sciences are two significant examples in this regard. Underlying both these philosophies lurked a common belief that science was essentially a realm of knowledge the validity of whose truth can be established. The problem was to give a explanation of a process whose inherent

rationality was accepted.

Notwithstanding the fact that it shares some common aspirations with the philosophies of the past, contemporary philosophy of science presents a different scenario. A radical change in the concepts of science and scientific knowledge has been introduced. The very beliefs whose truths were naively and uncritically presupposed by the earlier philosophies have been called into question. The notions that once ruled the investigations of scientific activities seem to have lost all their previous meaning and significance. The search for an explanation of scientific laws, of finding a criterion to test the validity of such laws, in short the search for a scientific method, is regarded as a mission impossible. The concepts of truth, validity, objectivity, certainty have all undergone a qualitative change and acquired new meanings. But most of all, the rationality of science, both in terms of the validity of its theories and its progress and development, has been severely challenged. The ideas of methodological anarchism (Feyerabend) and the pseudo-rational explanation of the progress of science have become fashionable trends in the contemporary philosophy of science.

Karl Popper is among those philosophers who jettisoned the traditional concept of scientific knowledge in a rather iconoclastic fashion. In fact, it would not amount to an exaggeration to regard him as the originator of the modern debate in the philosophy of science which subsequently resulted in the appearance of various trends differing in varying degrees in their

outlook on science, but albeit, concurring on one fundamental point: their antipathy to the essentials of the traditional outlook on science.

The feature which distinguishes Popper from his contemporaries (in his own eyes) is his unyielding commitment to rationalism. With the breakdown of the traditional view of science, philosophers had little reason to ascribe any rationality to scientific knowledge. Popper took issue with this growing nihilism about the possibility of any rational picture of the scientific enterprise. He claims that although it is no more possible to attach any certainty or absolute truthfulness to scientific theories, yet that does not preclude a rational interpretation of their scientific character.[1] Throwing the baby away with the bath water is not Popper's idea of rationality. With his theory of Critical Rationalism he claims to have provided science with a rational basis, a rationality of a different sort than the one presupposed by previous theories. The loss of meaning of one particular conception of rationality does not mean the loss of rationality as such. Rationalism in science can be maintained by relinquishing the false and limited ideal of rationality.

Popper believes that he has solved the notorious "Problem of Induction" which has baffled many a serious minded philosopher ever

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[1] The alleged collapse of Newtonian mechanics, whose truth for a long period of time was considered absolute and indubitable, was regarded by Popper, and later also by Lakatos, as the major blow to the traditional picture of science.

since Hume's formulation of it.[2] In the peculiar nature of his solution to the problem of induction lies his novel principle of rationality for scientific knowledge. Rationality is untenable only if it is equated with justification and verification. The search for true laws, true in the sense of being verifiable, the search for a scientific method that could establish the validity of scientific knowledge is, according to Popper, a futile search for a criterion that would lend rationality to justificationism. It should be dispensed with if science is to acquire a truly rational character. In its stead, he proposes his theory of falsification, furnishing science with a new criterion of rationality.

The fact that Popper throws the traditional criterion of rationality (where rationality is synonymous with justification) completely overboard, and puts forward a diametrically opposed criterion helps one to understand the importance of his solution to the problem of induction and its crucial meaning for the success of his criterion. They stand and fall together; only if his criticism of induction is justified (I beg Popper's forgiveness for my use of this word) his criterion of rationality can be considered to be satisfactory.

The question as to whether Popper has actually been able to provide science with a new criterion of rationality has utmost significance for the philosophy of science. His success would mean

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[2] Hume allegedly exposed the invalidity of the inductive mode of reasoning and on that basis concluded that all scientific knowledge is without a rationally justifiable foundation. The term "problem of induction", however, came from Kant, who attempted to solve the problem created by Hume's critique of induction.

a great breakthrough. It would prove, above all, the faultiness of the traditional picture of science, and the irrationality of the much in-vogue contemporary nihilism about the rational character of scientific knowledge. In that case, Popper would appear as a torch-bearer for the philosophy of science. But, on the other hand, if he fails to deliver the goods he promised, at least two consequences will follow. First, his contemporaries (such as, Kuhn and Feyerabend) may be right in their general orienation that science is not the kind of enterprise where one should look for rationality. Second, a thorough revision of the contemporary theories (including Popper's own theory) might be needed in order to see whether the belief in the non-rational character of science may be a result of misconceiving some important elements of what constitutes the philosophy of science (its logic, epistemology, methodology etc.).

This thesis seeks to establish the invalidity of Popper's argument against induction and justification in science.[3] It does so through reconstructing Hume's original argument against induction and through exposing the inconsistencies that are latent in Popper's position.

Popper maintains that science is rationally unjustifiable after Hume's logical criticism of induction. The fact this thesis

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[3]Popper argues that science is rationally unjustifiable as a result of the logical invalidity of inductive mode of reasoning, exposed by David Hume. For reference see "Realism and the Aim of Science", pp. 31-33. And also see "Conjectures and Refutations", pg. 42.

purports to establish is that Popper is not justified in his discarding of induction and justification after the "logical invalidity" of induction. The invalidity of Popper's argument is shown to be a result of his misconstrual of Hume's argument and of its unqualified importing into the structure of his own argument, without appreciating the implications of such a manoeuver within the context of his philosophical framework. That induction and science cannot be validly criticized for their logical invalidity within the structure of Popper's position is the outcome of this thesis.

If the argument presented in this thesis is valid, then it is not a mistake to equate the validity and rationality of science with its justification. Neither induction nor justification can be barred from science (as irrational) on the basis of Popper's criticism.

CHAPTER 1

HUME'S PROBLEM OF INDUCTION

Serious doubts concerning this or that aspect of the inductive mode of reasoning were raised by philosophers long before Hume. In their attack on the Epicurean philosophy, the Stoics objected to the "inherent insecurity of inductive reasoning", which was widely employed by the Epicureans in the construction and substantiation of their theories.[4] In the historical accounts of Sextus Empiricus, induction is described as a method based on insufficient grounding. Hume's position on "induction", which is termed by many "radical inductive scepticism", differs from preceding criticisms not only in the clarity of its expression and formulation but also in its substance. Earlier criticisms were directed against certain aspects of the procedures involved in inductive reasoning; even if their truth is conceded the method itself could still survive with slight modifications. Hume's critique, on the other hand, is more thoroughgoing as it attacks the core of induction. If its truth is granted the method would loose all its validity and justification. That explains why the problem of induction formulated by Hume emerges as one of the central problems of philosophy.

Surprisingly enough, Hume never used the word "induction" throughout the entire course of what is considered by Popper and by many others as his criticism of induction.

Before going on to explain Hume's views on induction, one

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[4]See, J. R. Milton, "Induction before Hume", pp.54-57.

thing must be made clear at the outset. The forthcoming explanation is by no stretch a comprehensive or even a detailed account of the problems related to the "problem of induction". It is, at best, an attempt to give a most general understanding of the nature of the problem which will facilitate the understanding of Popper's treatment of Hume's critique.

According to Hume, all our reasoning concerning (absent) matters of fact[5] involves a movement from observed to unobserved or from experienced to what is not experienced. If induction is considered as the mind's transition from particular cases of observation to hypotheses of unrestricted generality, it does take us beyond observation and experience: and it is in this sense Hume can be considered a critic of induction. The problem then arises: how can the bounds of experience possibly be transgressed in the attainment of knowledge about the world--the knowledge which must of necessity be based on experience of the world? Induction is based on experience and yet it to transcend experience. All universal hypotheses and empirical generalizations which constitute the main body of scientific knowledge suffer from this dilemma, on that account. In induction, the truth of a general hypothesis is inferred from singular observational instances. For example, upon observing a considerable number of instances of fire producing heat, we arrive at the general proposition that "fire produces

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[5] Hume does not use the word 'absent'. But as suggested by P. J. R. Millican, he sometimes speaks simply of "matters of fact" but he clearly means to refer to those that are absent from senses and memory. (See, P. J. R. Millican, "Hume's argument concerning induction.")

heat". In a similar fashion a considerable number of observations of white swans lead to the generalization that "all swans are white". Not only scientific knowledge but all our knowledge about "matters of fact and real existence" can be seen as following this pattern of inference.

Hume is usually interpreted as contending that universal propositions arrived at in this manner can never be justified by any kind of reasoning whatsoever. They are rationally unjustifiable. There is a gap between the truth of particular observations and the general hypothesis that needs to be explained. It is evident that no number of singular observational statements can entail the truth of a universal statement, as it would involve a transition from observed to unobserved, making it rationally unjustifiable. According to the principle of empiricism on which all scientific knowledge is supposedly based, all our claims about the world must be based on experience. Hence, when we see heat accompanied by fire on a number of occasions we can only be justified if our claims are restricted to those particular occasions of which we have had experience. Any claims made about the possibility of a similar occurrence in the future goes beyond our observation and is rationally unjustifiable. It would amount to flouting the rules of experience. But, nevertheless, we do make such claims and in fact the whole corpus of scientific knowledge consists of such claims. For Hume the question is what makes for the possibility of making such claims and believing in their truthfulness. In other words, how does the transition from observed

to unobserved or in a certain sense, from particular to universal become possible?

