JEAN PIAGET: A STUDY IN GENETIC EPISTEMOLOGY

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This dissertation has not been submitted previously either in part or in full to any University or Institute of learning for **the** award of any degree or diploma.

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I hereby declare that the work presented in this dissertation has been carried out by me under the supervision of Dr.S.G. Kulkarni and that this has not been submitted for a degree or diploma to any other University or Institution.

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JEAN PIAGET: A STUDY IN GENETIC EPISTEMOLOGY

PREFACE

This dissertation seeks to explore the thoughts of Jean Piaget whose works *are* increasingly attracting the attention *of* Philosophers of different persuations. Throughout his scientific endeavour aimed at the study of cognitive development, Piaget's central concerns were Epistemological, It is those concerns and the *way* they were persued by Piaget that constitutes the object, of this study. The task this dissertation sets for itself includes highlighting the ways in which Piaget continues and enriches the great tradition of epistemology and departs from it to work **out** a mode of thinking about the **time-honoured** questions regarding knowledge that is both critical and constructive, original and yet historically sensitive.

In the execution of this task the dissertation begins by explicating Piaget's general view regarding the nature and significance of philosophy put forward by him as an alternative **to** various theories of Philosopy, past and present.

Chapter 2 highlights and elaborates those themes and ideas which constitute Piaget's distinctive epistemological framework. The purpose of this chapter is to elucidate the unique features of Piaget's perspective which has turned a new leaf in the history of epistemology.

Chapter 3 deals with the fundamental theses of **Piaget regarding** the nature of knowledge — the theses which constitute the content of the framework elaborated in Chapter *2.*

In the last Chapter the concentration is upon Piaget's effort **to** develop a theory of science which reconciles his anti -

positivism with his conviction that science is uniquely endowed with epistemic virtues like objectivity, rationality and progressiveness. This Chapter also seeks to highlight the organic link between Piaget's Philosophy of Science and his Genetic Epistemological concerns and convictions.

It gives me a sense of great pleasure and satisfaction to express my overwhelming gratitude to my supervisor, Dr.S.G.Kulkarni,Reader, Department of Philosophy, School of Humanities -- a perfectionist, for giving me valuable guidance. Through timely encouragement, he enabled me to overcome many obstacles, both professional and otherwise. It was a matter of extreme pleasure to work under him and except for his keen interest and supervision this dissertation would not have taken shape.

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Finally, it goes without saying that for all error of omission and commission, the responsibility is solely mine.

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CHAPTER I: PIAGET'S THEORY OF PHILOSOPHY

This dissertation purports to make an exploratory study of Piaget's central epistemological ideas. Of course, Piaget is known for his seminal contributions to Genetic psychology in particular and child psychology in general. Yet, his work in Epistemology is no less significant as is borne out by the fact that leading philosophers of our tiroes have felt it necessary to respond to his views either positively or negatively. By working out an elaborate critique of traditional epistemology on the one hand, and by elucidating the presuppositions and implications of his own empirical work on the nature of human knowledge, Piaget, has given a distinctively novel orientation to epistemology. Piaget not only defends and develops a new conception of knowledge but also tackles in an original way the problem of the relation between the subject and the object -- the fountainhead of all philosophical reflection. Piaget's theory of knowledge which he calls Genetic Epistemology seeks to develop entirely new idiom and framework for the study of human cognition. It is the novelty of his orientation and originality of approach to the central problems of knowledge that makes his study worth undertaking.

In order to provide for ourselves an adequate understanding of Piaget's central epistemological thesis it is necessary to acquaint ourselves, however briefly, with the broad philosophical canvas on which Piaget paints his impressive picture of knowledge and thus to locate him within the contemporary philosophical

matrix. In doing so we briefly look at his *conception* of philosophy and his overall philosophical orientation. This Is all the more necessary in view of the fact **that** Fiaget **creates an** impression of being scientific and anti-philosophical.

We may begin by looking at the way Piaget distinguishes philosophy from science, According to him, it is wrong to *say* that whereas science reserves for itself the field of experimental reality, philosophy is pure deduction. This is because "mathematics . ., is there to show the appropriately scientific role of a well made deduction.[1] Nor can we say that science is aposteriori knowledge whereas philosophy is aprioiri knowledge. For, "so long as apriori knowledge exists, it, is upto mathematicians "to speak to us about it."[2] Also , we cannot distinguish between science and philosophy by saying that the goal of science is Relative whereas that of philosophy is Absolute. This is so because a scientist like MarxPlank has plausibly claimed that science must believe in the absolute of certain reality even if this is never achieved, whereas the philosopher Brunschvicg" asserts the possibility of constructing a philosophical system without restricting oneself to the postulate. of the previous absolute. It is equally wrong to draw a distinction between science and philosophy by saying" that the

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[1] *Psychology and Epistemology,* p.9.
[2] *Ibid.* p. 92.

former is concerned with the particular questions whereas the latter would tend toward total knowledge. For, the concept of total knowledge is extremely problematic. Piaget strongly feels that

> "Total knowledge is at the present time, and perhaps forever, an affair of provisional synthesis and of partly subjective synthesis, because it is infact dominated by value judgements which are non-universal but peculiar to certain collectivities and even to certain individuals."[3]

The above characterisations of philosophy via-a-vis science are fairly conventional and are made from the point of view of a certain view of philosophy which has a long and respected tradition and according to which Metaphysics constitutes the core of philosophy and Epistemology its shadow. In order to appreciate the rationale behind Piaget's rejection of such time-honoured distinctions between science and philosophy we have to look at the reasons for which he adopts an unfavourable attitude towards metaphysics.

Piaget finds disconcerting the tendency of metaphysics to talk about reality without anything like an objective criterion of truth. He says,

> "although speculative reflection is fertile and even necessary heuristic introduction to all enquiry, it can only lead to the elaboration of hypothesis, as sweeping as you like, to be sure, but as long as one does not seek for verification by a group of facts established experimentally or by a deduction confirming to an exact algorithm (as in logic), the criterion of truth can only

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[3] *Ibid.* p. 93.

remain subjective."[4]

Secondly, metaphysical thinking remains too vulnerable to the socio-political factors to possess universal value.[5] Thirdly, Piaget finds deplorable the propensity of metaphysicians to meddle in the field of scientific research by trying to prescribe norms to a scientific investigator. He complaints,

> "when an individual metaphysician (and they are still some, since there exists an indefinite multiplicity of schools and positions), having no other training than a perfect knowledge of philosophical authors and that afforded by his personal meditation, however extensive, undertakes to prescribe norms to a scientific discipline, one cannot but fear some abuse of previlege."[6]

All these objections against metaphysics are quite familiar and fairly standard- Also, such objections have not gone without being challenged. Yet, an important aspect of Piaget's overall philosophical orientation is his anti-metaphysical tendency generated by his awareness of the absence of consensus which is, by and large, characteristic of science. Fundamental disagreements in metaphysics are permanent, perpetual and even inherent.

> "'When two metaphysicians disagree, however honest and well intentioned they may be, this disagreement depends, if there is no misunderstanding, on questions of convictions and not verification or of logic. One can lessen the disagreement by clever argument, by *an* appeal to common values: it cannot be reduced by a factual verification or a formal demonstration. If there existed for such metaphysical questions tests that were able to convince everyone, we would then speak of truth,

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[4] *Insights and Illusions of Philosophy,* pp.11-12.

[5] Cf *ibid.* pp. 12-13.

[6] I*bid.* p. 18.

pure and simple, and no longer of metaphysics."[7]

Apart from making a questionable claim to knowledge, metaphysics or metaphysics-centered philosophy pretends to be superior to scientific knowledge. Piaget tries to account for this tendency on the part of metaphysics. Firstly, the metaphysicians think that metaphysics uncovers the apriori structures that constitute the very foundations of every science and that metaphysics as a study of foundations is superior to the sciences which only construct the edifices. However, scientific thinking is open-ended and multilayered such that

> "the fundamental process of the differenciation of levels is not alien to the sciences themselves and it is fundamental error to assume that their data are to be found at one and the same level."[8]

But the ability of the sciences to deal effectively with their own foundational questions has not made metaphysics humble. Rather,

> "by wishing to restrict science within certain boundaries in order to facilitate the belief in the possibility of a specific and a superior mode of knowledge, the parascientific philosophies are therefore always in danger of seeing these boundaries constantly change, and their own field of enquiry encroached upon by otherwise sounder methods."[9]

The second reason for the perpetuation of the myth of a para scientific knowledge entertained by the metaphysicians is the tendency among the nineteenth century scientists, especially biologists, to embrace a dogmatic materialism which was presented

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[7] *Ibid.* pp.63-64.
[8] *Ibid.* pp.81-82.
[9] *Ibid.* p.82.

as if it was derived from science itself.

> "The surprising thing is that philosophers have been victims pf the same illusions, so that as a reaction against

materialism they have proceeded to criticise science[10] and advance their speculative theories in the guise of a critique of science. The third reason for the belief in Metaphysics as a supra-scientific knowledge is the illegitimate twist given to the Kantian insight that all experience is a structuring of reality in which the epistemological subject takes an active part. The concept of an epistemological self is transformed into a metaphysical self even though Kant himself has shown that the self is not a substance, a force or a cause, but owes its identity to an internal unity of apperception.

Piaget thus, debunks the claim of metaphysics that it constitutes a knowledge superior to that of science. In fact he refuses to concede even the status of knowledge to metaphysics. Traditionally epistemology has been the shadow of metaphysics. According to Piaget, the immediate task of epistemology is to free itself from the clutches of metaphysics which is pretentious in its claim and dubious in its content and declare independence for itself – a task he sets for himself.

The antimetaphysical stance of Piaget has not pushed him into accepting Positivism as his philosophical creed even though

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[10]Ibid. p.83.

positivism has been one of the most vibrant antiroetaphysical movements of the twentieth century. On the contrary, his attack on positivism is as devastating as his attack on metaphysical philosophy.

The first objection of Piaget, against Positivism is that it is detrimental to science itself however much it gives science a place of pride in the scheme of our cognitive activities. For, it restricts the problematic of science to the confines of what is verifiable and thus truncates its scope by enclosing it. In other words,

> "Positivism is chiefly a philosophy of science which forbids science to cross certain barriers and which consequently prejudges the future."[11]

However,

> "contemporary science is essentially "open" and remains free to include any new problems that it wishes or is able to so long as it can find methods for dealing with them."[12]

The positivists attempt to restrict the problems of science is ill-at-ease with the *increasing* horizons of scientific theorising. The *very* fact that the questions regarding causality have occupied the central stage in the contemporary debates in physics and the fact that mentalism is still alive in psychology despite behaviouristic attack on it are all pointers to essential openess of scientific thought. Positivism is thus, antithetical

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[11] *Psychology and Epistemology,* p.93.

[12] Insights *and Illusions of Philosophy.* p. 40,

to the very spirit of science. Secondly, according to Piaget,

> "to assert that metaphysical problems are "meaningless" is unacceptable from the point of view of knowledge itself because we are not justified in definitely classifying a problem as either scientific or metaphysical; at the roost a disputed problem can be said "to be "without present cognitive meaning".[13]

What Piaget means by this is that we cannot say that scientific problems are meaningful and metaphysical problems are meaningless, because many of the problems in science are directly related to or emanate from metaphysical problems. It is absurd to think that meaningful problems are related to or emanate from meaningless ones. There may be metaphysical problems which perhaps will never get transformed into scientific ones, but there is no absolute criterion to decide before hand which metaphysical problems are or can be made amenable to scientific treatment and which are not so amenable. Thirdly, even if a problem does not have a present meaning from a cognitive point of view, can have a permanent human meaning and thus may be a legitimate philosophical problem. The problem of the meaning of life is, for example, remains

> "central from the point of view of human existence and thinking subject. ... it constantly occurs and forces itself on us in the form of "engagement", even if we do not know how to formulate it intellectually. And it is the same with the large number of problems."[14]

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[13] *Ibid.* p. 41.

[14] *Ibid.* pp. 42-43.

Fourthly, if one accepts the hard and fast line drawn by positivists between science and philosophy it becomes difficult to explain the fact that in the past the great philosopher's central philosophical ideas were heavily influenced by the character of their scientific interest. Thus Plato's

> "realism of transcendent Ideas was the only epistemology compatible with the peculiar status of Greek mathematics."[15]

Aristotle's theory of Immanent realism of forms can only be understood in relation to his interest in biology. Descartes' "discovery" of the epistemological subject and other components of his philosophy would be inexplicable without reference to his development of algebra and his discovery of analytical geometry. Further, his positive response to Galileo's views concerning the possibility of applying computational methods to physical transformations played a decisive role in formulating his philosophy. The empiricists like Locke and Hume questioned

> "The hypothesis of innateness using quite new arguments whose later historical development showed that they formed the starting point of an independent science; psychology founded on methodological observation and expeirment".[16]

In the case of Kant, it is too obvious, that Newtonian physics played a decisive role in the formulation and development of his philosophical ideas. Similarly, Hegel's whole philosophy Is

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[15] *Ibid.* p.47.

[16] *Ibid.* p.53.

informed by the historical and sociological thought of his times. Piaget notes,

> "Hegel cannot be made the founder of sociology any more than the empiricists can be made the founders of psychology, but it seems clear that a concern for sociological knowledge has played with him the same role as the concern for psychlogical knowledge among the empiricists."[17]

The thrust of the above reference to the history of philosophy is to bring to surface the organic relation between the central ideas and theories of the philosophers and their interest in and commitment to certain theories in science, formal or empirical. Piaget's contention is that positivism by treating such a relation to be accidental and superficial fails to do justice to the historical reality which is inconsistent with the hard and fast line between science and philosophy which positivism draws. It is because he is opposed to positivism, his conception of science and scientific method is antithetical to the positivistic paradigm.

