

\\ A CRITICAL EXAMINATION OF
POPPER'S THEORY OF KNOWLEDGE //

by

ALOO OSOTSI / MOJOLA

B.A. (Hons) University of Nairobi, 1975

THESIS

Submitted in partial fulfilment of
the requirements for the degree
of Master of Arts in Philosophy
of the University of Nairobi, 1977

Nairobi, Kenya.

UNIVERSITY OF NAIROBI LIBRARY



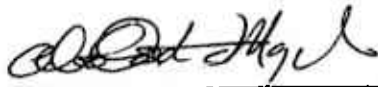
0100070 2

Bd. 159

Afr
BD
161
• Mb

D E C L A R A T I O N

**This thesis is my original work and has not been presented
in any other University.**



Aloo Osotsi Mojola

**This thesis has been submitted for examination with my approval
as University Supervisor.**



**Wolf Dieter Just, Ph.D. (HELDLBERG)
Department of Philosophy and Religious Studies
University of Nairobi.**

Key to Abbreviations of Books cited in the Text

1. L.Sc.D - Logic of Scientific Discovery
2. O.K. - Objective Knowledge
3. PH - Poverty of Historicism
4. C & R - Conjectures and Refutations
5. O.S. & I.E. - Open Society and Its Enemies
Vol. 1 & II

C O N T E N T S

Acknowledgements

1.	Introduction.....	1
2.	The Problem of Knowledge	10
3.	The Problem of Induction!.....	49
4.	The Problem of Demarcation.....	82
5.	Evolutionary and Conjectural Knowledge and the Problem of Truth.....	124
6.	Concluding Unscientific Postscript.....	158

Appendix:

A Summary of Popper's Twenty Theses on the 'Logic of the Social Sciences'.....	170
---	-----

B i b l i o g r a p h y	180
-------------------------------	-----

A C K N O W L E D G E M E N T S

My special thanks go to my philosophy teachers at the University of Nairobi. These are Professor Sjef Donders , who introduced me to the history of philosophy; Dr Joseph Nyasani who introduced me to metaphysics; Dr H. Odera Oruka who introduced me to logic, ethics, and social philosophy; and to Dr Wolf - Dieter Just who introduced me to epistemology, philosophy of science, and linguistic philosophy.

But I am more specially indebted to Dr Just, my supervisor whose help in the actual preparation of the thesis was considerable. I am grateful for his friendship, encouragement, and fruitful suggestions. Discussions with Dr Just not only broadened my outlook but also opened my eyes to new areas. Dr Just's wife also helped with some German translations - for which I extend much thanks and appreciation.

I cannot of course forget Mr Justus Mbae my post-graduate colleague, who was a real stimulus. My gratitude must also be passed to my wife Namitala my constant source of encouragement for her general contribution in not so obvious ways.

In the final analysis, however, I must claim responsibility for all the negative aspects of this work.

ex-1. Introduction.

" The theory of knowledge is traditionally a preserve of the professional philosopher. It is nonetheless a subject of considerable importance to the working scientist, however slight his overt preoccupation with the world of abstract ideas. "

Sir Solly Zuckermann, Beyond the Ivory Tower,
(1970), p. 11

The present essay is an attempt to understand and to interpret Popper's theory of knowledge. It is primarily based on his Objective Knowledge (1972), Logic of Scientific Discovery(1972) , Conjectures and Refutations (1965) and a few other of his writings.¹ The significance of Sir Karl Popper's views can hardly be overstated. His epistemological views have exercised a great influence on a whole generation of thinkers. Such outstanding men in their own fields of specialization, as varied as Jacques Monod, Sir John Eccles, Sir Hermann Bondi, Imre Lakatos, among others, have expressed their debt to him. Hilary Putnam, the Harvard philosopher has called Popper, " a philosopher whose work has influenced and stimulated that of virtually every student in the philosophy of science. "² Imre Lakatos, a brilliant logician and mathematician, noted that " Popper's ideas represent the most important development in the philosophy of the 20th century; an achievement in the tradition - and on the level - of Hume, Kant or Whewell."³ Y. Bar - Hillel calls him one of "the greatest philosophers of science of our time."⁴ Similarly Sir Peter Medawar of the Harrow Clinical Research Centre and a Nobel Prize winner for Medicine said on 28th July, 1972 on BBC Radio - " I