Hume tells us that it is the relation of cause and effect that takes us beyond our senses and memory and assures us of the absent matters of fact.[6] The relation of cause and effect explains why the idea of one (observed) thing lead to the idea of another (unobserved) thing. What makes us believe in the truth of the general proposition that fire is always accompanied by heat is because we consider the former as the cause of the latter. But this does not provide a solution to the problem of induction. The relation of cause and effect is itself based on experience. It is only through constant observation of one thing followed by another in the course of our experience that we come to consider one as the cause of the other. There is nothing in the nature of a thing that could possibly suggest or lead to the idea of another thing. Thus, the relation of cause and effect cannot be known by reasoning or any process of understanding. Experience is our sole guide in the discovery of this relation. And even after the discovery of this relation through experience, we can not base our conclusions regarding it on any form of reasoning or act of understanding.

> Even after we have experience of the operation of cause and effect, our conclusions from that experience are not founded on any process of reasoning or understanding. [7]

After making it clear that our conclusions from the

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[6] See "An Enquiry Concerning Human Understanding", pg.26.

[7] Ibid., pg.32.

experience of cause and effect are not based on reasoning, Hume tells us that these are based upon the supposition that future will be like the past; they proceed upon the principle of uniformity of nature. But this principle also falls short of solving the riddle of induction as it shares the basic flaw of all inductive reasoning. Through the exercise of reason we can never establish or justify its truth which basically is that all unobserved instances of a certain kind will resemble the observed ones. It is evident that the only reason to believe in it is our past experience of the world and the order we have observed in it. But obviously that does not warrant any claim about any kind of future orderliness or uniformity in the course of nature.

After exploring all these avenues that could possibly lead to the solution of the problem posed by inductive reasoning and after exposing the difficulties involved in providing a rationalist solution to the problem, Hume puts forward his own answer:

> In all reasoning from experience, there is a step taken by the mind which is not supported by any argument or process of understanding; there is no danger that these reasonings on which almost all knowledge depends will ever be affected by such a discovery. If the mind be not engaged by argument to make this step, it must be induced by some principle of equal weight and authority.[8]

That principle upon which all our conclusions from experience are ultimately based is custom or habit. In the absence of any rationally justifiable principle which can serve as the foundation of all our knowledge, we are led to believe that all our inferences

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[8] Ibid., pg.41.

from experience are effects of custom.

> For wherever the repetition of any particular act or operation produces a propensity to renew the same act or operation, without being impelled by any process of reasoning or understanding, we always say, that this propensity is the effect of custom.[9]

Thus, for instance, when we observe fire accompanying heat on scores of occasions, we are led by the force of habit to believe that "fire produces heat"-- in the fact that wherever there is fire there is bound to be heat. Hence, we form a customary conjunction between objects-- a conjunction which is unexplainable otherwise. All inductive reasoning betrays this kind of customary conjunction forming between objects which makes possible the movement from observed to unobserved.

The upshot of Hume's argument is that induction is not a valid method of obtaining scientific knowledge and so science is without a rationally justifiable foundation. However, it is rather absurd to discard science on that account. It can be maintained by giving up the search for a rationalist base for the authentication of scientific hypotheses. Although we have no rational justification to hold our theories, it does not stop us from believing in their truth. Thus, science appears to be a matter of belief rather than something capable of proof and validation by rational argument.

It is important here to understand Hume's argument as it has an ultimate bearing on Popper's solution to the problem of induction. Popper's position takes shape as a response to the

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[9] Ibid., pg.43.

problems created by Hume's treatment of induction. In the following pages we will see how Popper rejected what he considered wrong in Hume.

CHAPTER 2

POPPER'S SOLUTION TO THE PROBLEM OF INDUCTION

Popper was not the first to propose a solution to the problem of induction. Numerous attempts had been made to that end in the past.[10] His solution, however, stands apart among all the others in terms of its novelty of approach. It is a break from a certain tradition in which all the other efforts to solve the problem have been made. The radicalness of its approach amounted to a fresh vantage point from which to look at a problem which appeared insoluble from within the theoretical confines of a certain framework.[11]

According to Popper, all endeavours made toward a solution to the problem raised by Hume's critique of induction betray one common feature: they all presuppose justificationism as the only possible context in which that issue could be resolved. Justificationism is the belief that scientific knowledge can be justified by rational means or that the truth of scientific theories can be proved or verified through scientific method. Popper vehemently opposes this line of thinking. It is of no surprise to him that in spite of the expenditure of so much

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[10] Among some of the important names who grappled with the problem of induction are Bertrand Russell, C. D. Broad, Rudolf Carnap, Hans Reichenbach, and J. M. Keynes (The Bayesian Approach).

[11] Popper cites C. D. Broad, whose famous characterization of the problem of induction as the "dead skeleton in the cupboard of philosophy", was an expression of the exasperation of many others, including himself.

intellectual energy on it, the problem of induction resolutely maintains its insolubility. It is, in fact, insoluble from a certain position. The logical outcome of Hume's critique which, according to Popper, Hume himself failed to realize, is to give up that position (that induction is the only way of arriving at theories) and look for a solution in a different direction. All attempts to seek a solution within the context of justificationism are doomed to failure: this, Popper believes to be the gist and central implication of Hume's argument against induction.

The idea of the indispensability of justificationism for the rationality of scientific knowledge resulted in numerous attempts to save induction at all costs. Popper contradicts the popular notion that scientific knowledge is only possible through a substantiation of induction. Science can survive without induction and justificationism, he believes. The philosophy of science should boldly and gladly accept the implications of Hume's criticism and seek to provide science with a new criterion of rationality.[12] And this is precisely what Popper believes he is doing.

Popper concurs with Hume on the invalidity of inductive inference but he is unwilling to extend that invalidity to scientific knowledge, for that would deprive science of its rational character. Hume saw a contradiction between the principle

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[12] Popper believes that induction is the only way to prove the truth of scientific theories. Hence, if induction is invalid, science cannot be justified through any other means. But he maintains that science can still be valid and rational. The confusion only appears if we consider any attempt to secure a rational foundation for science as another way of justifying it: Popper contradicts this line of thinking.

of empiricism and the principle of induction. Popper defines the principle of empiricism as the rule that "our adoption and rejection of theories should depend upon the results of experience and observation". And the principle of induction is the belief that a valid movement from singular observation statements to universal laws of nature is possible.[13] Hence Hume embraced the contradiction without resolving it and at the expense of the rationality of science, Popper says. Hume realized the logical invalidity of induction yet he clung to it as the only source of knowledge pertaining to matters of fact and real existence. Hence, he put a stamp of irrationality and invalidity on the whole corpus of scientific knowledge. Popper, notwithstanding his agreement with Hume on the question of the invalidity of inductive inference, disapproves of the latter's ascription of irrationality to science. He proposes that by embracing the principle of empiricism and giving up induction, the rationality of science can be upheld.

Before Popper, the rationality of science was considered to be synonymous with its justification. According to this line of thinking, if science is not verifiable then it is not rational. Popper says that rationality of science must not be equated with justificationism. Hence science is not justifiable and can yet be rational. Popper is presenting a new criterion of rationality which can dispense with justificationism. Thus, presenting a new criterion of rationality is not inconsistent with upholding the

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[13] For a reference, see "Realism and the Aim of Science", pp.31-34.

rationality of science. The inconsistency only arises if we take rationality to be defined in terms of verificationism.

Popper contends that scientific knowledge does not depend on induction either for its conception or for its validation. Induction is a myth which has no role to play in the acquisition and validation of scientific knowledge. And that is why its invalidity does not and should not affect the rationality of science-- and of course the latter must not be equated with the rationality of justificationism.

> I believe that the allegation that we do in fact do proceed by induction is a sheer myth, and that the alleged evidence in favour of this alleged fact is partly non-existent, and partly obtained by misinterpreting the facts.[14]

The idea that we learn by repetition of observation is wrong, says Popper. We can never learn anything new or arrive at any new idea or theory by observing one thing followed by another-- no matter how many times we see it happening. That type of mechanical repetition can only fix something in our memory that has already been acquired-- any idea, theory or know-how to master a practical skill (Popper cites the examples of learning to play piano and riding bicycle in this regard). Learning, according to Popper, is a process which involves the method of trial and error-- we arrive at new ideas, conceptions, theories by modifying our already existing expectations and beliefs.[15] Here, Popper speaks of "inborn expectations" which guide our pursuit of knowledge.

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[14] See "Realism and the Aim of Science", pg.36.

[15] Ibid., For a detailed account see pp. 39-50.

> Thus, we are born with expectations; with "knowledge" which, although not valid a priori, is psychologically or genetically a priori, i.e prior to all observational experience.[16]

Thus, we never make a transition from observation to theory, as is commonly believed to be the case. Our theories do not originate in observation. This will be the clue to Popper's explaining the redundance of any method of induction as a necessary requisite for the possibility of scientific knowledge.

> The idea of induction by repetition must be due to an error-- a kind of optical illusion. In brief there is no such thing as induction by repetition.[17]
>
> Induction-- the formation of belief by repetition-- is a myth.[18]
>
> . . .the belief that we can start from pure observation alone, without anything in the nature of a theory, is absurd.[19]

In Hume's argument against induction Popper distinguishes between its logical and psychological aspects.[20] Hume's criticism of the logic of induction leaves us with no reason to believe that singular observations can ever entail the truth of a generalization nor can we believe in the principle of the uniformity of nature i.e. a belief in the regularities based on our

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[16] See "Conjectures and Refutations", pg. 47.

[17] See "Objective Knowledge", pp. 6-7.

[18] Ibid., pg. 23.

[19] See "Conjectures and Refutations", pg. 46.