However, his opposition to Positivism did not result in a sympathetic attitude towards twentieth century philophical currents such as Existentialism and Phenomenology. Piaget does not conceal his dislike for the anti rational is tic tendency *of* existentialists. They trivialised human freedom by reducing it to arbitrary choice. Phenomenologists, according to Piaget, have a naive conception of science when they say, as does

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[17] *Ibid.* p.58.

Merleau-Ponty, "The whole universe of science is constructed on the lived world." Against this, Piaget contents,

> "if the world of science is really "constructed" on the lived world, it is not in the manner of an edifice constructed on its foundations, for the aim of scientific thought is always to get. further away from this lived world, contradicting it instead of utilizing it. On the other hand, the true starting point of the universe of science is to be looked for in the world of action and not in perception abstracted from its motor and practical context, for the thought operation extends action by simply correcting instead of contradicting it."[18]

Piaget, however, sees some merit in the idea of Husserl, specially in the latter's oppositiion to dualism of subject and object and his rejection of both idealism as well as positivism. Yet, Piaget maintains that the great shortcoming of phenomenology is its neglect of historical and genetic points of view. Further, the phenomenological method which sets a heavy premium on the concept of intuition. But

> "Physical knowledge remains impossible without the logico-mathematical framework and it is impossible to construct the latter without its being applicable to "any" object whatever. It is this two-fold movement that intuitionism neglects, and this is why "intuition" remains an extremely poor method for philosophical knowledge-"[19]

We have not tried to provide a critical evaluation or even a detailed elaboration of Piaget's criticism of the various philosophical trends. We have only noted his negative remarks on them only to understand why he felt the need to formulate a

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[18] *Ibid.* p.87.
[19] *Ibid.* p. 115.

metaphilosophical position of his own. Piaget is convinced that science is philosophically significant because scientific facts and theories are philosophically relevent — a point summarily rejected by metaphysical philosophy, positivistic philosophy as well as existentialist and phenomenologistic philosophies. According to Piaget, scientific problems are only philosophical problems which are delimited and transformed so as to make thier solutions amenable to intersubjective testing. If it is objected that such a delimitation and transformation destroy the philosophical character of the problems, Piaget *can* counter that objection by saying that it presupposes *very* narrow and questionable conception of the "Philosophical". This does not mean that Piaget merges philosophy with science; he only questions the erection of philosophy as a distinct, autonomous and even superior mode of knowledge. According to Piaget, philosophy is undoubtedly an autonomous cognitive activity but not an autonomous system of knowledge. It is only science which constitutes knowledge, the aim of philosophy cannot be acquisition of knowledge but coordination of values. It should seek to work out *an* adequate scheme of values including the cognitive values. It should not aim at truth which is better left fco science. It should rather aim at wisdom. In this connection he says

> "It is clearly not accidental that Oriental Philosophy sees itself much more than ours does as being essentialy a wisdom, whereas a lesser development of science and technology would have allowed us to avoid a too systematic polarisation of values on to the field of

knowledge .

In fact, Piaget makes a startling remark that the idea of philosophy as a special type of knowledge parallel and superior to science is only two hundred years old. Traditionally, he maintains, philosophy has always been an attempt at a coordination of values. Hence, Piaget has a more positive attitude towards traditional philosophy than many contemporary philosophers who in one way or the other debunk traditional philosophy. For all his rejection of philosophy as a genuine knowledge Piaget never nullifies, unlike positivists, the cognitive value of philosophy. He makes this amply clear when be says,

> "a thinking subject in possession of knowledge and values, necessarily tries to construct a general conception that will bring them under one form or another, such is the role of philosophy in so far as it is a rational approach to the whole of reality. Every thinking man adopts or makes for himself a philosophy, even if his general conception and his understanding of values remains for him approximate and personal."[21]

Following these highly sketchy remarks regarding Piaget's critique of various contemporary philosophical trends as well as his own metaphilosopohical point of view, a few words about the central philosophical notions that characterise his approach to the nature of human knowledge are in order.

The most central idea that constitutes almost the leitmotif

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[20] *Ibid.* p.44.

[21] Ibid. p.43.

of Piaget's thinking is the idea of evolution which is common to the thoughts of such diverse nineteenth century thinkers such as Hegel, Marx, Comte, Spencer, Lamarck, Darwin and Huxley, etc. Piaget inherits their historical or evolutionary outlook. From his autobiography it is clear that biology, especially evolutionary biology, has always influenced his thinking. The nineteenth century thinkers believe that reality was a lawful process of evolutionary change. Piaget shared their belief that reality – biological, physical, psychological, social and intellectual -- is evolving in the direction of progress. That is, it is Piaget's conviction that the development of moral, rational, social, emotional and scientific judgement are isomorphic and can be seen as different facets of one basic and ultimate reality underlying process of equilibruim which is rational in nature.

Central to Piaget's philosophical canvas is also the view which he calls Structuralism. Structuralism as a philosophical position is held by such diverse thinkers as F.de Saussure, Lévi-Strauss, Chomsky and Marxists like Althusser and Godelier. Piagets commitment to Structuralism has visibly influenced his scientific works. Like other structuralists Piaget aims not to make quantitative productions based upon statistical measures or emperical laws but to weave a formal system in terms of which

"The actual is now interpreted as an instance of the possible"[22]. Of course a structuralist usually avoids the question about why a particular possibility was actualized, rather than some other. However, Piaget's adhearence to the structuralist approach places him far away from the Positivists. Unlike Positivistically oriented scientists, as Margaret Boden puts it,

> "Structuralists may ... consider relatively few cases, but they typically believe that their theories are interesting because they mark universal -- though highly abstract features of the mind".[23]

It must be noted, however, that Piaget's Structuralism has certain distinctive features. Firstly, Piaget's structures are neither things nor beliefs but coherent sets of mental operations that can be applied to entities in individuals psychological space. Secondly, and more importantly, Piaget's structuralism is organically related to his conviction that reality has to be grasped not in its staticity but in its change. As Gruber and Voneche lucidly points out

> "he is not only interested in showing that, at each stage of development, a great variety of acts express the same structure; he is also interested in the way in which structures are transformed from stage to stage. He has given fuller attention to and been more successful at the first of these tasks. But there is no questioning that his aim is a developmental or genetic structuralism. In this respect his intentions are quite distinct from the contemporary structuralist movement that explicitly avoids genetic or historical explanations, choosing instead to elaborate ahistorical analysis of structures as they are at a given moment or

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[22] Piaget Jean, *Structuralism.* p.38.

[23] *Piaget.* p.25.

period."[24]

It is this inseperability of genesis from structure that leads Piaget to give central place to the concept of Dialectic which in turn takes Piaget's structuralism away from that of Lévi-Strauss and brings him close to Marxist structuralists like Althusser and Godelier. Attacking Sartre's position as enunciated in his work Crtique of Dialectical Reason, Lévi-Strauss questions all those theories which assigned privilege status to history. Referring to this debate Piaget says,

> "an examinations of this debate seems to us all the more in order because both of the antagonists appear to us to have forgotten the fundamental fact that in the domain of the sciences themselves structuralism has always been linked with the constructivism from which the epithet "dialectical" can hardly be withheld."[25]

Piaget defends Sartre's constructivism but rejects Sartre's view that constructivism is peculiarly philosophical and alien to science. Sartre's view that confines constructivism and thus dialectic to philosophy implies that Sartre accepts the Positivistic account of science. In fact Positivism is a movement in philosophy and is

> "not the same as science (of which it gives a systematically distorted picture) but-- as Meyerson often pointed out -- even the roost Positivistic scientists do not act on the credo they expound in their prefaces".[26]

On the other hand, Piaget rejects Lévi-Strauss's idea that

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[24] 'Introduction'. *The Essential Piaget.* p.XXXI.

[25] 'Structuralism and Dialectic'. *The Essential Piaget.* p.775.

[26] *Ibid.* p.776.

dialectical reason is always "constitutive"[27] in the sense of building bridges and crossing them, whereas analytic reason separates because it wants not only to understand but to control. Lévi-Strauss's contention that dialectical reason is not something other than analytical reason but something additional in analytical reason[28] is not acceptable to Piaget according to whom "to describe the work of construction for which the dialectical attitude calls simply a matter of

> "throwing out bridges over the abyss of human ignorance whose further shore is constantly receding is insufficient. It is *often construction* itself which begets the negations along with the affirmations, and the syntheses whereby they are rendered coherent as well."[29]

In other words Lévi-Strauss construes Dialectic *in* a non-constructivistic sense because he is held captive by a static and ahistorical idea of reality. Piaget's insistance upon inseparably connecting "Construction" and "Dialectic" and both with "Structure" brings him close to Marxists Structuralists, especially Godelier. Godelier even while maintaining that fchejre is a priority of the study of structures to that of the genesis or evolution in Marx, nonetheless rightly insists

> "the method of structural analysis will, in other words, have to be generalised so as to become capable of explaining the conditions of variation and evolultion of structures and their functions."[30]

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[27] Cf Levi-Strauss. *The Savage Mind.* London, 1966, p.246.
[28] Cf *Ibid.*
[29] *Ibid.* p.776.
[30] quoted in `Structuralism and Dialectics'. *Ibid.* p.779.

Approving fully Godelier's methodological injunction, Piaget emphatically says,

> "For a structuralism of this sort, structure and function, genesis and history, ... are ... inseparable, the more so the more it perfects its analytical tools."[31]

Piaget reinforces the concept of Dialectic in his structuralist scheme by calling his version Operational Structuralism.

Accoring to Piaget, unless structuralism wants to avoid, on the one hand, being replaced by atomistic association which reduces the whole into parts or, on the other hand, lapse into a theory of Platonic Forms or Kantian Categories or Husserlian Essences, Structuralism has to be relational or operaional. Such a relational Structuralism maintains that

> "it is neither the elements nor a whole that comes about in a manner one knows not how, but the relations among elements that counts. In other words, the logical procedures or natural process by which the whole is formed are primary, not the whole, which is consequent on the system's law of composition, or the elements."[32]

The above discussion, to an extent brought to surface the central character of Piaget's general philosophical orientation. Needless to say, Piaget's criticism of the alternative philosophical theories are neither conclusive nor convincing. However, they sufficiently indicate his reasons, albeit not very strong, for his dissatisfaction with the various philosophical trends current in the twentieth century. It is true that his own philosophical stand point has not been articulated with the .

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[31] *Ibid.*

[32] *Ibid.* p.770.

rigour familiar to philosophers. Yet, Piaget succeeds in providing his readers sufficient inkling regarding the philosophical underpinnings of his multifaceted work which ranges from Epistemology and Logic to Education and Social Theory. In fact his empirical work in Genetic Psychology can be appreciated, Piaget repeatedly emphasises, only by placing it within the philosophical context of his Genetic Structuralism. This is especially so about his seminal contributions to Epistemology.

Following this highly sketchy and extremely loose description of Piaget's general philosophical framework we shall discuss Piaget's views regarding knowledge in general (Chapter 3) and scientific knowledge in particular (Chapter 4). But. these have to be necessarily preceeded by a detailed discussion *of* Piaget's epistemological framework which, according to him, radically departs from the Theory of knowledge as traditionally construed.

CHAPTER 2: PIAGET'S THEORY OF EPISTEMOLOGY

Epistemology or theory of knowledge which is the study of the nature and limits of knowledge is as old as philosophy itself- From the beginning it was accorded an importance which was next only to metaphysics.

Traditionally, epistemology has always sought to study the nature and limits of knowledge by trying to discover the norms that ought to be met in order that a knowledge-claim becomes genuine. The appraoch of epistemology through out history can thus be characetrised as Normative. The Normative idiom of traditional Epistemology by implication placed knowledge out of the world of nature. For, the terms of the study of the natural objects or facts are descriptive, whereas those of the study of knowledge are non-descriptive or normative. Knowledge, therefore, according to traditional epistemology is qualitatively different from, and belongs to a level distinct from the world of nature. The Normative orientation of traditional Epistemology led to the subordination of the Epistemology to Metaphysics. For, every Epistemologist sought to and was required fco demonstrate that what he considers to be the norms of knowledge are grounded in Reality. In other words, the transcendental justification of an epistemological theory concerning norms of knowledge was sought, to be provided by deriving an epistemological theory which needed such justification from a metaphysical theory which has its own grounds to stand on. This explains how epistemology was parasitic upon metaphysics.

The normative approach of Epistemology has been challenged in twentieth century. Some philosophers have attempted to provide what they called Naturalistic orientation to Epistemology. According to such Naturalistic Epistemologists, the terms of epistemological discourse ought to be descriptive rather than normative, thereby implying that knowledge is part of the world of nature. This trend got a fillip in the works of Quine. The Naturalisitc Epistemology has various versions. If knowledge is part of natural world and not different from it, is it essentialy psychological, biological or social? Going by the answers to this question we have three versions of Naturalistic Epistemology, namely,

a) Genetic Epistemology (Piaget)

b) Evolutionary Epistemology (Toulmin and others) and,

c) Social Epistemology (Steve Fuller is the roost recent champion of this trend).

Of course, Piaget's Genetic Epistemology is not averse to the idea that knowledge is not merely a psychological phenomena but also a biological one. Perhaps it may be wrong to draw a hard and fast line between psychology and biology in the case of Piaget. However, the emphasis which psychological considerations get in Piaget's Epistemological writings is sufficiently heavy to take him as claiming that knowledge is essentialy a psychological phenomenon.

Of course, there are Epistemologists today who *are* neither purely Naturalists nor purely Normativists. The Epistemologists

who work within the framework of either Analytical philosophy or Popper's Critical Rationalism may be called Semi-Normativist. For, while insisting upon the Normative character of the Epistmological discourse, they do not, unlike traditional Normativists, try to ground what they consider to be norms in *anything* like a Metaphysical Reality. Rather, they try to trace these norms either to langauge (as in the case of Analytical philosophers) or our biological needs of survival, as in the case of Popper. A similar half-blown normativism is attempted at by LarryLauden recently, whose much discussed papers try to articulate what he calls 'Normative Naturalism'.