[20] For a detailed discussion see "The Logic of Scientific Discovery", pp.30-32. Also see "Objective Knowledge", pg. 6 and "Conjectures and Refutations", pp. 44-45.

uniform past experience. But yet, as Hume informs us, we do believe in the truth of such generalizations and regularities.

The conclusion drawn by Hume was that although we have no rational means to justify inductive inferences, we can not discard them as all our knowledge about the world is based on them--induction must be regarded as self-authenticating, existing in its own right and being its own justification. As Popper explains:

> Hume thought that induction is rationally unjustifiable, but that it has its own kind of justification: it justifies itself in practice through its high degree of reliability in which we cannot but believe, though only irrationally.[21]

Popper, on the other hand, is of the opinion that there is no need to retain an irrational belief in induction even as a practical justification for scientific knowledge. The belief in the regularities in nature is not based on induction. It is a metaphysical belief which is psychologically prior to all observation.

> One of the most important of these expectations is the expectation to find a regularity. It is connected with an inborn propensity to look out for regularities, or with a need to find regularities.[22]

> Without waiting passively for repetitions 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.[23]

The belief in the regularities is not only psychologically but

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[21] See "Realism and the Aim of Science", pg. 52.

[22] See "Conjectures and Refutations", pg. 47.

[23] Ibid., pg. 46.

also logically prior to all observation, says Popper. Thus, what is true for logic is also true for psychology. In this manner Popper attempts to resolve what Hume found problematic. For Popper induction is not only rationally indefensible, it is also not the method through which knowledge is actually acquired. And that he establishes by making our belief in regularities prior to our . observation of them.

> For the expectation of finding regularity is not only psychologically a priori, but also logically a priori: it is logically prior to all observational experience, for it is prior to any recognition similarities.... and all observation involves the recognition of similarities(or dissimilarities).[24]

> This led me first to the conclusion that expectations may arise without, or before any repetition; and later to a logical analysis which showed that they could not arise otherwise because repetitions presupposes similarity, and similarity presupposes a point of view-- a theory, or an expectation. Thus I decided that Hume's inductive theory of the formation of beliefs could not possibly be true, for logical reasons. This led me to see that logical considerations may be transferred to psychological considerations.[25]

Popper further informs us that this solution of what he calls the psychological problem of induction(of how theories are arrived at) does not have a bearing on the validity of scientific knowledge. That is, even if we take our belief in the regularities

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[24] see "Conjectures and Refutations", pg. 48.

[25] See "Objective Knowledge", Pg. 24. I find this puzzling in light of Popper's statements about the strict demarcation of logical from psychological matters.

to be true, Hume's argument against induction would still be valid- - that is, even if it is true that fire produces heat, we can never establish this belief and will have no reasons to believe that it will continue to do so in the future-- that this regularity would cease to exist is always a future possibility.

Elaborating further on the question of validity of scientific knowledge, Popper comments that any link between induction and the validity of science can only be a result of not distinguishing psychological problems from the logical ones. He stresses the need to distinguish between the questions of fact and questions of validity.

> And yet it seems that there are few philosophers left who insist that we must distinguish between questions of fact and questions of validity (such as whether we have any reason to rely on induction) or use "inductive procedures or whether a theory actually originated by way of induction.[26]

From the standpoint of their validity, the origin of theories is irrelevant. How we arrive at scientific theories is something to be studied by psychology, as it involves psychological processes. At the stage of the conception of theories, it is absurd to talk of their validity or invalidity, says Popper. That aspect of theories comes into question only when they are put forward for testing: only then can we know-- through critical discussion and in the light of experience-- whether a given theory is valid or not. But prior to that, the question of validity of theories does not arise.

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[26] See, "Realism and the Aim of Science", pg. 36. (Also see "The Logic Of Scientific Discovery", for a similar point.)

Thus, the outcome of Popper's treatment of the problem of induction as it emerges in Hume can be summed up in the following four points. 1. Scientific knowledge can never be justified owing to the invalidity of induction (what Popper calls the logical belief). 2. Yet scientific knowledge does have a claim to validity and rationality. 3. Science is not based on induction (what Popper calls the psychological belief). 4. The invalidity of induction does not strip science of its rational character.

In the next chapter we are going to raise some objections against Popper's solution to the problem of induction. Through exposing inconsistencies and tensions in his position, it will be shown that the presence of these latter can only be meaningfully understood and explained if it is presumed that Popper's use of the term 'induction' carries at least two distinct senses or layers of meaning (which are distinct not necessarily in their own right but in the different functions these perform in Popper's position) and that their meaning and role in the structure of his argument is not duly recognized and appreciated by Popper himself.

CHAPTER 3

SOME OBJECTIONS TO POPPER'S SOLUTION TO THE PROBLEM OF INDUCTION.

In this chapter, I will present some objections to Popper's treatment of induction. I think that there are at least two distinct senses of "induction" that emerge from and are inherent in Popper's treatment of Hume. Popper does not consciously distinguish between the two and hence uses them univocally while his whole criticism is based on and gets its meaning in the context where the two senses appear conflated. This leads to some basic inconsistencies in his position which do not appear on the surface and demand a penetration into the core of his position.

The first sense of "induction" that emerges from Popper's account is of a method which allows for the inference of general propositions, ideas, theories from a series of singular observational statements[27]. Popper writes:

> It is usual to call an inference "inductive" if it passes from singular statements (sometimes also called "particular" statements), such as accounts of the results of observations or experiments, to universal statements, such as hypotheses or theories.[28]

Here, the invalidity of induction means the impossibility to draw such an inference. That is, on the basis of observational

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[27] I shall symbolize this sense of "induction": "induction$_{\alpha}$"--"ot" meaning from observation to theory.

[28] See "The Logic of Scientific Discovery.", pp. 27-28.

instances, statements of unrestricted generality cannot be validly inferred because such inferences necessarily involve a violation of the principle of empiricism upon which scientific knowledge--and any principle or method leading to it--must be based.

> There can be no valid reasoning from singular observation statements to universal laws of nature, and thus to scientific theories. This is the principle of the invalidity of induction.[29]

> ....now 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 turn out to be false: no matter how many instances of white swans we may have observed, this does not justify the conclusion that all swans are white. The question whether inductive inferences are justified, or under what conditions, is known as the problem of induction.[30]

The solution to the problem of induction in this sense lies in finding a valid principle of induction.

> If a "principle of induction", permitting us to derive universal laws from singular statements, could be found, and its claim to truth be defended, then the problem of induction would be regarded as solved.[31]

The second sense of "induction", which is closely associated with the first but is distinct from it, is of a possibility to predict the future course of events on the basis of past

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[29] See "Realism and the Aim of Science", pg. 32.

[30] See "The Logic of Scientific Discovery.", pp. 27-28.

[31] See "Objective Knowledge", pp. 8-9.

experience.[32] Here the invalidity of induction implies the impossibility to make the claim that future will be like the past. No amount of uniform past experience shall ever permit us to make a valid claim about future events. In the following passage Popper can be seen as formulating the second sense in a context where the two senses appear conflated.

Popper writes of Hume:

> He tried to show that any inductive inference-- any reasoning from singular and observable cases (and their repeated occurrence to anything like regularities or laws[what I call induction$_{\alpha}$] -- must be invalid. Any such inference, could not be approximately or partially valid. It could not even be a probable inference: it must, rather, be completely baseless, and must always remain so, however great the number of observed instances might be. Thus he tried to show that we can not validly reason from the known to the unknown, or from what has been experienced to what has not been experienced(and thus, for example, from the past to the future)[which I call induction$_{pf}$] : no matter how often the sun has been observed regularly to rise and set, even the greatest number of observed instances does not constitute what I have called the reason for the regularity, or the law, of the sun's rising and setting. Thus it can neither establish this law or make it probable.[33]

In the following passage Popper can be seen criticizing the validity of inductive reasoning in the second sense.

> One might even say that to judge from past experience, and from our general scientific

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[32] I shall symbolize this sense of "induction": "induction$_{pf}$"-- 'pf'meaning from past to future.

[33] See "Realism and the Aim of Science", pg. 31.

> knowledge, the future will not be like the past, in perhaps most of the ways which those have in mind who say that it will. Water will sometimes not quench our thirst, and air will choke those who breathe it. An apparent way of saying that the future will be like the past in the sense that the laws of nature will not change, but this is begging the question. We speak of a law of nature only if we think that we have before us a regularity which does not change; and if we find that it changes then we shall not continue to call it a "law of nature."[34]

A similar sense can be seen emerging out of this passage:

> ....that in spite of the rationality of choosing the best-tested theory as a basis of action, this choice is not "rational" in the sense that it is based upon good reasons that it will be in practice be a successful choice: there can be no good reasons in this sense, and this is precisely Hume's result. ... On the contrary, even if our physical theories should be true, it is perfectly possible that the world as we know it, with all its pragmatically relevant regularities, may completely disintegrate in the next second. This should be obvious to anybody today; but I said so before Hiroshima: there are infinitely many possibilities of local, partial, or total disaster... All this would hold even if we could be certain that our physical and biological theories were true. But we do not know it. On the contrary, we have reason to suspect even the best of them; and this adds, of course, further infinities to the infinite possibilities of disaster.[35]

A movement from past to future just like the movement from repetition of observation to theory involves a transition from observed to unobserved--which is a violation of the principle of experience on which indu

ction is supposedly based. At first sight, both the senses appear

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[34] See "Conjectures and Refutations", pp. 56-57.