Be it as it may, the important fact to note here is that the twentieth century has witnessed a *new* trend in Epistemology called 'Naturalism' which broke the monopoly of Normativism. The first important characteristic of Piaget's Epistemological framework is its Naturalistic orientation[1] – a fact which is in consonance with his known anathema for metaphysics-centered philosophy. However, as we shall see later in detail, Piaget integrates within his works both Normative and Naturalistic orientations in a philosophically splendid way. He synthesizes Normativism and Naturalism in a way that he transcends both. In other words, though Piaget *does not* reject *normativism in* Epistemology, he naturalises it sufficiently to mark a radical

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[1]The expression 'Naturalistic' has been used by Piaget *himself* to characterise his epistemological position. Cf *The Principles of Genetic Epistemology*. p. 17.

break with traditional Epistemology.

The second important characteristic of Piaget's Genetic Epistemology is its insistance that an adequate epistemological theory must set its eyes on the dynamics of knowledge. That is, knowledge must be considered primarily as a process. In other words, an epistemologically satisfactory theory of knowledge must capture knowledge in its dynamic mould. Genetic Epistemology is dissatisfied with traditional epistemology precisely because the latter considered the growth of knowledge to be irrelevant to its philosophical account. Criticising classical thoeries of knowledge, Piaget says,

> "The common postulate of various traditional epistemologies ... is that. knolwdge is a fact and not a process and that if our various forms of knowledge are always incomplete and our various sciences still imperfect, that which is acquired is acquired and can therefore be studied statically".[2]

The central aim of Genetic Epistemology is to provide a theory of knowledge in terms of the basic mechanisms that underlie the dynamics of knowledge.

Thirdly, Genetic Epistemology claims to be primarily a scientific theory. It is a known historical fact that different scientific discplines were once part of philosophy and at different tiroes and at different stages of thier development they became independent of philosophy. According to Piaget, it is now time for epistemology to claim its independence from philosophy. By such a secession philosophy will gain, since

"Philosophy has always been renewed by the sacrifices it

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[2] *Psychology and Epistemology: Towards a Theory of Knowledge.* p.1.

has been forced to make which have been rebounded in the form of reflections on new scientific activities".[3]

As we have rioted in the previious chapter, in Piaget's opinion there is no hard and fast line between scientific and philosophical problems. A philosophical problem becomes scientific when it is delimited and certain intersubjective methods of testing are evolved so as to make possible some amount of consensus over its solution. GeneticEpistemology converts the philosohical problems regarding knowledge into scientific ones. The required delimitation is done by disassociating the epistemological problems from the metaphysical issues with which they were inextricably associated by traditional epistemology. To quote Piaget again,

> "Instead of asking ourselves what knowledge in general is or how scientific knowledge (likewise taken in general) is possible, which naturally entails the consititution of an entire philosophy, we can limit ourselves by method to the following "positive" problem: how is knowledge increased? By what process does a science pass from a specific knowledge, later judged insufficient, to another specific knowledge, later judged superior by the common consciousness of adepts to this discipline?"[4]

Thus, dissociating epistemological problems from their metaphysical moorings results in a radical metamorphosis of the problems themselves. Further, Genetic Epistemology seeks to evolve certain methods which will help towards evolving consensus over thier solution. Piaget identifies two such methods — a) Psychogenesis and b) Historico-critical method. The method of psychogenesis consists in the careful study of the way the

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[3] *Ibid.* p.90.

[4] *Ibid.* pp.26-27.

cognitive development takes place in an individual. The second method pertains to the study of the development of science, the most evolved type of knowledge. We shall be explicating these methods in detail later.

The next defining feature of Genetic Epistemology is the centrality of the concept of structure. As Margaret Boden points out,"Structure ... is a crucial Piagetian idea".[5] As we shall see in chapter 3, it is a central contention of Piaget that the evolution of human knowledge displays transitions from one structure to another. In fact all knowledge is essentially structuration. To quote Margaret Borden again

> "For Piaget, a child who puts pebbles in a straight line, arranges sticks according to the length, or sees the ball as the cause of a broken window, is creating order rather than finding it waiting in the world; but she could not have done these things without a long process of bodily and mental activity whereby the various intellectual structures of ordering were themselves constructed."[6]

Cognitive development indicates a qualitative shift, emanating from the transformations in the underlying structures or principles in accordance with which cognitive activity is organised. Central to Piaget's notion of structure are wholeness, transformation and selfregulation. A structure is a unified whole and its parts are identified in relation to each other and their location in the overall structure. Secondly, for Piaget, structures are dynamic both in their development and

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[5] *Piaget*. p. 18.

selfmaintenance. By construing knowledge in terms of structures Piaget distances himself from Empiricism and by construing structures as dynamic he distances himself from Rationalism. Empiricism which Piaget calls, 'geneticism without structure' maintains that knowledge develops and grows in the individual without the growth confirming to *any* general principles; it comes about and grows adventitiously as experience comes. Hence there can be no principles governing its growth. The opposite view which Rationalism maintains and which Piaget calls, 'structure without genesis', maintains that the individual is born with the principles of his subsequent intellectual development already built in. Thus, according to Rationalism no new development takes place in any important sense. What we call growth of knowledge is pre-figured in the structure with which we are bora. Piaget steers clear of these two extremes and maintains what he calls -- "Genetic Structuralism". According to Genetic Structuralism there roust be principles that govern the growth of knowledge in the individual and these principles are a function of the system constituted by the interaction of the individual with the environment.

The epistemological framework of Piaget is claimed by him to be "Dialectical" in its spirit. He often refers to his position as `Dialectical Constructivism'.[7] Dialectics denotes a triadic movement or argument which passes from the thesis, to its

[7] Cf *Biology and Knowledge*, p. 212.

contradictory, the anti-thesis, and then to the synthesis which in turn can act as a new thesis begetting a novel synthesis on a higher level. The progression from one level to another is not a linear sequence but a spirally creative process. Central to the dialectical thinking is the idea that all novelty arises out of necessity. Piaget regards dialectics as "Inherent in all the sciences involving an evolution or a becoming".[8] According to Piaget, novelty constitutes the essential feature of knowleldge and hence art adequate epistemology must make it the focal point of its attention. Such an epistemology is dialectical in the sense it maintians that

> "all knowledge involves an aspect of novel elaboration, and the important problem for epistemology is to reconcile this creation of new material with the two fold fact that on a formal level the novel items are linked by necessary relationships as soon as they are elaborated; and on the level of reality they make objectivity possible, and they alone do this".[9]

Not only Piaget construes the essential problematic of epistemology in dialectical terms, he construes his own position as a dialectical product of opposite theoritical traditions - Thus, in psychology the thesis, anti-thesis and the synthesis are respectively typified by Behaviourism, Gestaltism and Piaget's own Developmental Psychology. In Biology they are represented by Lamarkism, Darwinism and his own theory of 'Evolution by Epigenetic Assimilation'. More importantly in philosophy the thesis, anti-thesis and synthesis are exemplified by Empiricism,

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[8] *Insights and Illusions of Philosophy.* p. 115.
[9] *Ibid.* p. 14.

Rationalism and Genetic Epistemology. Thus Piaget's Genetic Epistemology is dialectical in two senses: a) It is itself a dialectical outcome of a conflict between two opposite theories of knowledge that dominated the tradition; and b) It seeks to provide a dialectical account of knowledge wherein knowledge-process involves not merely a change but development which, in Kitchener's words,

> "Proceeds towards more rational, comprehensive and adequate totalities, in which some parts of earlier stages are negated and *some* retained, but always in a new form that transcends the earlier ones".[10]

Piaget calls his Epistemology "Constructivist". Knowledge, according to him, has to be understood in terms of the constructive activity of the subject – the activity of constructing structures in succession which exhibits a progressive degree of equilibrium. In other words, knowledge is not so touch discovery as construction. Structures which the subject constructs are neither discovered in nature completely nor inherent in the self. To understand knowledge is to understand the constructive function of the subject -- the active creation of novel structures. While Empiricism ignores activity and structure entirely, Rationalism posits active structuration with no attention to the processes by which the structured whole is formed. Mo doubt the rationalists rightly rejected the passive conception of the knower as entertained by the fttapiricists. They considered the knower to be an active agent

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[10] *Piaget's Theory of Knowledge: Genetic Epistemology and Scientific Reason*. p. 92.

structuring experience in terms of the structures he is endowed with- Piaget is not satisfied with the kind of and the degree of activity Rationalism attributed to the subject. According to Piaget, the subject is so active in the knowledge process that he constructs the structures rather than merely inheriting them. A point which is crucial to note in this connection is that in Piagetian consturctivist scheme, in the very process of constructing the structures the subject constructs and reconstructs itself. Knowledge, thus involves construction in this double sense -- a point so crucial to explain why Piaget considers constructivism as an essential component of his epistemological framework. The process of structure construction is what propels the development of forms and categories which are not given to us within a fixed scheme but are developed by us from primitive beginnings by successive cycles of interaction with environment -- a point with which Kantianism is ill-at-ease although Piaget finds his constructivism to be "very close to the spirit of Kantianism".[11] Of course, Piaget concedes, "that all construction elaborated by the subject presupposes antecedent internal conditions, and in this respect Kant was right".[12] However, the emergence of non-euclidian geometry by reducing the euclidian geometry to a particular case nullified Kant's idea of the universal necessity of euclidian space.

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[11] *Insights and Illusions of Philosophy.* p. 57.
[12] *Principles of Gene tic Epistemology.* p. 91.

Piaget contends that Kant's conception of antecedent conditions for the subsequent construction was too rich and concludes

> "so it seems that if we wish to arrive at an authentic apriori, we roust progressively reduce the `intention´ of the initial structures until what remains qua antecedent necessity is reduced to a simple functioning. It is from the later that these structurings originate: in the Lamarkian sense in which **the** function creates the organ -- which is still true on the phenotypic level. Clearly, then, this functional apriorism in no way excludes but rather lends support to the theory of the continuous construction of new structures".[13]

The above discussion was purported to bring to surface the seminal features of the epistemological framework which informs and guides Piaget's views regarding the nature of knowledge. Throughout this discussion we tried to show how Piaget claims that his epistemology is a) Process-oriented b) Naturalistic c) Scientific d) Structuralist e) Dialectical and f) Constructivist, set his position apart form the whole of traditional epistemology. We will augment this discussion by looking at what he considers to be the methods of Genetic Epistemology, his attempt to transcend Naturalism-Normativism dichotomy and his position vis-a-vis time honoured philosophical theories like Idealism, Materialism, Realism, etc.

According to Piaget, two methods are available to Genetic Epistemology: a) Historico-Critical method and b) Psychogenesis - The **first** method consists in *the study of* -the evolutionary and logical relations between certain epistemic elements or categories like number, space, time etc. so as to map -their

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[13] *Ibid.*

structural relations occuring over a time and leading up to the contemporary scientific thought. It seeks to lay bare the structural and developmental relations between basic scientific concepts. In the words of Kitchener,

> "What is significant about the historico-critical method is Piaget's conceptualisation of it as a history of scientific concepts or categories of thought, a conceptual history incorporating the concepts that are necessary for scientific thought – logic, space, time, causality, quantity, classification and so on. The critical half of the historico-critical method consisted of critically evaluating the nature, validity and limitations of scientific concepts whereas the historical aspect insisted on performing this critique by reference to the actual history of science".[14]

However, the historico-critical method is alone insufficient "because the scientific notions are initially tied to those of commonsense and because the prehistory of these notions risk forever being unknown, that it is necessary to complete the historico-critical method by the psycho-genetic method."[15]

The psychogenetic method is so crucial that "The first principle of genetic epistemology ... is ... to take psychology seriously".[16] This method consists in the study of the *way* a human being acquires those categories or concepts which he applies to the data of his experience and which Kant so, successfully recognises. For example, at birth a child has no knowledge of propositional necessity whereas at adolosence he/she does. Hence the question would be,how is it possible for the

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[14] *Piaget's Theory of Knowledge: Genetic Epistemology and Scientific Reason.* p.151.

[15] quoted in Kitchener. *Ibid.* p.153.

[16] *Genetic Epistemology.* p.9.

subject to attain such *an* awareness of necessity? Similar questions may be asked about such concepts *as* number, space, time, identity etc.

The significance of psychogenesis for epistemology, Piaget brings out, by comparing psychogenesis with embryology. It Is now recognised that embryology can shed light on comparative anatomy and thus on the evolutionary theory as a whole. He says,

> "such comparisons deserve our attention, for there is no doubt that child psychology constitutes a kind of mental embryology not only as a description of the individual's stages of development but chiefly as the study of the very mechanisms of this development."[17]

Elaborating the biological analogy to justify the method of Psychogenesis Piaget very lucidly points out,

> "A comparison will make this necessity understandable. A scientific epistemology, conceived as an analysis of multiple cognitive processes in their diversity, is comparable to a kind of comparative anatomy of the structure of knowledge which would confront the most distant intellectual constructions in different scientific fields to reveal invariants and trans formations. Biological comparative anatomy was intensified and enriched the moment embryology was able to reconstitute the intial development of structures which morphology failed to understand in their adult state. Thanks solely to embryological examination, a great number of relations and "homologies" was thus established. Psychological study can render scientific epistemology or the comparative theory of the growth of knowledge exactly the same service".[18]

Given the fact that Piaget's idea of the dual method is suggested by an analogy in the history of biology, it is not surprising to find him maintaining a parallelism or even an isomorphism between the two methods. According to him, though these two methods are

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[17] *Psychology and Epistemology.* p. *24.*

[18] *Ibid.* p. 105.

directed to different phenomena they converge in so far as they lay bare in their distinctive areas, patterns of cognitive developments that are identical, and it is their identity which holds the key to the question regarding the nature of knowledge.

The importance which Piaget associates with the second method shows how keen he is to add an empirical dimension fco epistemology. According to Piaget, no worthwhile epistemological undertaking can even begin without some empirical commitments regarding the nature of human psyche, though philosophers from the beginning have tried to draw a wedge between epistemology and psychology. Piaget contends

> "[all] episteraologists refer to psychological factors in their analysis, but for the most part their references to the psychology are speculative and are not based on psychological research."[19]

The psychological assumptions or claims of the philosophers either masquerade as commonsense knowledge or wear the mask of philosophy and thus go for ever undetected. All philosophers and specially the empiricist philosophers have engaged in arm-chair speculations regarding the nature of mind and mental operations while they involved in epistemological reflections. Even logical positivists are no exception to this. No doubt, they tried to depsychologise their theory of knowledge by replacing psychological locutions of their predecessors such as 'sensations', 'ideas' and 'beliefs' by neutral expressions like 'sense data', 'concepts' and 'propositions'. They, in fact,

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[19] *Genetic Epistemology*. p.7.

affirmed that logic and mathematics are nothing but specialised linguistic structures- Piaget here feels the need to examine the factual basis of this claim. He says,

> "We can look to see whether there is any logical behaviour in children before language develops. We can look to see whether the coordinations of their actions reveal a logic of classes, reveal an ordered system, reveal correspondence structures. If indeed we find logical structures in the coordination of action in small children even before the development of language, we are not in position to say that these logical structures are derived from language. This is a question of fact and should be approached not by speculation but by an experimental methodology with its objective findings."[20]

In other words, the central contention of positivi3ts is not factually opaque but is based upon questionable empirical claims which are unexamined and covert. Thus, Piaget rejects the received view in epistemology that a factual or empirical knowledge of human psyche is irrelevant to the philosophical account of knowledge.

Does this mean that Piaget seeks to reduce epistemology to psychology? The answer is `no´. First of all psychogenesis is not the only method of genetic epistemology. There is as we have seen the historico-critical method which has a strong normative component in it, precisely because it is critical and not merely historical and to be critical is to take recourse to norms. Secondly, psychogenesis itself cannot be purely non-normative enquiry. For, psychology is not purely factual. The object of psychology, according to Piaget, is action. The study of action

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[20] *Ibid.* pp.8-9.

involves two kinds of facts: the (physical) movement of the organism and states of consciousness. The special problem of psychology is to discover the relation between the two and hence to solve the mind-body problem. According to Piaget, psychological explanations of action attempt to integrate or relate the series of rational implications with the causal series. Piagets theory of equilibrium is *an* attempt to bridge this gap. For, equilibrium has a double sense: it is both causal and implicational. Thus any law of equilibrium involving the claim of increasing stability or greater mobility would be both empirical and normative. Given Piaget's conception of explanation in psychology such hybrid laws would be essential. Further, the central epistemological locutions of Piaget such as equilibrium and decentration are normative concepts since they are characterised in terms of 'increasing objectivity', 'greater problem solving ability' etc. and all these are normative concepts. Piaget brings this out lucidly when he says,

> "in sum, Genetic Epistemology deals with both the formation and the meaning of knowledge. We can formulate our problem in the following terras: by what means does the human mind go from a state of less sufficient knowledge to the state of higher knowledge? The decision of what is lower or less adequate knowledge, and what is higher knowledge, has of course ... normative aspects".[21]

Inspite of all this there is a strong impression that Piaget naturalises epistemology so totally as to reduce it to psychology. If it were so he would not have made the concept of

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[21] *Ibid.* pp. 12-13.

'epistemic subject' the nucleus of his discourse. The concept of epistemic subject cannot figure in a purely factual undertaking as it denotes not an average or typical individual but an 'ideal' that represents something universal and stands for certain norms. The very centrality of such a notio/n in Piaget must ward off any impression that he reduces Epistemology to Psychology in order to make room for a fullblooded naturalism. In fact Piaget hits the last nail on the charge that he reduces genetic epistemology to genetic psychology when he says,

> "epistemology is the theory of valid knowledge and even if this knowledge is never in a state and always forms a process this process is essentially the passage of a lesser to a greater validity ... (and) such a process raises questions of both facts and validity. ... if it were a matter solely of facts, epistemology would be reduced to a psychology of cognitive functions, and psychology is incompetent to solve questions of validity."[22]

Thus though genetic psychology is not merely a factual study as its subject matter calls for more than mere organisations of mental fact on causal lines, epistemology still cannot be reduced to genetic psychology since the former is essentially committed to the concept of validity which is irrevocably normative, however much, genetic psychology might shed light on the central epistemological issues. Thus Piaget has provided a factual or naturalistic dimension to epistemology without setting at naught its normative character. Hence, Piaget is both a naturalist and a normativist, or better still is neither naturalist nor a normativist as he questions the very dichotomy between the

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[22] *Psychology and Epistemology*, p. 8. (emphasis added)

from some point of view. To see something is to place it in a certain cognitive structure which gives it a meaning that involves a relation between a signifier *(an* image) and tJse signified (a system of schemata). It is undoubtedly true that such a conception of object and subject takes Fiaget very close to idealism. He would definitely agree with Marx who said,

> "The chief defect of all hitherto existing materialism — that of Feuerbach included — is that the thing, reality ... is conceived only in the form of an object, ... but not as human sensuous activity, practice, not subjectively. Hence it happened that the active side, in contradistinction to materialism was developed by idealism".[23]

Also Piaget's much vaunted proximity to Kant reinforces idealism into his thinking. For, Kant's distinction between the world of experience (Phenomena) and the transcendental world (Noumena) expressed a strongly idealistic streak in his thinking. However, Piaget tries to ward off the impression that he is an idealist by appealing to the biological basis of knowledge when he says,

> "To attribute logic and mathematics to the general coordinations of the subject's action is not an idealistic overestimation of the part played by the subject, it is a recognitioin of the fact that, while the fecundity of the subjects thought processes depends on the internal resources of the organism, the efficacy of those processes depends on the fact that the organism is not independent of the environment but can only live, act or think in interaction with it".[24]

But this biological argument is as weak as the refutation of idealism by Dr.Johnson who kicked a. stone to prove that Berkeley was wrong. Yet, Piaget cannot be branded as an idealist, without

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[23] 'Thesis on Feuerbach'. *Selected Works. Vol.I.* Progress Publishers, Moscow, 1969.

[24] *Biology and Knowledge.* p.345.

qualification. In order to uderstand Piaget's position vis-a-vis Idealism-Realism controversy it is necessary to understand in what sense he is an idealist. Piaget rejects materialism of the usual type as he rejects the reduction of psychology from physiology. He defines psychology as the science of "implicatory" rather than 'causal relations'.[25] Thus he distinguishes cognitive processes ('implications') from their material embodiment ('causes'). Piaget's anti reductionism is heavily coloured by his Kantianism. This is evident when he says,

> "psychology thus occupies a key position if the sciences of nature explained the human species, humans in turn explain the sciences of nature, and it is upto psychology to show us how ... It follows that the system of sciences cannot be arranged in a linear order ... [but their forms] is that of a circle, or more precisely, that of a spiral as it becomes ever larger. In fact, objects are known only through the subject, while the subject can know himself or herself only by acting on objects materially and mentally."[26]

In other words, Piaget's idealism has to, be understood not in metaphysical sense since he questions, without being a positivist, the legitimacy of metaphysics as an area of knowledge and considers it to be aiming at wisdom (coordination of values). His idealism implied by his rejection of reductionism has to be understood in epistemological sense. That is, his is, epistemological idealism as opposed to epistemological realism. Against epistemological realism which maintains a copy theory of

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[25] *Experimental Psychology its scope and methods.* vol.7.

[26] *'What is Psychology?' American Psychologist.* vol.33. (1978), p.651.

cognition, Piaget maintains that all our knowledge is mediated via the subject constructed structures. Hence as Kitchener says, "it is both correct and illuminating to view Piaget's constructivism as a Kantian view about noumena and phenomena."[27] Piaget maintains like Kant, that object in itself can never be known but that one can believe in its existence and one's knowledge can approach this object as a `limit'. The question whether our knowledge progressively approaches the object in itself, Piaget's answer is that, there is a direction to the growth of our knowledge and that by a series of successive approximations our knowleldge increases towards a mathematical limit. No doubt Piaget seeks to justify his assumption of the existence of an independent object by saying that it is the only possible explanation of the orthogenetic progress of science. He writes,

> "the existence of this object [i.e., the object as a limit] constitutes the only possible explanatiion of the directed approximations, even if one is never certain of having attained the end and even if the knowledge acquired in the course of this history prevents us from believing in all ultimate characteristics."[28]

From this it appears that Piaget is trying to solder a type of metaphysical realism on a Kantian-looking veriety of epistemological idealism. Yet, he disowns metaphysical realism as he amply makes clear when he says,

> "certainly one may say that reality explains the evolutioin of science, for experimental science is a

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[27] *Piaget's Theory of Knowledge*: Genetic Epistemology and Scientific Reason.* p.105.

[28] quited in Kitchener. *Ibid.* p. 108.

> progressive conquest of reality. Eut reality is never given in itself, science assimilates only by means of mathematical frameworks. Hence one attempts in vain to establish the laws of science by invoking reality, as if reality is external to scientific reasoning and exerted pressure on it form outside".[29]

Thus Piaget is, on the one hand, unequivocal in his rejection of epistemological realism but equivocal in his acceptance of metaphysical realism.

As noted earlier the two methods of Genetic epistemology namely a) psychogenesis and b) historico-critical method are directed towards two distinct phenomena namely a) the psychological development of the individual and b) the historical evolution of scientific concepts. These two phenomena constitute two inseperably related areas of enquiry for Genetic Epistemology. They constitute the ontogenetic and phylogenetic dimensions of Piaget's epistemology. In chapter 3, we deal with the ontogenetic component of genetic epistemology and in chapter 4, the phylogenetic one.

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[29] quoted in Kitchener. *Ibid.*

CHAPTER 3: PIAGET'S THEORY OF KNOWLEDGE

This chapter constitutes the denouement of the dissertation as it seeks to bring together Piaget's views on the nature of knowledge which he claims to have been justified by his empirical findings.

We begin with his concept of epistemic subject. The existence of an epistemic subject is taken by him to be axiomatic. The centrality of this concept to Piaget's thought distinguishes him from the typical psychologists including the developmental psychologists with whom he is identified- For, developmental psychologists even when they concentrate on cognitive aspects of human personality, are concerned with either in groups or separately. The study of the latter results in an interest in unique characteristic of individuals, whereas the focus on the former leads to *an* interest in group averages. However, Piaget is interested in neither. His focus is on, what he calls an epistemic-subject, "that which is common to all subjects at a same level of development."[1] Whereas the individual subject is centered on the conscious self, the sense organs or its own actions and hence is basically egocentric, the epistemic subject is decentered.[2] The epistemic subject is thus an abstract, ideal knower supposedly exemplified by every normal individual. The concept of epistemic subject involves the notion

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[1] Beth. E. W. & Piaget. J. *Mathematical Epistemology and Psychology.* p.308.

[2] Cf *The Place of the Sciences of Man in the System in Sciences.* p.25.

of reason and rationality which according to Piaget, is universally present in the individuals. This abstract entity called epistemic subject should not be understood to be an average or mean of all the individual elements composing it. In *an* average every characteristic of the members of the class is relevant. When an average includes individuals that are abnormal, it does not obtain the typical normal individual whereas in the case of an ideal entity only certain normative properties of healthy specimens are considered. Whether it is Chomsky's "ideal-speaker" or Piaget's "Epistemic-subject", as Kicthener points out,

> "the assumption is that under ideal conditions, every actual member would attain this level of competence, even "though many of them actually do not."[3]

In the empiricist tradition the subject, if at all it exists, exists for name sake. In fact it has a derivative existence since it is nothing more than the seat of experience. Its role is completely passive. The rationalists tradition no doubt makes room for the activity of the subject in so far as \it construes knowledge as something involving more than experience. The subject is considered to be the locus of once-and-for-all given a-priori concepts which constitutes the crucial elements of human knowledge. Yet,in the rationalists tradition the subject remains static like a screen on which the pictures are projected and in that sense alien to knowledge both as a product and as a

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[3] *Piaget's Theory of Knowledge: Genetic Epistemology and Scientific Reason.* p.27.

process. It is, therefore, not surprising that Popper's Theory of knowledge which he calls Critical Rationalism construes knowledge as essentially objective and seeks to develop an epistemology without a subject. On the other hand, Piaget radically transforms the active role of the subject in the rationalist scheme. The active subject of rationalism becomes constitutive of the knowledge system at the hands of Piaget with the result that the epistemic subject of Piaget grows with the growth of the knowledge. An epistemic change, therefore, is the subject-transformation. In other words, because the subject is constitutive of knowledge the subject re-creates itself in and through the cognitive process. Though it is illuminating to see in Piaget a lot of parallelism with Kant his dynamic conception of the subject is intimately related to the conception of self as entertained by the Expressivist Philosophers, like Schelling and Herder, who reacted against the idea of self as an unchanging substance. Just as self, according to the expressivists, expresses itself through life and life's activities and transforms itself through that very process of expression, the epistemic subject of Piaget expresses itself through cognition and transforms itself by that very process since it is constitutive of cognition itself. Thus, though the concept of epistemic subject is *never* totally absent in the philosophers' analysis of knowledge, the concept assumes a connotation and significance in Piaget's scheme which it does not have previously either in his empiricist or rationalist predecessors.