[35] See "Objective Knowledge", pp. 22-23.

other. They both apparently share the common ground for which induction is criticized for its invalidity by Popper, i.e., a violation of the principle of experience. But this similarity, although significant because it forms the connection between the two senses, conceals more than it reveals. It conceals the crucial difference (lying at the core) between the two senses in which induction is criticized for its invalidity in Popper's argument. Without any further ado and without creating unnecessary mystery about the matter, let's turn to Popper and locate the source of the difficulty.

Popper asserts that induction is an invalid mode of reasoning and concludes that all scientific knowledge is unjustifiable or non-verifiable. Here, the impression one gets is clearly that the invalidity of induction, i.e., the impossibility of reasoning validly from observation to theory, renders scientific knowledge unjustified--so the unjustifiability of science stems from the invalidity of induction$_{\alpha}$. Popper suggests a cure for science's alleged invalidity of induction--discard justificationism. For Popper, the invalidity of induction is a proof that science can never be justified.

My point is that if we take induction$_{\alpha}$ then, according to the implications of Popper's position, the invalidity of induction cannot refute or lead to the dismissal of justificationism.

Popper claims that science is not based on induction-- that scientific theories do not originate in observation. But then he goes on to say that this fact about the origin of theories is not

relevant from the point of view of their validity. On the basis of the origin of theories the question of their validity cannot be settled. But is not induction$_{\alpha}$ a method that explains the conception or formation of scientific theories-- that theories originate or are inferred from observation? To expose the invalidity of such an inference pertains only to the question of their origin. The fact that we can't validly go from observation to theory merely says that the origin of the latter in the former can never be proved. But this, according to Popper, must not have a bearing on the validity of a theory. The question then arises how on the basis of the impossibility of reasoning from observation to theory can induction be invalidated?

The point we have established so far must stand clear. In Popper's argument, what invalidates induction and makes all scientific knowledge non-verifiable cannot be the impossibility of going from observation to theory, but something else. Why? Because the invalidity of scientific knowledge must not be determined by a line of reasoning that pertains to psychology only.

Thus, the (alleged) fact that induction$_{\alpha}$ is invalid cannot be a ground to discard justificationism. The invalidity of induction$_{\alpha}$ must not have a bearing on the question of validity, verifiability, and rationality of scientific knowledge. But when Popper dismisses justificationism on that basis, he has confused the two senses of induction. He attempts to show that it is the impossibility of justifying induction$_{\alpha}$ that renders justificationism untenable, but what actually comes out of his argument is that the possible cause

of the discardment of the latter lies somewhere else; it lies in the invalidity of induction$_{\beta}$.

It is to be noted that Hume never uses the words "induction" or "scientific theory", in his criticism of induction and he does not speak of any inference of universal hypotheses from singular observations. All that is Popper's recreation of Hume's argument. Popper unabashedly treats Hume's argument as carrying the sense of induction$_{\alpha}$. He writes:

> . . . To this end I replace Hume's "instances of which we have experience" by test statements--that is, singular statements describing observable events ("observation statements", or basic statements); and "instances of which we have no experience" by "explanatory universal theories".[36]

I think that the invalidity of induction$_{\beta}$(which Popper fails to consciously distinguish from induction$_{\alpha}$) is not an argument against induction as a method of reasoning (where induction means a movement from repetition of observations to theory) as such. It is an argument against the possibility of making valid claims (whether scientific of extra-scientific) about "matters of fact and real existence", beyond the point of perceptual experience. It is in this sense that Hume considers every claim about unobserved matters of fact (whether singular or universal) rationally unjustifiable. When Popper says that even if our belief in regularities is true it would still be unjustified (as Hume's argument would still hold), he bases his claim on this sense of Hume's argument but confusedly understands it to be an argument

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[36] Ibid., pg. 7.

against inductive method. According to the Humean line of reasoning, any piece of information about the world is not justified (beyond the point of its perceptual experience) not because of the invalidity of any particular method of reasoning which allows for the obtaining of conclusions that move from singular to universal but because of the fact that it would amount to making a claim about the future-- a future, which can always be conceived, "without involving a self-contradiction" to turn out differently from the past and the present. When Popper argues that we cannot validly hold a claim about the future continuation of regularities in nature--even if we know them to be true, it is this Humean line of reasoning which makes his claim sensible. And it is only on this account that science as a body of statements about the world can be considered unjustifiable. But if science is unjustifiable knowledge, the invalidity of inductive inference can not be the reason, according to the implications of Popper's position.

Thus, Popper's position is based on a confusion between two senses of induction; but because of their indistinguishability in his eyes they amount to a similar objection against the justification of scientific knowledge--which is a major inconsistency in his position.

The conclusions that can be drawn from Popper's argument and which logically follow from his position are ones he would not be willing to concede. In sum, his position entails that a criticism

of induction$_{\alpha}$ cannot dispose of justificationism. And that a criticism of induction$_{\alpha}$--which apparently leaves no room for justificationism--is not solely a criticism of the invalidity of induction as a method of obtaining knowledge-- it is applicable to any statement made about a world, which at any next moment can possibly contradict anything said about it by changing in unpredictable and previously inconceivable ways.

At this point in the discussion, it is worthwhile to have a little excursion into the concept of justification as it pertains to induction and scientific knowledge.

CHAPTER 4

TWO SENSES OF INDUCTION AND THE UNDERLYING SENSES OF JUSTIFICATION

The justification of the claim that regularities exist in nature is different from the claim that they will always exist in the future. The first claim would be possible if induction$_{\alpha}$ were valid in the first sense, according to the implications of Popper's argument. The second claim presupposes a different sense of justification for its validity that is both abstract and absolute in its character, and which is distinct from the sense of justification that underlies induction$_{\alpha}$. This will be shown in this chapter and in the one following it. The purpose of the forthcoming explanation is primarily to bring to the fore the sense of justification in Popper which is distinct from the sense of justification underlying induction$_{\alpha}$. A detailed exposition of the nature of the first sense of justification is not given on that account.

The argument against making a generalization like "fire produces heat" is that any number of observations of heat accompanying fire do not allow an extension of experience beyond those particular observations where heat was seen accompanied by fire. Only finite instances of such an operation of cause and effect can be observed--and one is allowed only to speak of them.

Thus, even on the basis of uniform past experience extending over centuries, a belief in the generalization"fire produces heat" cannot be reasonably held--not necessarily because of the possibility that in the future fire might produce water--but because of the fact that there are infinite possibilities of such instances of observation and our actual observations would always be finite. Hence, if at this moment I am witnessing an instance of heat accompanying fire, I cannot validly claim that fire produces heat, not because it is conceivable that it may produce snowballs but because that generalization supposes the exhaustion of all possible instances of observation (according to the principle of empiricism) of fire accompanying heat at the time when I made this claim.

The same is also true for our past experience. When we say that in the past fire produced heat we could only refer to the actual observations of such an event--which might have been observed a trillion times. But still that would not make the general claim valid as it presupposes infinite observational instances. To say that five trillion times heat was seen accompanied by fire does not validate the claim that fire in the past fire produced heat.

An example from one of the natural sciences would make the point clearer still. Chemistry is one of those sciences which is commonly thought of as relying on induction for obtaining knowledge. Take the example of a simple and one of the most common chemical reactions. We hear that when one molecule of hydrogen

combines with one molecule of chlorine, it yields two molecules hydrogen chloride. On the basis of a number of experiments (in some cases only one experiment proves to be sufficient) the chemical scientist pronounces the result of the experiment, generalizing it in the form of a chemical equation. Now, according to the argument that invalidates induction$_{\alpha}$, the generalization is unjustified. The point to be understood is that the invalidity (in the first sense) of the result of the equation does not stem from the future possibility of an experiment where the similar reaction might yield sulfur nitrate. It issues from the unrestricted generality of the conclusion which goes well beyond the bounds of actual experimentation (again, according to the principle of empiricism). According to the logic of the invalidity of induction, a valid claim cannot be made unless every bit of hydrogen present in the universe is reacted with every bit of existent chlorine. Hence, it is the infinity of the task which renders induction$_{\alpha}$ invalid and justification in that sense untenable.

The second claim that "regularities will always exist in the future" would not be justifiable even if induction were valid as a method of inference. Here, justificationism is untenable for a different reason. Whereas, in the first instance, justification was impossible because of the impossibility of establishing the belief in the existence of regularities in nature, in this case it is the impossibility of continuing to believe in the existence of regularities, even if the truth of the belief in the existence of regularities be granted.

As explained earlier, this is an argument against making any valid claims about a world that can always change unexpectedly. Any claim made about this world is valid only as long as the content of the claim is available to direct perception. As soon as it ceases to be the object of direct perception in any given point in time, it becomes a victim of Hume's argument and loses its validity.

An elaboration of this point through a famous example might prove helpful in understanding the distinction between the two senses of justification in question. It is claimed by the critics of the inductive method of reasoning that on the basis of multiple observations of black crows, one cannot jump to the conclusion that all crows are black. Now, in the first sense of justification and of induction the generalization is unjustified because it presupposes an observational experience of all crows. But in the second sense, and this is important, one does not get to the point of generalization; as the blackness of the crows observed cannot be settled beyond the point of their immediate and direct perception. Thus, when I move from the first crow to make an observational claim about the second, after establishing the blackness of the former through observation, my first claim has lost its validity in the meantime. So I cannot continue to claim that the first crow is still black. According to Hume's logic, we have no reason not to believe that the first observed crow during the course of its non-observation might have turned into a blue creature. Thus, one can only make valid claims about what one is perceiving at the very moment, and if the perception is not revived after the moment is

over, all claims made during that time period are invalid for all present and future moments. So claims which are justifiable are extremely limited. They are about the present objects of perception only.