Equally important to note in connection with Piaget's notion of epistemic subject is his idea of subject-object relation which can be appreciated only in the background of Piaget's Theory of Relations. Piaget opposed the traditional view that individuals are logically prior to their relations. He also opposed the equally strong traditional view that relations are logically prior to the individuals that *are* related. Piaget is not even satisfied with the interactionist view which tries to reconcile the traditional view. The eminent pshychologist Meachem points out,

> "whereas in the interactional model the individual and the cultural-historical contexts *are* viewed as primarily static elements that act upon each other, in the transactional model these are viewed as continually changing derivatives of an ongoing activity or transaction."[4]

As Kicthner says, "this transactional model clearly underlies Piaget's Theory of Rationalism"[5], which he puts forward as an alternative to atomism and holism, when he says,

> "The relational method thus consists in beginning neither from preliminary, isolated elements (atomistic method), nor from ready-made totalities corresponding to primitive intuition, but from a construction of relations each of which is already "totalised" in a sense and which results in structures d'ensemble or totalities in the strict sense, but without supposing them from the beginning or ignoring them afterwards and constituting them in an intelligible form."[6]

Piaget's espousal of relationalism leads him to consider subject and object not only as interdependent but as internally related

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[4] quoted in Kitchener. *Ibid.* p.48.

[5] *Ibid.* p. 48.

[6] quoted in Kitchener. *Ibid.* p.49.

to each other in the sense the relations between them modifies and change both of them. In fact, according to him, there is no exact or fixed limit or boundary between them. He explicitly says,

> "there does not exist a static limit given once and for all between subject and object because the mind gradually constructs itself and at different stages of this construction the boundary is thus re-drawn."[7]

It is Piaget's repeated assertion that there exists between them a complex of relations, of change, and reactions which imply complete continuity and one cannot treat subject and object as seperate from the context or continum constituted by the system of interactions that unify them. But does this mean that the concept of epistemic subject is ontologically empty? Piaget's point is that the distinction between the subject and the object is real but not absolute. It is real becuase it is the subject which acts on the object and it is not absolute because by the very action the subject changes itself. It is significant to note here that the identity of the subject is maintained and retained, according to Piaget, by action. In other words, the subject is subject precisely because it can act on the object. That is to say, the defining characteristic of the subject is its activity. Hence, according to Piaget, all knowledge begins not with experience but with action. In fact an important service, in Piaget's view,

> "that contemporary genetic psychology can render the study of elementary relations between the subject and

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[7]quoted in Kitchener. *Ibid.* p.48.

> object of knowledge is to free us from that tenacious and deadly illusion that all knowledge comes from "sensation".[8]

Psychogenetic analysis can establish a continuity between logico-mathematical or physical operations and actions conceived as the source of the act of intelligence itself. It is the infants sensory motor activity that enables him to organise schemes of the permanent objects and of the practical space of displacement. As the primitive universe of change is the objectless one and the perceptions in such a world do not suffice to provide substantiality without moving scenes the problem is, how does the child construct the notion of object. According to Piaget,

> "In so far as the subject succeeds in finding them again by a systematic co-ordination of movements, does he believe in the objects ... and this co-ordination is nothing more than the product of a system of compositions in which the means of detour and return to the initial point plays an important role . . . Object permanence and the practical group of displacements are •therefore constructed simultaneously by actions."[9]

Further, the "Form Constancy" the essential geometrical characteristic of a solid object, as experiments have shown, is only acquired by the child due to the manipulation of all objects. Thus, elementary knowledge is the result of the activity of the subject to incorporate the objects to the scheme of its own actions capable of reproducing and combining among themselves. In fact even the most abstract engagements of the subjects as in the case of logic and mathematics are to be

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[8] *Psychology and Epistemology.* p. 105.
[9] *Ibid.* p. 107.

understood in terras of or as extensions of the subjects' concrete actions. In Piaget's words, "operations of intelligence *are* nothing more than . . . actions interiorised and comparable among themselves in a reversible manner."[10] In short, even at its initial stage human knowledge exhibits too complex a relation between the subject and the object to be captured in either Empiricist or Rationalist terms. The complexity can only toe taken care of by explicating it in terms of the way the human subject engages in the activities and how he judges these activities in terms of certain goals. Piaget provides a wealth of factual information to show how it is the actions of the subject that sets in motion the cognitive development whose logic Piaget seeks to capture in terms of a pattern. It is this pattern which constitutes the central theme of Piaget's theory of knowledge.

The pattern of cognitive development according to Piaget, has to be mapped in terms of what he calls stages. Piaget identifies four major stages of cognitive development. They are a) Sensori-motor stage b) Pre-operational c) Concrete operational and d) Formal operational stages. These four stages are not about the actual behaviour but about the cognitive structures underlying the behaviour. Piaget's theory is basically one of epistemic competence and his stage structures are put forward as models of the underlying mental reality. In this sense Piaget is very close to Chomsky, according to whom,

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[10] *Ibid.* p. 108.

> "... linguistic theory is mentalistic, since it is covered with discovering a mental reality underlying actual behaviour. Observed use of language or hypothesised dispositions to respond, habits and so on, may provide evidence as to the nature of this mental reality [i.e., competence], but surely cannot constitute the actual subject matter of linguistics ... "[11]

In other words, Piaget's [fc]stages' has to be taken to refer to the mental phenomena comprising of cognitive competence that makes certain overt behaviour possible. Such a mentalistic interpretation makes Piaget stand diametrically opposite to the behaviouristic interpretation of 'cognition' and its cognate concepts and interpretation to be found in the writings of many analytical philosophers.

In the first stage, which Piaget calls the sensori-motor stage or the period of infancy, the infants ways of knowing *the* world is sensory, perceptual and rootoz'ic. In this stage, actions begin to take the form of simple explorations geared towards the noticing their environmental consequences. There is a movement towards true intentionality and the development of more directed behaviour. Intelligence begins to manifest in the growing capacity for covert and symbolic manipulation of objects. Most crucial in this stage is child's overcoming egocentrism. In the beginning the child does not make the distinction between himself and the world,for he is not aware of himself- As piaget paradoxically puts it, "The self is at the center of reality to begirt with, for the very reason that it is not aware of itself."

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[11] *Aspects of Theory of Syntax.* M.I.T. Press, Cambridge. p. 4.
[12] quoted in Kitchener. p.21.

The process by which the child seises to identify world with himself and Starts making distinctions between the self and non-self is called by Piaget 'decentration' which is attained by a process of construction of an external frame of reference. The construction of such a frame of reference is due to the child's friction with others and his realization of the need to provide justification for what he does or says.

The second stage is called by Piaget Pre-operational stage by which he means that these years (2-7) *are* preliminary to the development of truly logical operations. (Operations are flexible mental actions that can be combined with one another to solve problems). The important development in this period is representational thought -- (the ability to form mental symbols to represent objects or events that are not present) and transductive reasoning -- they reason from the particular to the particualr, often in ways that are influenced by their desires. These children do not understand cause-effect relationships very well.

In the third stage, which Piaget calls stage of concrete operations, the intellectual tools that children develop constitutes the major advance in the power of the child's reasoning. The child becomes capable of logical thought. The operations are concrete in the sense that they are tied to the real world of objects and events. The children can clearly think of the objects that are real, but not very clearly about more hypothetical propositions/abstract concepts thus showing that the intellectual growth is still incomplete.

Finally, in the fourth stage which Piaget calls, the stage of formal operations the individual develops the ability to think *in* terms of abstract concepts. He is able to perform mental operations on hypothetical propositions or possibilities that may or may not be evident. It is obvious that the whole trajectory of the cognitive development spans from the most concrete actions to the most abstract operations. In other words, the path which Piaget has charted for knowledge as a dynamic process is a path from concrete to abstract via different intermediary stages.

From epistemological point of view the details of Piaget's characterisation of four stages are not important. What are important are the dynamic image of knowledge that emerges from his scheme of four stages and the type of necessity that characterises the transition between the stages as well as the teleological component of such a transition.

As noted earlier, each stage in the development of knowledge is characterised by a structure constructed by the subject in organizing the experience. The texture of a structure is such that it allows for two types of modifications, namely, a) Assimilation and b) Accommodation. Piaget speaks of assimilation as being "the incorporation of objects into structures".[13] Assimilation is the modification of the incoming stimulus or input information by the activity of a pre-existing structure. Accommodation is the active modification of the structure itself

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[13] The mental development of a child (trans. A. Tenser). In *Six Philosophical Studies.* New York. Vintage. 1968, p.8.

so as to adapt the structure to the input. Both assimilation and accommodation function together in an intimate way. In the words of Kitchener,

> "Accommodation is the process of adjusting structures to the object as assimilated, and assimilation is the incorporation of an object into accommodated structures."[14]

In fact they are the two sides of the same process of adaptation of the epistemic organism (subject) to the epistemic environment (object). The biological overtones of these concepts are too obvious even to mention. If an organism is well adapted to its environment it can be said to stand in Equilibrium with its environment. Equilibrium is a relatively stable but inherently dynamic state of some structure such that it can adapt to varied inputs without an essential change. In the course of development new experiences are either assimilated into the existing structures, thus gauranteeing a structural continuity or the new experiences necessitate the development of new systems of structures with a different equilibruim state. Thus the process of cognitive development is a progressive achievement of increasing equilibrium states. Hence, one can speak of degrees of equilibrium with the result the cognitive dynamics has to be understood, according to Piaget, not merely in terms of change but in terms of progress, that is, change with the direction, a goal or end-state towards which it is moving and the standard in the terms of which the progress *can* be assessed. Such a

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[14] *Piaget's Theory of Knowledge: Genetic Epistemology and Scientific Reason.* p.54.

teleological conception of cognitive change logically implies the relation of commensurability between stages made possible by constancy of norms. In other words, Piaget should make room for a type of continuity assured by invarience of certain standards common to all structures in relation to the assessment of the success of the latter. Without such a continuity and invarience equilibrium becomes intra-stage matter rather than an inter-stage relation leading to an epistemological relativism. Piaget's insistance on the total novelty of each stage vis-a-vis its predecessor lands in such a relativism. On the other hand, he tries to make room for an inter-stage continuity by speaking of the relation between two successive stages as a necessary one. It is in this sense and in this context that the concept of necessity acquires an overwhelming significance for the whole of Piaget's epistemological scheme. As Atkinson rightly says,

> "the necessity of the order of the stages cannot depend on any empirical facts since these cannnot, by definition, be necessary. It roust depend either on the defining of the higher stages to include the lower stages. Or else it roust depend on the overarching theory of the determinants of development. Piaget's theory uses both these reasons in claiming that the sequence of stages is necessary."[15]

The second way of establishing the necessity involves a) showing that what he considers to be facts regarding mental stages are really general; b) exhibiting a deductive relation between the statements describing those facts; and, c)showing that there is a substrate, actual or model, concrete or abstract which provides •the underlying reality of the logical deduction. In other words

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[15] *Making Sense of Fiaget: The Philosophical Roots.* p.8.

it amounts to showing that each stage is a structure of a whole such that, "once a structure is achieved, one *can* determine every operation it covers".[16] However, this method of establishing necessity involves all the thorny problems concerning the logic of explanation. The second way of establishing the necessity appear more advantageous though Piaget himself consider these two ways to be complimented. As said earlier the second method consists in showing that the structure or elements of a lower stage are an integral part of the structure of the subsequent stage. Each new stage is a transformation of the previous stage, thus making room for change as well as conservation. The structured core of the previous stage is conserved and this »is what Piaget means by `filiations´ between stages. Whenever a new stage is achieved the fundamental structured properties of the previous stage are *not* only conserved but *are* re-elaborated on a new plane. For example, the knowledge that the child constructs at the initial, that is, sensory motor stage is reconstructed by him into a novel and richer configurations at the subsequent stage. In fact, in Piaget's view, the new structure will be "based upon" the earlier one though the former is essentially new. In other words, the earlier elements will be present in the new structure in a different form. This implies that two successive stages are characterised by identity of content. atleast to an extent, on the one hand and difference in Form on

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16. 'The Stages of Intellectual Development in the Child and Adolescent'. in *The Child and Reality*. p. 52.

the other. Explicating Piaget's concepts of Form and Content in this connection Atkinson says,

> "Piaget distinguishes between the Form and the Content of knowledge. The forms are progressively constructed by a person's own actions. Since roan's action develop, the forms he constructs also develop. The content, however is influenced by the particular interactions the person has with the environment. The forms are determined by the stage of action to which the person has developed; while the content varies with the physical and social environment. Piaget stresses continuity in his definition of alteration."[17]

However, the most crucial point in this connection is whether Piaget cart reconcile his idea of relative constancy of content and radical shift in form with the dialectical relation between form and content? This is very important in view of the fact that Piaget, through out his work has accepted the idea of dialectic and dialectical logic maintains the dynamics of both form and content. In other words, Piaget has to show that the dialectical relation between form and content is not ill-at-ease with his idea of content continuity and form variation. If in order to reconcile the two he disowns the concept of content continuity, then, he is let to accept the idea of a radical discontinuity between the stages. In other words, Piaget's attempt to show that the inter-stage relation is stronger than a mere empirical regularity is not free from serious problems.

Till now we were discussing Piaget's notion of epistemic progress and the problems that beset his attempt to establish that notion. We shall briefly look at his conception of **'objectivity'**.

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[17] *Making Sense of Piaget: The Philosophical Foots.* pp. 17-18.

By and large, epistemologists in the • past have sought to establish the objectivity of human knowledge by showing that our cognitive claims are reflections of reality. As Richard Rorty has shown in celebrated work Philosophy and the Mirror of Nature there is a strong tradition in the history of Philosophy beginning with Plato which maintained that human mind," the glassy essence of man" is capable of mirroring reality. Empiricism tries to establish this *mirroring* by *showing* that knowledge is constituted by experience which is only the **result** of subjects' passive reception. Rationalists with their concept of apriori ideas faced the challenge of establishing this objectivity of knowledge by showing that apriori ideas, while being not the products of experience, are yet representative of reality. In doing so they had to explain how if at **all**, the objective world confirms to the apriori ideas, Liebnitz's concept of pre-established harmony is significant in this connection. Kant, with his strong sympathies towards Rationalism and with his dissatisfaction with his rationalist predecessor's attempt \ at establishing the objectivity of human knowledge sought to locate such an objectivity in the very constitution of the subject but the brilliant attempt of Kant resulted in an Agnosticism which no rationalist with a clear conscience can live with . Piaget attempts to provide a radically altered version of the Kantian view of objectivity sans its Agnosticism.

As we have seen Piaget rejects the copy theory of cognition. I3e lucidly remarks

> "knowing an object does not mean copying it - it means acting upon it. It means constructing systems of transformations that can be carried out an or with this object. Knowing reality means constructing systems of transformation that correspond more or less adequately to the reality. There are more or less isomorphic to transformations of reality. ...Knowledge, then, is a system of transformations that becomes progressively adequate."[18]

The transformation which the subject engages in are constitutive of the object itself. These tranformations are the products of the thinking which involves abstraction. The abstraction involved is not just empirical one – abstraction of a property from an object but also a reflective one. In reflective abstraction one abstracts a property not from an object but ones action *on* the object and, in particular, from the logical coordination of one's action. Such abstractions are **projected** on to the objects via its projection on a scheme into which an object is placed in order to understand it. Thus, all objects are constructed by the subject. Since knowledge involves action and action transforms object, every object is transformed by the *very* process of knowing it.

It is very obvious that Piaget's position is diametrically opposite to that of copy theory of cognition. How then does he show that knowledge is objective ? According to Piaget, the epistemic subject gradually attains more and more objectivity by attaining for its structures higher and higher levels of equilibrium. The evidence for such a progressive attainment of objectivity lies in the success of the organism in adapting itself to the environment. It is the role of the environment that

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[18] *Genetic Epistemology*, p. 15.

gaurantees objectivity. In other words, the relation of ' identity between the subject and organism and between object and environment is crucial to Piaget's notion of objectivity. Piaget rejects subjectivism not so much by defending objectivism but by rejecting the dichotomy between subjectivism and objectivism itself. Both subjectivism and objectivism survive on a static conception of subject and/or object. "The epistemic subject", as Kitchener says summing up Piaget's theory of objectivity,

> "constitutes the epistemic object, which is an intentional object requiring a conceptual scaffolding to make it possible. It is not, however, a completely subjective construction, *for* the environment (or reality) plays a decisive role in delimiting possible constructions and setting out constraints on our adequate construction. This entails the view that form (or structure) resides in reality as much as in the subject and hence (contra Kant) that form is not exclusively the product of the subject. Structures of reality must be assumed to exist in order to explain why knowledge progresses the way it, does."[19]

As against emperists who traces objectivity to the concrete experience of here and now, Piaget, in the words of Atkinson,

> "explains the increasing objectification of thought in terms of its increasing structural complexity and its increasing abstraction or freedom from `the here and now´, freedom from reliance on perception."[20]

In sum, the moot point is that Piaget is convinced that the proof for the possibililty of increasing accord of abstract thought with concrete reality consists in the actual fact of the increasing success with which the human organism is adapting itself to the environment by acting upon it. The influence of

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[19] *Piaget's Theory of Knowledge: Genetic Epistemology and Scientific Reason.* p.121.

[20] *Making Sense of Piaget: The Philosophical Roots.* p. 119.

Pragmatism on Piaget's theory of objectivity is too obvious even to be mentioned. But equally obvious is Piaget's intimacy with Kantianism. For, despite the dynamic character of Piaget's subject, like Kant, Piaget traces the locus of objectivity in the subject. This has led to a serious misunderstanding of Piaget's position. Those philosophers who consider 'objectivity' to be irreducibly social concept have repproached Piaget over his overtly individualistic approach. Thus, Hamlyn says that like Empiricism and Rationalism Piaget's epistemology is Individualistic. Like them it treats other people as existing for the individual simply as part of the individual's environment, as objects and not as co-subjects.[21] That is, according to Hamlyn agreement between the individuals stands at the foundations of knowledge, as Wittgenstein has convincingly shown and Piaget's individualistic approach to knowledge cannot come to terms with the communital aspect of knowledge. To an extent this charge against Piaget has some *force* since Piaget underplays the social dimension of knowledge. Yet, the force of this charge can be mitigated by pointing out that Piaget's 'Epistemic Subject' is not identical with the 'Individual'. Hamlyn may be right or not in his characterisation of traditional epistemologies like Rationalism and Empiricism as Individualistic. But he is *some* what off the mark when he makes the same accusition with the same force against Piaget. For, Piaget repeatedly makes it clear that though genetic psychology is relevant for genetic epistemology,

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[21] Cf *Experience and the Growth of Understanding.* p. 10.

the latter cannot be reduced to the former since where as the former revolves around the concept of individual the latter does so around that of the `epistemic subject/ .The epistemic subject is a normative category. That is, to be an epistemic subject is to satisfy certain norms. Norms by definition are trans-individual and therefore social. Hence, atleast indirectly an epistemic subject is not a -social. In other words, Piaget can, without inconsistency, make room for a social aspect of the epistemic subject. It is true that even then the concept of the social, in Piaget is not *very* vibrant. But so too is the concept of the social in the works of analytical epistemologists like Hamlyn. The analytical epistomologists have not embraced, a thorough going sociological conception of knowledge, nor have worked out the essential bearing *of* cultural factors on cognition. In fact, as Stephen Toulmin points out, analytical philosophers like Hamlyn, instead of developing Wittgenstein's concept of "Forms of Life" in the direction of a radical theory of cultural relativism, have attributed to him via the same concept a kind of **Kantian** absolutism.[22] In other words, analytical epistemologists enthusiasm for Wittgenstein's concept of forms of life has not resulted in sociolising the concept of knowledge in any radical way and this blunts their criticism of Piaget. By this we only mean that just as the failure of analytical epistemologists to develop a fullblooded sociology of

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[22] Cf `The Concept of Stages in Psychological Development' in *Cognitive Development and Epistemology.* p.57.

knowledge should not blind to the. positive contributions of analytical epistemology, Piaget's soft peddling of social dimension of knowledge should not detract us from recognising this fundamental insights.

Hamlyn also accuses Piaget of "incoherence" generated by an uneasy combination of the empirical and the philosophical. According to Hamlyn, Piaget's theory on the one hand, claims a factual support and on the other hand it "involves as at least one component a traditional philosophical position of its own ,"[24] namely, the Kantian position. This charge of incoherance does not stick. Hamlyn has to establish that the empirical and the philosophical conflict within any frame work. It may be that they conflict within same frame works, for example the one accepted by analytical philosophy and may not conflict within other frame works. After all two things are similar or different, conflicting or consistent depending upon a point of view. History of Philosophy has shown that there is no particular point of view which can be said to be the only possible philosophical point \of view. `Philosophy´ has been an essentially contestable concept. In sum, `coherance' or `incoherance´is essentially an intra-theoretic concept and not a theory-neutral one and our choice of a theoretical point of view may be a pragmatic one, in the sense that the choice depends upon criteria which are not and

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[23] 'Epistemology and Conceptual Development' in *Cognitive Development and Epistemology.* p.23.

[24] *Ibid.*

even cannot, be objective. Secondly, it is not *very* easy to maintain a discontinuity between the conceptual (philosophical) and the *empirical as ftamlyn seems* to think- Perhaps, an important, if not the important, way of understanding a concept Is to study its genesis and its change as the functions of the development of *&* conceptual matrix, as Toulmin advocates.[25] Thirdly, the gap which Hamlyn sees between the Theory of knowledge on one hand, and Psychology of learning on the other, might be reduced by drawing our attention to the relation between concept of knowledge and concept of learning. Perhaps, Hamlyn thinks that `knowledge´is an achievement-concept where as `learning´ is not. Even if this is so it does not follow that , a better understanding of learning will not result in a more precise analysis of `knowledge´ and similarly the other way round. Supporting such a possibility Toulmin compares `**knowledge'** with `health´ and `learning´ to `curing´. Just as a proper understanding of curing will lead to an enriched notion of health, a proper study of learning might lead to an adequate construal of knowledge. Finally, Hamlyn is guilty of exaggeration when he says that Piaget's theory presupposes a traditional philosophical position namely Kantianism.[26] As we have seen Piaget's theory is not merely a Kantian duplication. Unlike Kant, Piaget seeks to work out, on Expressivist lines a

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[25]Cf `The Concept of Stages in Psychological Development' in *Cognitive Development and Epistemology.* pp.37-38.

[26]Op. cit. .p.15.

dynamic conception of Subject, Object and Subject-Object relation. Though it is true that he is nearer to Kant than to Expressivists in so far as his general philosophical persuasion is concerned, it is not right to say that his theory has no locus standi of its own. In short, Hamlyn's charge of incohenece against Piaget on the one hand, arbitrarily opposes the empirical to the conceptual or philosophical and on the other hand, misrepresents Piaget's philosophical moorings.

Another eminent analytical philosopher, Norman Malcolm, considers as illconceived the whole of Piaget's project. According to Malcolm, cognitive processes and structures are myths. They are invoked to explain knowledge which in fact does not need explanation. For, knowledge is not a process but. an achievement. According to Malcolm, the kind of project Piaget has undertaken presupposes that knowledge is a process and an internal one at that, that requires an explanation in terms of hidden structures. In Malcolm's view Piaget is as wrong about knowledge as Chomsky is about language. Whatever be the roerit\of Malcolm's interpretation of the concept of knowledge his idea *of* explanation is essentialistic. According to him, explanations must be provided only for processes or events. Recent developments in philosophy of explanation have shown that there can be many types of explanations which have nothing common to them. There can be only a 'family resemblence' to use Wittgenstein's expression *among* them. All that is required for an explanation to be genuine is whether or not it illuminates what it seeks to explain. In this sense it is very much possible

that Piaget's theory explains certain aspects of knowledge. In fact he has done so by calling into question certain received views in epistemology nurtured by empiricism or rationalism or both. Malcolm has to advance arguments in denying this rather than taka recourse to the so-called `logic of all explanation" for it is doubtful whether there is anything called the logic of all explanation according to which the domain of explanandum is constitutive only by events *or* processes.

Another familiar charge against Piaget is that his system is a closed one. For, it is a rigid and fixed system of stages. It does not recognise the importance of variations within a culture or across cultures. However, Piaget *can* reply that cultural variations pertain only to the quantitative aspects of the theory such as the rate of development through stages. Secondly Piaget, while advancing his theory of stages, does not maintain that there is only one invariable sequence of stages. He can make room for alternative possibilities for development commensurate with varying cultural formations. However, the range of possible sequences, he is convinced, is not unlimited. A general theory of cognitive development, according to Piaget, may, in fact, should make room for alternative possibilities. However, it should recognise the limits of the framework within which those possibilities operate, and more importantly plot those limits in an order. This is precisely his theory of stages seeks to be. It plots the broad contours within which the epistemic subjects evolved by acting on the environment as permitted by their cultural context. Hence, the deterministic nature of Piaget's

theory is not as strong as it appears.

Lastly, does Piaget's theory commit a genetic fallacy?, as some would think. Genetic fallacy connotes the wrong epistemological move to provide a transcendental justification of knowledge in terms of its genesis. Infact Piaget neither seeks to provide a transcedental justification of knowledge as it is none of his concern nor takes recourse to genesis. For him sufficient justification of knowledge can be given in biological terras, that is, in terms of its role in enabling the organism to cope with and transform itself and the environment. In other words, the spirit of Piaget's approach is too pragmatic to go in for a transcendental justification. Further, Piaget is averse to the idea of the genesis in an absolute sense. To put it in his own words,

> "the important lesson learnt from the origins is that there never are absolute beginnings. ... to assert the need for a genetic inquiry does not therefore need that we accord a privileged position to this or that phase regarded as an absolute beginning: it is rather to note the existence of a construction not clearly defined and to stress the fact that in order to understand all its phases or atleast the greatest possible number. If we have concentrated on the beginnings of knowledge in the field of child-psychology and biology, it is not because we attribute to them an almost exclusive significance, but simply that on the whole they seem to have escaped the notice of epistemologists."[27]

Ail this is not to deny that there are serious shortcomings in Piaget's theroy of knowledge. There is, for example, important need to adumbrate a theoritical framework which integrates within it Piaget's empirical findings and conceptual

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[27] *Principles of Genetic Epistemology.* pp. 15-16,

observations which Piaget is yet to provide. However, genetic epistemology is not to be identified with Piaget's theory.[28] Piaget has made a beginning in constructing a tradition — a beginning which is promising enough to warrant further development.