It is important to understand that from both the positions the future prediction of a black crow is unjustified--but for different reasons. From the first position because we are only entitled to make claims about things that have actually fallen under our observations-- no matter whether things (both observed and unobserved) are conceived to be in a condition of eternal change(or to put it more correctly, as having the potential to change in infinitely unpredictable ways) or are considered as eternally the same. And from the second position because we cannot go beyond what we see as there is always a possibility of change hitherto unknown.

Both the positions share the same principle of empiricism in common: their difference lies in the corresponding ideals of reasoning they presuppose. In the first case, that ideal is abstract-- in the second, it is abstract but also necessarily absolute. A clarification of this point through a further discussion of Hume and Popper will pave the way to an understanding of the basis of inconsistencies in the latter's position. But before that, let's grapple a little more with the interpenetration of the two senses of induction and the two senses of justification in Popper's argument.

1. Induction$_\alpha$ and its relation to the first sense of justification: As said earlier in the exposition, if it were

possible to reason validly from observation to theory, the justification of the claim that regularities exist in nature would be possible. What contradicts this possibility is the principle of empiricism which does not allow the inference of unrestricted generalizations from howsoever many observational instances.

2. Induction$_e$ and its relation to the second sense of justification: Even if induction in the first sense were possible according to the first sense of justification, the difficulty posed by the second sense of justification would still stand in the way of making a valid claim about the future existence of regularities. That is why, from this position it is a matter of indifference whether regularities exist in nature or not; because even if they do exist, it cannot be maintained that they will continue to do so. This insouciance towards the existence of regularities in nature is to be noted--its meaning and actual function in Popper's argument will be revealed shortly. Thus, even if induction is justified in the first sense, it would still be unjustified according to this (second) sense.

3. Induction$_{pf}$ and its relationship to the two senses of justification: Induction$_{pf}$ can be valid if it establishes its validity according to the second criterion of justification--through establishing that regularities will always exist in the future. What can be gleaned from Popper's argument is that it requires an entirely different sort of reasoning (to establish that belief) than the one which would establish the claim that regularities exist in nature-- that is the why it appears

irrelevant from the standpoint of seeking a justification of the second kind whether the justification of the claim "regularities exist in nature", is possible or not. Again this is something to be taken into account--its full meaning will be revealed with the unfolding of our argument.

It has been shown earlier that induction$_{\alpha}$ does not exist for Hume, at least not in the context where he questions the validity of the statements made about matters of fact and real existence, and in Popper, the two senses are so conflated that the second one, while distinct from the first, has an ultimate bearing on the latter.

At this juncture, a fuller understanding of Hume's argument against inductive reasoning becomes inevitable if we wish to resolve the tensions in Popper. And that is what we intend to do in the next few pages.

CHAPTER 5

HUME'S POSITION ON REASONING CONCERNING MATTERS OF FACT AND REAL EXISTENCE

In his A Treatise of Human Nature, Hume asserts that, "we have no reason to believe that those instances which have fallen under our observation will resemble those of which we have had no experience."[37] This can be taken to mean that our belief in regularities cannot be extended beyond our observation of them, by any stretch of reasoning, whatsoever. In this formulation it appears Hume is simply stating that although we can hold a rational belief in the existence of regularities we perceive, we cannot reasonably extend that belief to include any possible existence of such regularities in the future.

If that were the structure and underlying sense of Hume's argument, we would not be able to meaningfully criticize Popper for his conflation of the two senses of induction and the underlying senses of justification--and for the misjudging of their functional-operative role in the build-up and execution of his argument. But Hume's argument, in its most essential sense, is not what it appears to be--certainly not what it appears to be in Popper's formulation of it.

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[37]See "A Treatise of Human Nature", pg. 104.

Popper's formulation of Hume's argument about induction$_{\mu}$ gives the appearance that the latter is solely directed against the possibility of holding a rational belief in the future existence of regularities, and is impervious in its main argumentative thrust to the past and present existence of regularities: this can be gleaned from Popper's arguing that even if our belief in regularities is true, Hume's argument would still hold. But it is our contention that Hume's argument is essentially directed against the possibility of holding a rational belief in the existence of regularitiesas such--and also in their future continuance. The deception of Hume's arguments lies in apparently avoiding and escaping what it actually attacks and negates. It negates the possibility of a rational belief in regularities. However, it does that through an apparent negation of the possibility of holding a rational belief in the future existence of regularities (which it actually does in Popper's argument). If we take Hume's argument at face value, then what logically follows from his argument against regularities (against induction$_{\mu}$) is only the invalidity of the belief in the future existence of regularities and not the invalidity of the belief in their existence as such. But in both Hume's argument and in Popper's formulation, it appears to negate the belief in the existence of regularities, besides the belief in their future existence. This tension can be resolved by not taking the argument on its face value and looking instead for a deeper reading.

It is our contention that in the actual structure of Hume's

argument, the impossibility of establishing belief in the future existence of regularities issues from the impossibility of establishing belief in the existence of regularities.

Two principles are at work in Hume's position (in both his Treatise and the Enquiry): the principle of empiricism (or pure empiricism) and the principle of abstract reasoning with its absolute criterion of justification. Any claim about absent matters of fact is rationally indefensible, according to Hume's position. Why? Because the content of any such claim cannot be perceived through the senses (hence a violation of the principle of empiricism) and the opposite of any such claim is possibly conceivable or conceivably possible, without involving a self-contradiction (abstract reasoning).

In his Enquiry, Hume distinguishes between two kinds of statements: one dealing with the relations of ideas that are discoverable through a pure exercise of reason (in this category falls the sciences of mathematics and geometry). The other dealing with matters of fact and real existence (which includes all the statements made about the world) that are perception-based and whose truth cannot be discoverable by a priori reasoning and whose denial is possible without self-contradiction.[38]

In Hume, the principle of empiricism goes hand in hand with abstract reasoning; they both complement and rest on each other. If we analyze his argument, this is the first impression we get: we can reasonably talk only about what we actually observe. What we

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[38] See "An Enquiry Concerning Human Understanding", pg. 25.

observe is a 'B' following an 'A'. We cannot reasonably maintain that 'B' follows 'A'(a certain regularity) beyond our perceptions of those instances where we have actually observed 'B' following 'A'. The reason we cannot go beyond our particular instances of observations to assert that B always follows A is that 'B' is conceivable as not following 'A' in all those instances which have not yet fallen under our observation, without involving self-contradiction. Here the link between pure empiricism and abstract reasoning is important to grasp: the former is not negating the possibility of making valid claims about absent matters of fact on its own(it is not saying that such claims are not rational as their denial is " perceivable" without self-contradiction). It is doing it in collaboration with the latter.

Thus, in Hume, the only way we can reasonably assert that 'B' always follows 'A' is if we could satisfy the demands of the abstract mode of reasoning--and this can only be done by establishing such a link between A and B which will guarantee that 'B' will always follow 'A' in all those as yet non-observed instances. But, alas, the mind is unable to form such an absolutely necessary link between any A and B that pertains to matters of fact and real existence. Here it can be seen why we are justified in our description of Hume's criterion of reasoning as absolute, in addition to being abstract (the issue of its abstractness will get further attention in the chapter following the next one). The kind of link which can establish that 'B' will always follow 'A' is the sort which exists between the components of a mathematical equation

of the type 2+2=4--a relation that can be established with absolute certainty by a pure exercise of reason. That no such link exists in the case of matters of fact is what comes out of Hume's argument.

Hence, we can only reasonably go beyond what we experience to assert that 'B' always follows 'A' and that 'B' will always follow 'A', if we can establish an absolutely necessary mental link between A and B--and because we cannot, on the basis of reason, establish such a link, we cannot, on the basis of reason assert either that B always follows A or that B will always follow A.

It needs a little more probing to set things right in Hume--that is, to see his argument in its true light and to make good our claims about the deeper sense of his argument, made at the beginning of this discussion. But this task we postpone for the time being--until we see the bearing of what we have so far established about Hume's argument on Popper's position. And by the way, it was never our intention to launch a critique of Hume--as we are mainly concerned with Popper--in gaining a clear understanding of the contradictions through which he develops his argument. Hume only comes in the picture where a knowledge of some of the essential aspects of his original argument becomes inevitable for a better understanding of Popper. So, without further ado, let's turn, once again, to Popper.

CHAPTER 6

POPPER'S POSITION

It is our contention that the inconsistencies in Popper's position can be brought to the fore by recognizing that it actually answers two separate questions, namely, 1. Do regularities exist in nature? 2. Do they exist at all? And it does so without consciously realizing that the two questions are separate, even though they bear upon each other.

At first blush, the difference between the two questions seems to be trivial in terms of its content and sophistical, if not totally absurd, in terms of its form. Where else can regularities possibly exist, if not in nature? and if regularities are supposed to be non-existent, doesn't that include their non-existence in nature as well? If so, then what is the point in posing the question of the existence of regularities apart from the question of their existence in nature? One has to admit that all these are genuinely meaningful questions that deserve reasonable answers. But there is a little problem with that. The answers must be sought from Popper(and to some extent from Hume) in whose position the distinction between the above mentioned two questions, which appear non-sensical and irrelevant, is actually made--rather than from us.

It is our contention that Popper imports the first question

into the structure of Hume's argument (which only poses and answers the second question, while abstracting from the first) through maintaining the second question intact in its original Humean sense within the structure of his own argument, along with the first one. This makes for the fact that in Popper's position the two questions appear as distinct and acquire full meaning, no matter how absurd and meaningless these appear from outside the context of his position.