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[28] Cf Bernard Kaplan: 'Genetic Psychology and Theory of Knowledge' in *Cognitive Development and Understanding.*

CHAPTER 4: PIAGET'S THEORY OF SCIENTIFIC KNOWLEDGE

In this Chapter we briefly look into Piaget's philosophy of science. The concern of the science has been central to Piaget's epistemological reflections. As we have seen, Piaget considers the cognitive development of the individual and the growth of science in history as two areas where genetic epistemology can establish itself. In other words the genetic theory of knowledge realises it self in and through these fields. That is why, Piaget contends that psychogenesis which provides an interpretive accounts of individual cognitive developments and historico-crticial method which constitutes a study of the dynamics of scientific ideas form the ontogony and Phylogeny of Genetic Epistemology. We have considered the former in the Chapter 3. It is in the fitness of things that, we end our discussion with the consideration of the latter which constitute Piaget's Philosophy of Science. Piaget's Philosophy of Science or Theory of Scientific Knowledge is part and parcel and infact the ultimate fulfilment of his Genetic Epistemology. It is his genetic approach to knowledge contextualized to what he considers to be Scientific Knowledge. Secondly, throughout his epistemological writings Piaget has accorded a special and even unique status to science as a cognitive activity. His celebrations of science almost borders on Scientism. Lastly, Piaget's contributions to the Philosophy of Science are significant enought to merit serious considerations. It is not for nothing, that Thomas Khun, one of the leading philosophers of

our tiroes, in his path-breaking work- The Structure of Scientific Revolutions, acknowledges the influence of Piaget's works on his thinking. He says,

> "Because they displayed concepts and processes that also emerge directly from the history of science, two sets of Piaget's investigations proved particularly important: The Childs Conception of Causality. , . . and Les Notions de mouvement et de vitesse Chez l'enfant. "[1]

It is not surprising that Khun appreciated Piaget's thinking. For, Piaget inhereted and promoted a tradition of philosophical reflection on science prevalent in the Continent whose somewhat altered origin, Khun inaugarated in the Anglo-Saxen world. One of the important intellectual currents that influenced Piaget in his formative years was Historico-critical philosophy of science that prevailed in Europe. The key figures of this heterogeneous movement were a galaxy of French Philosphers such as Brunschvicg, Lalande, Meyerson, Poincaré, Duhem and latter Gaston Bachelard and Alexandre Koyre'. All these thinkers were influenced by Kant who endeavoured to critically investigate into the categories of thought. Subsequent- to the attempts by French-Neo--Kantians like Cournot and Renouvier to Jettison Kants original twelve categories were replaced by concepts more basic to science, the historico-critical philosophers of science started investigations into the nature and limits of particular concepts basic for science such as number, causalilty, chance, position, finality

1. *The structure of Scientific Revolutions* University of Chicago Press Chicago (1970) 2nd Edition, P. vi.

etc. Eut, unlike Kant who sought to give a transcedental deduction (justification) of his categories, these philosophers tried to look at the historical development of reason *to* discover what was, if anything `necessary' about those concepts. This meant paying close attention to the history of science or. scientific reason and to the role of those concepts in science. Since these concepts and categories develops and change such a necessity would have to concern the process of change itself. It was natural that the historico-critical philosophers of science were attracted by Hegel and attributed a logic or rationality *for* the very development of these categories as Kitchener says,

> "Like Hegel, this group was led to endorse a version of historicism, the view that one *can* understand a concept only by investigating its origin and tracing its development, since its nature is revealed during the course of its development."[2]

Piaget sees himself as part of this tradition and claims that Genetic Epistemology "constitutes a simple extension of the historico-critical method."[3]

Even though historico-critical tradition was a vibrant force in the continent by and large in Europe and in the whole of Anglo-Saxen world, Positivist's Philosophy of science virtually held this way throughout the first half of twentieth Century. According to Positivism, philosophy of science was nothing but the logic of science in the sense of providing an account of

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2. *Piaget's Theory of Knowledge : Genetic Epistemology and Scientific Reason* P. 12

3. Quoted in Kitchener *Ibid*

logical structures common to all explanations, laying bare the logical relation between the observational sub-structure and the theoretical super-structure and finally to advance a logic of induction. If the central task of philosophy of science is construed on such lines, history *of* science becomes irrelvant to philosophy of science. Philosophy of Science, according to Positivists must have its eyes on time-invarient factors which determines scientific thinking and refuse to look at those aspects of science which vary with time. Thus, Positivists made Philosophy of Science and History of Science irrelevant to each other.

In the middle of the twentieth century, fundamental change took place by way of the emergence of anti-positivists philosophy of science. One important development in this connection was the growing recognition of the relevance of history of science to philosophy of science. Most, if not all, contemporary philosophers of science claim that an adequate philosophy of science has to be Historicist in its orientation. It is in this way Piaget's philosophy of science anticipates these contemporary developments. Much before the eminent philosophers of science of the day, Piaget made histroy of science constitutive of his philosophical reflections on science. Since, as Kitchener says, "Piaget's philosophy of science is essentially a historicist one."[4]

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[4] *Ibid* P.176

In what sense is Piaget's philosophy of science historicist? Historicism has three senses. In the first sense it means in Popper's words,

> "an approach to the social sciences which assumes that historical prediction is their principal aim, and which assumes that this aim is attainable by discovering the "rhythems" or the "patterns", the "laws" or the "trends" that underlie the evolution of history."[5]

Piaget In no way claims "that his historicist philosophy of science is capable of predictions of the future possibilities of science. Hence Piaget's theory of science is not historicist in this sense. According to the second sense of historicism, historicism me arts that the truth of a scientific theory, the objectivity of a scientific belief, and the rationality of scientific practise is relative to the historical era to which they belong since the criteria of truth, objectivity and rationality are not trans-historical. Thus, the second sense of historcism connotes a relativist thesis. Since Piaget rejects relativism in any direct sense the second version of historicism cannot be attributed to him. In its third sense, historicism means to put it in the words of Mendelboum.

> " the belief that an adequate understanding of the nature of anything and an adequate assessment of its value are to be gained by considering it in terras of the place it occupied and the role it played within a process of development."[6]

It is in this sense Piaget's philosophy of science is historicist. It is also in this sense that many contemporary

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5 *The Poverty of Historicism.* Harper, Hew York. 1964 P.3

6 Quoted in Kitchener.P.177.

philosophers of science are historicists since, according to them, a scientific theory or a paradigm or a research programmme or a reseach tradition should not be seen in terras of an atemporal set of norms or propositions but rather as a developmental entities which unfolds over a time in response to a changing environment which is historically given.

The anti-positivist or Post-positivist philosophy of science which integrated history of science with philosophy of science brought about a new orientation to the *very* problematic of philosophy of science . Thus the new problems of philosophy of science are a)how is scientific knowledge objective ? b)how is scientific knowledge rational? and c) how is scientific knowledge progressive ? Thus, the new problematic of the post positivist philosophy of science revolves round the three inter-related issues of scientific objectivity, scientific rationality and scientific progress. A proper understanding of Piaget's philosophy of science may be provided by considering how Piaget responded to these problems and how his responses *are* related to his Genetic Epistemology.

Scientific ob.iectivi tv

The positivists philosophy of science which is wedded to empiricism traces the objectivity of science to the so-called pure observational basis of scientific theories. Earnest Mach worked out in detail such a theory which positivists boldly took over and refined it. The idea that scientific theories are based on observations which are pure in the sense

that they are theory free landed itself into problems. Max Planck, the father of quantum theory showed the paradox that would result from such a view ;

> "our forms of physical knowledge would be drawn from sensation but their progress consists precisely in their being free from any anthropomorphism and consequently placed as far as possible from the sensorial fact!"[7]

According to Piaget, the paradox can be resolved only by rejecting the idea of the sensory origin of scientific knowledge. Secondly, Piaget rejects the idea of theory free or neutral observations or facts. According to him, observations are those aspects of the world or properties of objects that can be directly observed and to which the theory in question can be applied. For example, in Physics there are valves of certain variables obtainable by procedures taken to be unproblematic by the theory in question. Therefore, what is observable is relative to a theory. It involves both content given by the object and form contributed by the subject. But even this content is not given by a pure object. An object is the result of the construction on the part of the scientist. No doubt, there are concepts which are not purely theoretical concepts but these non-theoretical concepts ore reconstructed by the. theory and integrated and reorganised into complex theoretical structures. The process by which this is done is called reflective abstraction. A theoretical transition in science results in a new reconstruction of these observational concepts. Thus,

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7 . *Psychology and Epistemology*.P.64 .

observations undergoes transformation as theory changes, with the result all observations are theory laden. By this Piaget means that there is no such thing as `given' and that every reading of experience presupposes a prior theoretical frame work. The distinction between theory and observation is thus relative to a theoretical stand point and is drawn in constantly new ways.

Karl Popper also rejects the water tight distinction between theory and observation. He traces scientific objectivity not to the so-called pure observations but to the inter-subjective testability of our theories. Accoridng to Popper, scientific testing is one of falsification and not of verification as Positivists thought.That is why Popper calls himself a negativist as against the Positivist. However, Piaget does not share Popper's idea of falsification. As Kitchener points out,

> "like Khun and Lakatos, he does not think that falsification is the correct word to use for these distrubances, perturbations, or anomolies."[8]

Falsifications are disappointed expectations. we need to undertake the subsequent cognitive operation of constructing a broader cognitive framework that identifies and classifies the negative evidence as something in order to decide what these disappointed expectations are. It is worth quoting Piaget in this connection :

> "...it often happens that a new fact ultimately destined to exclude a previously accepted theory will at first not be understood in that light, and so gives rise in the meantime to a series of retouches of anterior theories before it becomes apparent that it is infact their coherence itself that is under threat. In such

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S . Op.Cit.,P.199.

areas it is thus easy enough (albeit after the event) demonstrate the existence of contradictions."[9]

Of course, Popper is not a naive falsificationist. According to him a theory is falsified when its test-implication is not borne out provided we are ready with a better alternative theory. But Piaget goes one step further and says that we can identify a falsifying instance only when we have a better theory – a theory which integrates the negative fact into a richer conceptual scheme.

Piaget's rejection of Positivism and Popperianism does not lead him to reject the very idea of objectivity and accept subjectivism which is usually attributed to, righty or wrongly, Khun and Fayerabend. Piaget is somewhat conservative. According to him, not only scientific knowledge is objective but also that objectivity is traceble to observations which are relatively theory free, if not, absolutely theory free as Positivists claim. It may be noted that, like Popper, he maintains relative theory -- freedom of observtions but in a different - way. According to Popper, an observation is relatively theory independent in the sense though it is dependent on some theory it is independent of the theory which is tested with reference to it. Piaget makes room for the relative theory freedom of observations in a different way. As we have seen, according to Piaget, the observational concepts are reconstructed by a theory which integrates and reorganises them. The same observational concepts

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9 . Quoted in Kitchener.P.200.

are taken by the new or successive theory as primitive. The new theory- restructures the concepts in a new way and the cycle continues. Now Piaget asserts that something is preserved through these processes of reconstruction of observational concepts by the new theories. Then the transformation is not complete. Some observational core is preserved however elusive it is and it is this core to which we have to trace the objectivity of our scientific theories. Thus, Piaget manages to maintain theory laden character of observations without rejecting the very idea of scientific objectivity in a way which is different from that of Popper. It is true that Piaget's idea of the preservation of an observational core through the cycles of transformations is beset with problems. Yet the originality of his attempt cannot be overlooked.

Scientific Rationality:

The question whether and if so, in what sense, transition from one theory to another is rational has been central to the twentieth century philosophy of science. Those who say that pattern of scientific growth is rational *are* called Rationalists and those who reject that thesis are called *Anti-Rationalists.* By and large the rationalists traced the rationality of science to the adoption of a certain method by scientific practitioners. Thus, according to them, it is the method of science which makes science the paradigm of institutionalized rationality. Till recently Positivists dominated the scene in philosophy of science. Positivists maintained that the method of science was the

method of induction. Hence, they sought to explicate the notion of scientific rationality in terras of the cannons of inductive method. As inductivists, they attempted to justify, like their predecessors, the principle of induction so as to ward off the ghost of Hume who advanced powerful arguments to show that our belief in the principle of induction is an irrational one. Positivists failed like their predecessors.Karl Popper put forward the Hypothetico-Deductive Scientific Method. He maintained that scientific knowledge is rational because it adheres to the norms of the Hypothetico-Deductive method. By pointing to the asymmetry between verification and falsification, he assured himself that hypothetico-deductivism would not land itself in the predicament similar to the one Inductivism landed in. But Popper's method appeared to be at odds with the actual scientific practice. There are many instances in history of science where a theory is retained even when it is falsified. Hence Popper was forced to complain that science behaves irrationally at times. But according to him such aberrations are rare. Rare or not such cases remain embarassments for Popper. The tendency to search for positive evidences *and* remain blind to the negative ones is, according to Popper, a mark of irrationality and science to an extent has displayed irrational tendency.

But Piaget shows that such a tendency is not irrational by calling our attention to certain facts of *our* psychic life discovered by his empirical inquiry. According to Piaget, the developing individual tends to see only favourable data and

ignore or even not see unfavourable ones. Piaget offers us a psychological explanation that refers to underlying cognitive developmental mechanisms. In the beginning, Piaget claims, the raind spontaneously concentrate only on affirmations and positive characteristic of objects and actions. This is because,

> "At the perceptual level, only positive characteristics are perceived, and negation is not. a process occuring in perception. It is true, in a sense, that one can perceive the fact that an object is no longer where one saw it before, or is not in its usual place, but in that case these are not pure perceptions : they are observations in response to an expectation, and that expectation, like the observations, depend on the entire action and thus goes beyond the realm of perception proper "? [10]

In the same way scientists can easily see the presence of a property that their theory leads them to expect. To see what they do not expect they need to evolve subsequent theoretical don.gtructi.on. into which the unexpected can be assimilated. Hence according to Piaget, there is nothing irrational about scientists overlooking the negative instances. Piaget, thus, does not see irrationality even in those 'rare' instances, where according to Popper, science exhibits deviant behaviour.