The sources of tensions in Popper's position appear to us to lie in the fact that, on the one hand, certain parts of his exposition can only be intelligible if we presume that he subscribes to the view that the aforementioned two questions are separate, while, on the other hand, he, elsewhere, treats them as one and the same question.

The invalidity of induction$_{\alpha}$ settles the first question(Do regularities exist in nature?) while the invalidity of induction$_{pf}$ supplies an answer to the second(Do regularities exist at all?). The impossibility of reasoning from observation to theory implies that regularities are not drawn from nature, but are imposed on it. The impossibility of arguing validly from past to the future decides that regularities cannot exist at all.

Popper fails to explicitly distinguish the two senses of induction and the role these play in his formulation and solution of Hume's problem. He remains unaware of the separation of the question ("Do regularities exist in nature?") into two separate questions, namely, "Do regularities exist in nature?" and "Do

regularities exist at all?" This is a result of the manoeuvre whereby Popper straightforwardly imports the first sense of induction into Hume's original argument and maintains that Hume sought to show that theories cannot be validly inferred from observational statements.[39] This is manifested in the confused state of Popper's argument where he, on the one hand, actually treats the two questions separately and provides two different answers to them while, at the same time, poses them as one and the same question. This interpretation of Popper can only become clear by looking at the inconsistencies through which he develops his argument.

The major inconsistencies that issue from Popper's confusion make their presence felt when he dislodges the belief in regularities on the ground of the impossibility of reasoning from observation to theory.[40] On the one hand, he asserts that the origin of theories is irrelevant from the point of view of their validity. He says, "I hasten to add, however, that my factual thesis has no bearing on my logical or my methodologial or my epistemological doctrines. For the factual psychological, and historical question, 'how do we come by our theories?, though it may be fascinating, is irrelevant to the logical, methodological and epistemological question of validity."[41] --which means that

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[39] See "Conjectures and Refutations", pg. 55.

[40] See "Realism and the Aim of Science", pg. 31.

[41] Ibid., pg. 36.

induction$_{\alpha}$ must not have a bearing on the validity or invalidity of the belief that regularities exist in nature. And on the other hand, he maintains that the logical invalidity of inductive method does make the belief in the existence of regularities in nature untenable--implying that if we could validly infer theory from observation, the aforementioned belief can be established.

In fact, Popper distinguishes between the question of origin and that of validity without appreciating their relationship to the two aspects of the question ("Do regularities exist in nature?")--and to the two senses of induction, in the context of his argument. In his argument, the invalidity of induction$_{\alpha}$ actually means that theories do not originate in observation--our belief in regularities is not perception-based--in short, it is not based or derivable from our observation of nature. In view of his strict demarcation of the question of origin and the question of validity and their non-interference in each other's affairs, this position finds its conscious expression in Popper's psychological approach to the problem of induction, according to which we do not derive regularities from nature, we impose them--and for that matter, we do not need induction. Owing to the non-interference policy that exists between questions of logic and questions of psychology(with the latter dealing with the question of origin and the former with the question of validity) the logical invalidity of induction$_{\alpha}$ leaves the question of the validity of theories, the question of the belief in regularities, wide open. And that question Popper

settles through criticizing induction in the Humean sense which, as shown earlier, deals with the belief in the existence of regularities in an abstract and absolute fashion.

Thus, Popper, while maintaining that he has separated the domains of the origin and validity of theories, in actual fact attempts to decide the issue of validity of theories through a line of reasoning that should only pertain to the question of origin. And at the same time, he tries to settle the question of origin, although in a contradictory and unconscious manner, through Hume's argument which basically attacks the validity of theories in isolation from the question of their origin (the validity of this last remark about Hume is relative to the context of Popper's formulation of Hume's problem; as the two questions, in a certain sense, remain unidentified in Hume. We will explain this later). Hence, in Popper, there is a constant encroachment of one domain into the other(logic and psychology), in spite of an ostensibly scrupulous demarcation of their territories. (This point will be established more thoroughly in the next chapter.)

The belief that the first domain has no connection with the second finds conscious expression in Popper's claim that even if our belief in regularities is true, it would still be a victim to Hume's argument[42]--which means that Hume's argument is still applicable to our belief in regularities even if we grant that the latter are drawn from observation, rather than that they always been there present beforehand in some form, as our "a priori innate

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[42]See "Objective Knowledge", pp. 22-23.

expectations". And the discarding of the belief in regularities as unjustifiable after the invalidity of $induction_{\alpha}$ is a contradictory assertion of the fact that the question whether we have any reason to believe in the existence of regularities in nature has two components and $induction_{\alpha}$ contains both of them in a unified but independently recognizable form (and this, we will explain later).

The employing of Hume's argument to settle the issue relating to the validity of theories merely signifies that the latter issue is not resolved by the invalidity of $induction_{\alpha}$ but by Hume's critique of the belief in regularities. As it becomes apparent in the logical flow of Popper's argument,(rather than to Popper himself) that the question of the existence of regularities remains untouched by the invalidity of $induction_{\alpha}$, Popper employs the Humean sense in saying that even if regularities exist in the first sense they still cannot exist in the sense of $induction_{pf}$.

The logical invalidity of $induction_{\alpha}$ in fact, establishes Popper's psychological belief and provides it with a firm logical foundation. Now it becomes clear what earlier appeared to be problematic, namely, Popper's principle of transference through which he was (after a long period of pondering!!) able to transfer the results he achieved in logic to the domain of psychology and vice-versa. Not only that he resolves what he calls the "chicken-and-egg question"[43] (which should not have any bearing on the discoveries of Popper the epistemologist) in an idealist fashion

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[43]See "Conjectures and Refutations", pg. 47.

(by saying that our belief in regularities is not rooted in observation but in our a priori instincts) he gives it the ultimate seal of validity by establishing it on the authority of logic.

The truth of the matter is that Hume's argument only attains its conclusiveness in its Popperian formulation, once it is established that regularities, wherever else they might exist, cannot and do not exist in nature. In Hume's original argument the issue of the origin of regularities remains subdued, and out of the reach of abstract reasoning. But its suppressed presence eventually creates contradictions through exposing the absoluteness of abstract reasoning that functions in isolation from its conscious identification and resolution. But thanks to Popper's identification and formulation of this issue in a certain contradictory manner, it provides the much awaited opportunity for the abstract reason to complete its final act in the most comprehensive fashion. With one majestic sweep, his argument renders invalid the belief that regularities exist in nature. With the question of their existence in nature taken care of, the belief in their existence is shown to be totally unjustified by the dictates of abstract reasoning, with an absolute criterion for establishing the existence of regularities at its disposal.

Thus, the question of the belief in the origin of regularities has an ultimate bearing on the question of the validity of the belief in regularities in Popper, despite all his disclaimers. It settles the issue which ultimately determines the nature of the

verdict on the existence of regularities; and yet Popper asks us to ignore it altogether when deciding upon the validity of the belief in regularities in nature.

In the following chapter we are going to locate the ultimate source of tensions and inconsistencies in Popper.

CHAPTER 7

THE REAL SOURCE OF TENSIONS LOCATED

There is a little problem within induction$_{\alpha}$ in Popper, which was not pointed out earlier in the exposition. Then our main objective was to underscore the distinction between the two senses of induction and show their bearing upon each other, to the end of exposing certain problems in Popper's position which could not have been brought to the fore otherwise. But now is the proper occasion to introduce the final contradiction, as all the other contradictions in Popper's position are ripe and ready for their resolution.

We have argued earlier in the discussion that Popper was wrong to ascribe induction$_{\alpha}$ to Hume as the latter has not mentioned any inference from observation to theory in the course of his criticism of induction. Previously, we sought to show that this confusion in Popper owes its presence to the fact that he mistakenly believed Hume to be concerned with the validity of theories as such. This we still believe to be the case. But there is yet another side to this issue which earlier escaped our attention. It is this: Popper maintains (in his psychological criticism of induction) that "induction by repetition is a myth". We can never learn anything

new or arrive at a new idea by repetition of observations, "induction by repetition is an optical illusion", and then resolves the problem by saying that we do not, in fact, proceed by observation. And he argues in a similar fashion in his logical criticism, for which he will be held accountable. He says that "Hume tried to show that any reasoning from singular and observable cases (and their repeated occurrence) to anything like regularities or laws--must be invalid."[44] And then goes on to say ". . . as a result we can say that theories cannot be inferred from observation statements."[45] At another place he writes "the logical problem of induction arises from Hume's discovery(so well expressed by Born) that it is impossible to justify a law by observation or experiment, since its 'transcends experience'.[46]

The mistake Popper commits lies in his not realizing the distinction between the different senses of induction carried by the movement from repeated observation to theory ($induction_{\alpha 1}$) and the movement from observation to theory ($induction_{\alpha 2}$), as such-- and in reducing one to the other.[47]

Hume's position states that the existence of regularities

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[44] See "Realism and the Aim of Science", pg. 31.

[45] See "Conjectures and Refutations", pg. 42.

[46] Ibid., pg. 54.