However, what, according to Piaget does scientific rationality consists in ? Central to his theory of Rationality is the idea of equilibration. A transition from one epistemic structure to another occurs because the second is more equilibrated than the first. In fact the earlier epistemic structure leads to a transformation in which new epistemic

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10 . Quoted in Kitchener. P.200.

structure is more equilibrated precisely because the former is less equilibrated. Contextualizing Piaget theory of rationality to science we can say that the transition from one theory to another theory is rational because the latter is more equilibrated. It *may* be noted here that the focus of Piaget's theory of rationality are scientific theories themselves rather than the behaviour of the individual scientists as Kitchener says,

> "in offering equilibration as the explanation of epistemic transitions in science, Piaget is offering an account to why the epistemic subject -- what one could call the scientific mind or scientific reason -- made the transition, say, from Ptolemaic to Copernican Astronomy."[11]

From this, it follows that in Piaget's scheme theories or theoritical structures constitutes an independent world (independent of the actual behaviour of individual scientists) reminiscent of World 3 of Popper and Lakatos. Like Popper and Lakatos, Piaget is thus providing internalist and not externalist account of scientific growth in the sense of a logico-rational one in terras of 'good reasons' and not external or causal factors. Hence, Piaget's explanation of scientific development appears to be close to Popper's and Lakato3's rational reconstruction of the internal logic of *theory-change.* However, unlike them, Piaget is against the radical seperation of rational factors (which come in World 3) and psychological causes (which come in World 2). For, according to him , psychological causes

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11 . *Ibid.* P.187.

are not irrational. Piaget's theory of scientific rationality, thus, combines the normative idiom associated with the concept of equilibrium with the descriptive one of the causal sequence constituted by psychological phenoemena.

Do the norms of scientific rationality, according to Piaget, undergo change or do they remain invariant ? Given his historicist orientation it is natural to expect, Piaget to maintain that scientific rationality changes over time since norms underlying it are historically variant. According to Piaget, reason, including scientific reason changes over time but it changes rationally. Elaborating on this point he makes a distinction between the structure of rationality and function of rationality. By the structure of rationality he means the norms which decide what is it to be rational- These norns3 are subject to change and are therfore historical. But the function of reason is changeless and therefore, trans-historical. For example, the norms concerning non-contradictions might vary from time to time and place to place(For instance, Levy-Bruhl, the anthropologist has argued that primitive people do not go by our standards of non-contradictions). However, the function of the principle of non-contradiction, namely, the search for coherence and unity of thought remains unchanged. It is in this way that Piaget reconciles his historical orientation with his rejection of the relativist construal of scientific rationality. Underlying this reconcilation is his convinction that a through going rationalist position undoes itself if it. relativises rationality to historicl

specificities.

Scientific Progress:

The question, "In what sense, if at all does science progress?" takes the brunt of the twentieth century discussions in philosophy of science. For many philosophers like Popper progress of science is axiomatic. In fact, according to them, progressive character is unique to science. They all share the view of Popper that it is only in science that one can see progress whereas, in all other fields of creative activities there is only change.[12] In fact, the concept of scientific progress is so central to many contemporary theories of science that they trace even the notions of scientific objectivity and scientific rationality to that of scientific progress. That is to say, according to them, science is objective and rational becaue it is progressive. Thus, of the three epistemic logical virtues that science is claimed to possess, namely objectivity, rationality and progressiveness, the last is generally taken to be most basic. Hence the concept of scientific progress has turned out to be the focal point of philosophical attention.

The Positivists construes scientific progress in terms of cumulative growth of scientific theories. According to their view, each scientific theory is an incremental addition to its predecessor. Karl Popper who rejected the idea of the cumulative growth of science read scientific progress in what he considered

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12 Cf *Conjuctures and Refutations* Routledge and Kegan Paul. London. 1963. P.216

to be in the increasing verisimilitude of scientific theories. He maintained that in science between two sucessive theories the later one is a greater approximation to the truth than the earlier one. Thus, according to him, scientific theories progressively correspond to reality though perhaps they never attain perfect correspondence. Philosphers of science like Khun and Fayerabend have convincingly shown that both the positivist and the Popperian conception of scientific progress to toe indefensible or atleast problematic. In doing so they have called into question the very idea of scientific progress.

It is interesting to see what Piaget's response would be to the question whether and if so in what sense science is rational. His conception of cognitive development as qualitative leaps of stages is at odds with the idea of cumulative growth of scientific theories in view of his contention that ontogeny (psychogensis) and phylogeny (history of science) are isomorphic. The strong constructivist element in his thinking is inconsistant with his correspondence theory of truth which Popper enthusiasticaly embraces with some modifications. From this it does not follow that Piaget rejects the *very* idea of scientific progress. According to him, progress is indubitable reality and science exemplifies it more impressively than any other type of knowledge. He is firmly committed to the thesis that all epistemic change must be characterised *as* progressive. For, if there was no progress reason would not evolve rationally Conversly, reason by defination roust be rational in its evolution

and since every thing is expression of reason all epistemic change must be rational and hence progressive. Apart from the questionable assumption that reason does not change without reason, this argument is hardly convincing. Hence Piaget takes recourse to another argument to show the actuality of progress is general and scientific progress in particular. This argument revolves around the concept of orthogenesis or directional vector. By this Piaget means that there is a tendency towards an ideal equilibrium between organism and environment. Without accepting such a thesis, according to Piaget, we cannot understand evolutionary biology. Criticising the orthodox Neo-Darwinism (selection theory) for its commitment to the notions of randomness and chance, Piaget contends that if evolution takes place by random mutation and because of chance it is impossible to give a rational explanation precisely because the process itself is irrational. Hence if rational explanation is possible evolution must exemplify *an* intelligible pattern -- a pattern that is direction oriented and hence progressive. Piaget extends the same argument to the epistemic evolution and contends that orthogenesis holds in cognitive matters as well in the sense that all epistemic change involves a tendency toward an ideal equilibrium between epistemic subject and epistemic object.

If progress is an indubitable fact of life, including and especially scientific life, how does scientific rationality express itself? Given Piaget's view that scientific knowledge is open ended and therefore permanently incomplete, it will never

give the ultimate picture of reality. By a series of successive approximations scientific knowledge approaches its object but only as a mathematical limit which we can never reach. Though this idea of Piaget is very close to the Popper's notion of verisimilitude, unlike the latter it is not wedded to the correspondasnce theory of truth. Piaget is criticised for being not so clear about his concept of approximation as Popper is.[13] Of course it is true that Popper with his characteristic clarity explicates his conception of scientific progress by proposing that the criterion of scientific progress is the increasing verisimilitude of our scientific theories and the criterion of verisimilitude is the truth-content minus the falsity -content of a theory (the difference between the totality of true test implications and the set of false -implications). Apart from the doubtful possibility of showing that in the history of science our recent theoires have greater verisimilitude in this sense than their predecessors, Popper's theory of scientific progress suffers from a serious lacuna. On the one hand, verisimilitude means, according to Popper, nearness to truth and given that Popper is the realist ,a theory which has a greater verisimilitude corresponds to reality than the one which has lesser verisimilitude. On the other hand, 'verisimilitude' has been given another sense by Popper's proposal according to which it is a quantity resulting from the substraction of one

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13 . Kitchener, Richard F. Op.Cit. P.182.

measurable entity from the other. Thus "Verisimilitude" has two senses: epistemic verisimilitude which is not measurable and measurable verisimilitude which is not epistemic. Critics of Popper accuse him of fusing or even con-fusing these two senses of verisimilitude. Though Piaget is not clear about the precise way in which successive scientific theories register progress over their predecessors, he is not guilty of such a fundamental con-fusion. This is precisely because he eschews the very idea of `correspondence with reality'. Ho doubt he gives a impression that the concept of progress *can* have cash value only in the face of a pre-existing object when he says,

> "... the existence of this object (i.e., the object as a limit) constitutes the only possible explanation of the directed approximations, even if one is never certain of having attained the end and even if the knowledge acquired in the course of this history prevents us from believing in all ultimate characteristics."[14]

However, consistant with his constructivism, Piaget also holds that such a pre-existing object is atleast partly constructed in so far as an object is known by performing operations on it and in doing so an object is altered. Hence, the correspondence theory of truth with its idea of object or a complex of objects as given does not square well with Piaget's over all constructivist orientation. Thus, a significant point about Piaget's conception of scientific progress is its tenous relation with the concept of correspondence with reality and theory of •truth associated with it.

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14 Quoted in Kitchener, *Ibid.* pp.182-183.

Is the growth of science continuous or discontinuous ? It seems intutively clear that anyone who entertains the idea of scientific progress must allow for continuity in the growth of Science. Piaget by stressing the novelty of theoretical transitions undermines the possibility of continuity. According to him, whenever a theory is constructed to solve certain problems and to explain certain phenomena by its very nature the theory itself produces new problems which it cannot solve. That is a theory at level - n while realising earlier possibilities creates other possibilities which can be realised by a theory at level n+1. Now it. *may* be noted that a theory at level n+1 and a theory at a level n+2 realise different possibilities; it is not that n+2 realises the same possibilities as n+1 but in a better way than the latter. Hence it is very difficult to compare them in terras of their betterness from a neutral point of view. In other words their accomplishments are too different to make them commensurable. Thus, Piaget is forced to maintain essential discontinuity between our successives fundamental theories which according to him are cognitive structures.

But, Piaget does not want to be so radical. He wants to make our successive theories commensurable by insisting that an old theory is incorporated into a new one. This is reminicent of Popper's idea that a new theory in science preserves its truth content of its predecessors such that the latter is the limit of the former. According to Piaget, although there is a qualitative change when we go from one theory to another in so far as there

is a structural transformation, it is **not** total **replacement** but rather a developmental transformation in which the elements are present as a material 'base' that has been restructured. However, weak and questionable is Piaget's thesis of the continuity in scientific growth, it is not as naive as the positivists doctrine of continuity which hinges on the cumulative growth of scientific theories. However, the idea that the old theory incorporated into a new theory is common to both Popper and Piaget though they understand this idea in different ways. Such a thesis has come under fire, thanks to brilliant attempts of Khun and Fayerabend who have shown that theory succession results in the change of the meaning of common locutions. Two successive fundamental theories cut the world in two different ways since they 3peak two different languages, so different, that what is said in one cannot be translated into the other. This provocative move of Khun and Fayerabend has driven home the point that a concept of inter-theoretic continuity is essentially problematic and even indefensible. Thus, Piaget is as vulnerable to the attack of Khun and Fayerabend as Popoper is.[15] Yet, Piaget does not show any sensitivity to such a radical development as incommensurability thesis. It is surprising that Piaget refers with admiration to

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15 It may be objected that Piaget is as not vulnerable to such attacks as Popper and Positivists are since Piaget maintains continuity, and discontinuity between successive theories unlike Positivists for whom Scientific growth is only cumulative since a new theory is only a incremental addition to a old one. But we all know that Popper is vulnerable to such a attack. Even he fernsvs it. Hence Piaget too is.

Khun's work The. Structure of Scientific Revolutions.[16] Yet he does not bother to counter one of the main thesis of that work namely incommensurability thesis.

• This studied silence of Piaget on incommensurability thesis and his attempt to coverup `discontinuity' by 'continuity' has prompted some scholars to charge him with positivism of nineteenth century variety and romantic scientism.[17] This charge Is not altogether unfounded. However, such a positivist element is more than counter-balanced by many of Piaget's thesis regarding the nature of scientific knowledge -- the thesis which emanate from his genetic epistemological framework. We end our discussion by highlighting one of the most significantly anti-positivist aspect of his work on scientific knowledge.

At the end of his work The Structure of Scientific Revolutions. Khun asks the question "what must nature, including man, be like in order that science be possible at all '?" Speaking of this Kantian — looking question, Khun says,

> " The world of which that *community* is a part *must* also possess quite special characteristics, and we are no closer than we were at the start of knowing what these must be. That problem -- what *must* the world be like in order that man may know it ? -- was not,however, created by this essay. On the contrary, it.is as old as science itself, and it remains unanswered."

The question which Khun raises for obvious reasons is

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16 . *Psychology and Epistemology.* P.3.

17 - Cf. Kitchener. Op.Cit. pp.127-128.

18 . *The Structure of Scientific Revolutions*, University of Chicago Press. Chicago. 1969.

an a thematic to Positivists. They do not even raise it, let alone answer it, precisely because the question has nothing to do with, and is even at odds with, questions of 'logic of science/' Piaget has answered atleast one dimension of this question. The question, "what should the world be like in order that science be possible?" can be decomposed into four (sub) questions : (1)What should the physical world be like in order that science be possible ? (2) what should the biological world (that is the biological nature of man and his biological relation with nature)be like in order that science be possible ? (3) What should the social world be like in order that science be possible ? and (4) what should the psychological world of man be like in order that science is possible ? Piaget has taken the fourth question seriously and answered it very effectively. This he has done by relating his responses to issues like scientific objectivity, scientific rationality and scientific progress with the epistemologically oriented investigation into cognition as psychological phenomenon. The organic relation between his views on science and his views on the cognitive aspect of human psyche are two facets of his epistemological endeavour. One *can* bring out this relation by either of the two following ways : (a) By presenting his philosophy of science in terms of his view regarding the historical development of scientific concepts like causality, velocity, location, time, space etc and drawing attention to its parallelism with his theory regarding the cognitive development in the individual; and (b) *By* giving an

exposition of his responses to the issues of scientific objectivity, rationality and progress and relate them to his theses concerning the cognitive development in the individual. In view of this dissertation, the second way is more effective because it places Piaget's insights and convictions regarding science in the forefront of the current debates and discussions in philosophy of science. Further, done this way, Piaget's views acquire added significance since his views pertain to those issues in philosophy of science that have made it the frontier area of philosophical research. For, it is these issues which have given within the body of philosophy of *science* a new and sharper focus to the time-honoured epistemological questions concerning truth, rationality, objectivity and subject-object relation etc. By the same process philosophy of science has returned to its epistemological moorings which it had lost under the positivist regime that in the name of rigour forbade *any* inquiry into questions that are broad and substantial. The single most credit of Piaget's philosophy of science is its refusal to toe the Positivist line in the name of doing scientific philosophy and come out with responses that anticipated post-positivist developments of the future from whose point of view Piaget might appear quite conservative. After all as Hegel said, "one cannot be better than one's age; one can be one's age at its best".

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