[47] I shall call the first sense within "$induction_{\alpha}$": "ot_1": 'ot_1' meaning from repetition of observation to theory. And the second sense "ot_2": 'ot_2' meaning from observation to theory. Wherever I use induction without qualification, the sense of induction is implied where the distinction between ot_1 and ot_2 is sublated.

cannot be inferred from repeated observations--from which it does not immediately follow that the belief in the existence of regularities cannot be drawn from observation, as such. Repetition of observation is only one mode of observation--a certain method of observing. Its failure to get to the existence of regularities does not prove that observation cannot lead to the belief in the existence of regularities. Using one of Popper's favourite examples, we can make the point clearer still. He says that "we learn from our mistakes". Now there can be a number of ways and methods to learn from our mistakes. From exposing the invalidity of one such method, it does not follow that we cannot learn from our mistakes. In the same way, repetition of observation must be regarded as one method of getting to regularities through observation and its invalidity must not be taken to mean that we can't learn from observation.

Popper has the two senses of induction confused when he uses the invalidity of induction$_{\alpha 1}$ as a charge against induction$_{\alpha 2}$ and reduces one to the other. But this confusion actually provides a clue to an understanding of the real source of Hume's problem.

In order to fully appreciate the significance of this tension in Popper, let's recapitulate Hume's basic argument. A repetition of observations of a certain B following a certain A cannot lead to the discovery of a rational connection between them--no matter how many times the repetition takes place. Hume is reluctant to say anything explicitly about the possibility of finding a regularity in observation as such--which is the other reason that in his

argument, the sense of induction, where induction implies a movement from observation to theory, is not explicitly mentioned. But Popper, although he consciously holds that the questions of origin of ideas must not bother an epistemologist, whose principal occupation is to make judgments about the validity or invalidity of ideas, unconsciously goes a step further than Hume in the fact that he recognizes and formulates the question of origin apart from the question of validity, albeit without appreciating its true meaning within the structure of his argument.

It is our contention that in the formulation and resolution of the question of origin (which appears in Popper's argument as a possibility of moving from observation to theory as distinct from moving from repeated observations to theory), Popper brings to the fore two essential aspects of Hume's original argument which remain hidden and unidentified in the latter's position and make for the confusion in understanding its true meaning.

The impossibility of induction$_{\alpha}$, the sense of induction which Popper unconsciously derives from Hume's argument signifies two things: that theories are not derived from nature, and, that a belief in them cannot be established through observation.

It is our belief that Popper is only able to formulate the question of origin because of his views on the psychology of perception--which are different from Hume's. In the chapter on Hume, we discussed how Hume was reluctant to relinquish induction even after establishing its logical invalidity. His argument was that although we have no rational basis by which to justify our

thinking about matters of fact and real existence in cause and effect terms, we do think in that manner--and for that reason we cannot dispose of "induction." It should be considered as self-justifying, through its high degree of reliability in practice. And then we went on to explain how Popper claimed to be in agreement with Hume on the latter's logical criticism of induction but adopted a different stance on the psychology of induction. Popper's argument was that not only is induction invalid (after the critique of Hume), it is also not the method through which we attain our knowledge of the world. It is a mistake--an optical illusion, he said.[48] His psychological views can be summed up in two basic points: first, that there is no such thing as pure observation--as all observation is theory-laden[49]. And second, that our belief in regularities is prior to our observation of them. It is not a derivation from nature but an imposition on it.

The fact that Popper was able to formulate and resolve this question (of origin) has to do with his psychological views, and the fact that he does it in an unconscious manner, without appreciating its real meaning in the structure of his argument, has to do, on the one hand, with his conscious demarcation between the facts of logic and psychology with the latter having no influence on the practice of the former, and on the other hand, with the unconscious encroachment of one domain into the other in his argument. Popper the psychologist must not influence Popper the

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[48] See pg.18. of this thesis for the reference.

[49]See "Realism and the Aim of Science", pp. 45-47.

logician, according to Popper. But, against his own wishes, and all for the better in our view, his psychological views creep into his logic and determines its course.

We believe that in Hume, the reason repeated observations cannot lead to regularities has actually to do with the nature of observation as such. Popper makes this fact known through his unconscious importing of induction$_{\alpha 2}$ into the original structure of Hume's argument.

The two senses of induction carried by the first sense in which induction is considered invalid by Popper stand for: 1. theories are not drawn from the observation of nature (ot_2). 2. the belief that theories are inferred from observations cannot be shown to be valid, even if it is true (ot_1). This first sense within the induction$_{\alpha}$ can be seen as carrying the Humean sense. Although Hume never mentions any invalidity of theories, his argument which encompasses all matters of fact and real existence can be seen as broad enough to include the belief in theories. And that is why we were cautious enough to maintain that Hume's argument is not particularly directed against the belief in theories (it can also be considered an argument against eduction, a method that allows for the movement from particular to particular) although that belief could not be excluded from its domain without qualification. In that sense Popper can be viewed as somewhat justified in importing this sense into Hume's argument (unlike in the importing of the second sense, where he is not justified at all). But in this case too there is a little difficulty that needs clarification.

It is right to maintain that, according to the implications of Hume's argument, the belief in the existence of regularities can never be rationally justified. But the sense which arises out of Popper's formulation is if Hume is simply saying that even though we can hold a rational belief in the existence of regularities we perceive, we cannot extend that belief to include the non-observed instances of such regularities. This is a distortion of the real meaning of Hume's argument. The real meaning lies in the fact that we can't observe regularities at all. We observe a conjunction between A and B but can never observe a connection between them--and this is the reason no matter how many times we see the conjunction, it can never establish the existence of regularities. Hume says:

> So that, upon the whole, there appears not, throughout all nature, any one instance of connection which is conceivable by us. All events seem entirely loose and separate. One event follows another; but we never can observe any tie between them. They seem conjoined, but never connected.[50]

So, Popper is right to the extent that Hume can be interpreted as saying that the belief in the existence of regularities is not justified--but the invalidity of this belief does not issue from flouting the kind of empiricism which discredits all unrestricted generalizations. In that sense Hume can be taken to mean that although our belief in the particular instances of regularities we observe is justified, the belief cannot be generalized to include all the non-observed instances--which would be a gross

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[50] See " An Enquiry Concerning Human Understanding", pg. 74.

misrepresentation of Hume. The sense which comes out of Hume's argument is that even in the particular instances of observations, we cannot observe the existence of regularities--and that is the principal reason of not being able to hold a rational belief in their existence at all.

The second sense (induction$_{p0}$ in which induction is considered invalid by Popper (in our original distinction between the two senses of induction) is intimately connected with induction$_{\alpha 2}$. The reason a rational belief in the future existence of regularities cannot be held has to do with the fact that we cannot hold a rational belief in their existence under any circumstance (past, present, future).

Our claim made at the end of the section on Popper (p.50) that Hume's argument only attains its conclusiveness in Popper's formulation of it is not without foundations. For its perfect execution, Hume's original argument is in need of two things: 1. An explicit expression of the fact that regularities cannot exist in nature. 2. A belief in their existence cannot be established by observation. And Popper renders this service through developing his psychological beliefs on induction, and then incorporating them, through a plethora of inconsistencies, into the structure of Hume's argument.

As we have stated a few paragraphs back, that from the invalidity of inferring the belief in the existence of regularities from repeated observations, it does not follow that observation of nature as such cannot lead to the belief in regularities--but both

Hume and Popper, consider this to be the case--which can be gleaned from their arguments. In Hume, it is not explicitly stated, but a careful dissection of his argument exposes that the reason for not being able to maintain a rational belief in the existence of regularities does not lie in the failure of repeated observations as a possible method of substantiating that belief--but in the nature of observation as such--where observation, by its very nature, does not allow the formation of a connection between any A and B that pertains to matters of fact and real existence. Hume could not explicitly formulate this position as he remained within the confines of empiricistic psychology, where sense impressions are deemed as the ultimate source of knowledge. The ultimate expression we could extract from him is that even if we cannot establish that we move from observation to theory, we do, in fact, by some inexplainable gap in reasoning, move from observation to theory.

The fundamental nature of Hume's logical argument is incompatible with his psychological beliefs. His logical belief is that "induction" is not a valid mode of inference and cannot be maintained on any kind of reasoning. His psychological belief is that we do, in fact, proceed by "induction", although not through reason but by custom and habit. That inconsistency could only be surmounted by maintaining that we do not proceed from observation of nature at all. And here, Popper comes into the picture, with his "rationalist" psychology, where observation, of necessity, is theory-laden and our innate, inborn expectation of finding

regularities is regarded as prior to all observation of nature.

> Thus, we are born with expectations; with "knowledge" which, although not valid a priori, is psychologically or genetically a priori, i.e. prior to all observational experience.[51]

Popper sought to resolve the tensions in Hume by replacing the latter's empiricistic psychology with his rationalistic one. Our belief in the existence of regularities is not based in our observation of nature, and it can also never be established that it is based in our observation of nature. That is Popper's position.

But just like Hume, who retained his irrational psychology (irrational in the sense that it is not founded on reason) even after the removal of its logical basis, Popper maintains that his psychological beliefs, significant as they are as they resolve the contradiction in Hume, have no relevance to the outcome of his logic. Induction is still to be discarded on the grounds of its logical invalidity, as pointed out by Hume, he maintains. But what actually and unconsciously happens in Popper's argument, sometimes at the back, and often times at the front of his conscious beliefs, is what we have tried to expose and establish all the way throughout the entire course of this thesis.

Thus, Popper, by consciously upholding the view that what invalidates induction is the impossibility of moving from repeated observations to theory and then deducing the impossibility of moving from observation to theory from that commits the same error as Hume. But through developing a different psychology of

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[51] See "Conjectures and Refutations", pg. 47.

perception and through an unconscious manoeuvre whereby he shows the bearing of his psychology on his logic, Popper does two things: First, he tries to resolve the contradiction between Hume's logic and psychology by maintaining that 'we do not proceed by observation' and so it is not surprising if we could not establish this belief. Thus, reconciling the conflict between the two senses contained in the first sense of induction and making the one follow from the other. Second, unable to do so because of the implications of his consciously-held premises that psychology cannot influence logic, he negatively established the bearing of the question of origin on the question of validity in his argument.

The upshot of the preceding discussion is that the logical invalidity of induction, of itself, is insufficient to dispose of induction (taken as whole in a unified form, with all the senses subsumed).It can only show that theories cannot be inferred from repeated observations or that our belief in regularities cannot be inferred from repetition of observations--and then to deduce the impossibility of the inference of theory from observation as such. But, as we have argued, this line of reasoning is invalid for logical reasons. In order to ascribe wholesale invalidity to induction, a line of reasoning is needed which can substantiate the invalidity of the movement from observation to theory. This cannot be achieved consciously and conclusively in a framework where logic and psychology are treated as two separate and isolated domains.

It is our belief that the arguments of Popper and Hume, both of which ascribe wholesale invalidity to induction, betray the fact

that the invalidity of induction (taken in a unified form) stems (in their arguments) from a line of reasoning which actually proceeds in the reverse manner than the line of reasoning which appears on the surface of their arguments. That is, from the impossibility of going from observation to theory, it is deduced that theories cannot be inferred from repeated observations. But this line of reasoning, just like the one which appears on the surface, is invalid for similar reasons. In a framework where logic and psychology are consciously treated as separately existing domains, not interfering in each other's business, the issue of logical validity must not be settled by the results that pertain only to psychology. And conversely, logic must not be able to determine the validity or invalidity of psychological beliefs.

To go from the line of reasoning that appears on the surface to the line of reasoning that lies beneath it and which determines the actual structure of the argument, one has to journey through a sea of confusions in Popper. And that is what we have done uptil now. But not to no avail.

It is our belief that the tensions in Popper's position can be meaningfully understood and brought to a reconciliation if we presume that the order of reasoning which seeks to invalidate induction (in a unified form) proceeds from the impossibility of maintaining a belief in the regularities in nature through observation to the impossibility of establishing a belief in regularities through repeated observations.

And now, finally, we can go about fulfilling our promise of setting things right in Hume, made at the end of the section on Hume. Taking what we have argued there to the mainstream of the present discourse, we can see Hume's argument in its true light, and understand the source of problems.

We have shown how the principle of empiricism works in collaboration with abstract reasoning in Hume, and makes impossible the establishing of any link between any A and B that pertains to matters of fact and real existence. It apparently negates only the possibility of holding a rational belief in the existence of non-observed regularities. But, as we have tried to show, this is only an appearance. In actuality, it negates the possibility of holding a rational belief in the existence of regularities of all sorts--even the ones that we allegedly "perceive". And then we have also maintained that the problem in Hume actually lies in the nature of observation as such rather than repetition of observations (whose invalidity as a method also issues from the peculiar nature of observation), when it comes to establishing a belief in the existence of regularities. Let's see how.

We believe that the reason why Hume's argument makes a rational belief in the existence of regularities impossible is because it essentially presupposes that regularities do not exist in nature. It simply cannot function without this presupposition. But Hume's argument, both in its original form and in its popperian formulation, cannot consciously maintain a claim about the impossibility of the existence of regularities in nature and then

proceed from there, as it would amount to settling a metaphysical issue while deciding upon an epistemological matter--which goes against the consciously held premises (Hume as a sceptic, cannot or I would say should not take positions regarding metaphysical matters. And same is also true for Popper, although for slightly different reasons).

The reason we have called reasoning in Hume 'abstract' is precisely because it seeks to establish a priori connections between A and B that pertains to matters of fact and real existence, in the mind. This could only become possible as a result of abstracting from nature--abstracting from the concrete existence of A and B in nature--which is also why abstract reasoning acquires an absolute character and settles only for connections between A and B which are no less absolute and certain than the connections between mathematical terms. And when it finds no such connections between A and B, pertaining to nature yet seen in isolation from their existence in nature, it passes its verdict: no such connections exist between any A and B that belongs to matters of fact and real existence. The pure observation(pure because it is purified of all mental, theoretical-cognitive functions) on the other hand, continues endlessly and relentlessly, its self defeating task of finding regularities in nature. The observation of nature yields nothing but a customary conjunction between A and B. The way we see it, the failure of observation to find connections is no dilemma. Given the structure of Hume's argument and its epistemological framework, the observation of any

connection between two objects in nature is a logical impossibility. How can a connection be found between any two objects which are conceived as necessarily unconnected and logically separable?

Now it can be seen why we claimed earlier that induction$_{\alpha}$ which Popper formulates and incorporates into Hume's original argument is an essential for the perfect execution of Hume's argument--And why the argument against induction must be seen as proceeding in the reverse than the manner in which it actually appears to proceed in Popper's argument. The tensions in Popper's position can now be seen in their actual setting.

CHAPTER 8

CONCLUSION

A question may arise, inquiring of the outcome of this laborious exercise of exposing tensions in Popper's treatment of Hume's problem of induction, in terms of its bearing on the philosophy of science. The answer, unlike the exposition that preceded it, is very plain and simple. Induction cannot be discarded on the basis of Popper's criticism of it. If the argument presented in this thesis is valid, then the whole Popperian enterprise of doing away with justificationism in science, on the ground of the "invalidity of induction", appears as groundless. And by the same token, rationality of science (in the sense in which it is synonymous with justification) can be considered safe and sound and under no threat, either from Hume or from Popper.

The fact this thesis has endeavored to establish is that induction cannot be validly criticized for its "logical invalidity" in a philosophical setting where logic and psychology, metaphysics and epistemology, are treated as isolated domains, existing in their own confines, with the conclusion obtained in one having no bearing on the conclusion reached in the other.

Popper consciously and avowedly operates within such a philosophical framework and yet attempts to establish the invalidity of induction, and destabilize justificationism. As a

consequence of operating with an internal inconsistency, his argument, at each stage of its development, enters into contradictions, exposes its untenability and eventually comes to grief.

Justificationism in science can only be disposed of by settling the "metaphysical" issue of the origin of regularities and ideas in an idealist fashion within the confines of logic and epistemology; through settling the question of validity by the question of origin; by consciously and courageously (of course, it takes a lot of courage on one's part to maintain a position like that!) maintaining that regularities do not exist in nature and they must not be sought in nature and then employing Humean logic to establish these beliefs. But one thing must stand clear: there is no logic which can substantiate the initial holding of this belief. The settling of the "metaphysical" dispute regarding the question of origin must of necessity must imply a logicless moment where one has to take sides on the issue as a matter of preference. But once this belief (metaphysical idealism in this case) is upheld on its own basis, it does not have to stand alone for another moment. The logic of Hume and Popper would waste no time in establishing that justificationism in science(any attempt to establish the truth of theories which claim to reflect regularities in nature) is a mistake, an "optical", as well as a conceptual illusion. But, as we have said before, in order to accomplish this, the framework in which metaphysics is viewed as disconnected from epistemology and logic, has to be given up.

But Popper is most unwilling to take this step, that is, openly declaring himself as an idealist in philosophy and an enemy of materialism and its doctrine of the objective existence of objects in nature and the connections that holds between them. He, in fact, does the opposite. He adopts a position on the "metaphysical" question, which he calls "metaphysical realism", according to which, the world and its regularities must be seen as existing objectively and independently of human consciousness. His metaphysical realism is in stark contradiction with the position that he so passionately tries to establish in his alleged metaphysics-less logic. Here, he presents himself as an enemy of metaphysical idealism and places himself on a different plane than idealists like, Berkley and Hume. But soon after having the moment of self-satisfaction of holding a plausible view about the nature of reality and of distancing himself from what he considers "absurd" philosophical positions, he takes no time in responding to the exigencies of his logical-epistemological standpoint. Let's hear it in his own words:

> .....Yet I stated in L.Sc.D. that I believed in metaphysical realism. And I believe in metaphysical realism still.... Metaphysical realism is nowhere used to support any of the solutions proposed in L.Sc.D. (in this my method differs from the usual practice of the idealist who, from Berkeley to Hume to, say, Reichenbach, use their metaphysical views to support their epistemological theories.) It is not one of the theses of L.Sc. D., nor does it play the part of a presupposition. And yet, it is very much there. It forms a background that gives point to our search for truth.[52]

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[52] See "Realism and the Aim of Science", pg. 81.

> . . . Rational discussion, that is, critical argument in the interest of getting nearer to the truth, would be pointless without an objective reality, a world which we make it our task to discover.[53]

Popper's practice is the opposite of what he preaches. It is very true that he nowhere uses "metaphysical" realism to support his solutions. To the contrary, he uses all his solutions to refute its claim. To his saying that he never uses his metaphysical beliefs to support his epistemological theories unlike the other idealist (implying that he is one among them!) we have already argued that how, he, distorts the claim of his own consciously held premises in logic and epistemology by making them subservient to the task of establishing his metaphysical position. He is right again when he says that rational discussion would be pointless without an objective reality--and yet it is the same objective reality along with its regularities which he could not stand in his logic and epistemology. Presenting himself as a materialist, he serves the cause of idealism and attempts to give it a logical-epistemological basis; but, in vain. The establishing of the validity of this last claim might be considered as the final outcome of this entire exercise.

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[53] Ibid.

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