think Popper is incomparably the greatest philosopher of science that has ever been. "5 These kind of utterances could be multiplied. My point in citing them is to underscore the fact that it is valuable and necessary to understand the ideas of a man with the kind of influence which Popper exercises over many others of outstanding reputations in their own disciplines. I will not only present, elucidate, and analyse Popper's ideas but I will also try to interpret them and to evaluate them critically.

Karl Popper was born on July 28, 1902 at Himmelhof in the Ober St. Veit district of Vienna. His father Dr Simon Siegmund Carl Popper was a doctor of law in the University of Vienna where Karl Raimund Popper also studied. The environment in which he grew was conducive to, and facilitated academic and intellectual pursuits - science, music, philosophy, etc. Early in life, according to his own testimony, Popper was already struggling with the ideas of the great thinkers - Newton, Kant, Spinoza, Darwin, Marx, Adler, Freud, among others. By around 1919 - 1920, Popper claims to have arrived at the great philosophical results or "solutions" which were to make him famous, such as his solution to the problem of demarcation, and to the problem of induction.

At University, Popper studied history, literature, psychology, philosophy, although he specialised in physics, mathematics, and philosophy. He did some work among neglected children, and also did some cabinet-making. In 1928 he received his Ph.D degree and

qualified as a teacher a year later, writing for this a thesis on the problems of axiomatics in geometry which included a chapter on non-Euclidean geometry. In 1932 Popper completed his The Two Fundamental Problems in the Theory of Knowledge (Die ~~beiden~~^{zwei} Grundprobleme der Erkenntnistheorie) - a title which was an allusion to Schopenhauer's Die beiden Grundprobleme der Ethik. This book was aimed as a critique and corrective to the doctrines of the Vienna Circle. It was read in manuscript form by several members of the Circle - such as Feigl, Carnap, Schlick, Frank, Neurath, Gomperz. This unpublished manuscript became the basis for Popper's famous Logik der Forschung (1934) later translated as Logic of Scientific Discovery (1959). It has been commented that if this important book had been translated earlier, the course of positivistic and linguistic philosophy in the English speaking world would have been saved some detours.⁶ Popper's fame rests primarily and principally on this seminal work. In 1936, he was appointed Senior Lecturer at Canterbury College, Christchurch, New Zealand; and in 1949 he became Professor of Logic and the Philosophy of Science at the London School of Economics where he taught till his retirement. He was knighted in 1964.

Popper's other very significant work is The Open Society and Its Enemies (1945) written in two volumes. Both this and Popper's The Poverty of Historicism (1944-1945) (1957) are solidly based on Popper's concept of scientific method as presented in The Logic of Scientific Discovery, and represent

Popper's refutation of the controversial doctrine of historicism.

Popper's ideas are widely known and acclaimed in the West where, as mentioned above, some see him as the greatest philosopher of science, if not of all time, of our time. It however remains for posterity to establish his true status in the world of thought. In the Third World, however, Popper is hardly known - and where known sometimes very superficially. Since the publication of Brian Magee's popularization of Popper's thought in the Fontana Masters edition; Popper (1973) the situation has somewhat changed. Magee's portrayal of Popper is positive and full of praise and admiration for his thought. It is mainly descriptive and elucidatory, being hardly critical of Popper's views.

In this paper, as we have already mentioned we try to offer our understanding and interpretation of Popper's epistemological standpoint. But we do not stop there, for our approach is extremely critical - if only to counteract the general and uncritical attitude which characterizes many assertions on Popperian thought, which also unfortunately overlook the negative and detrimental side of this highly original genius. As matter of fact, Popper claims very much for his theories. Among other things, he claims to have solved the problem of induction and to have eliminated the blunder of the subjectivist theory of human knowledge by replacing it by an objective theory of essentially conjectural knowledge. Popper has greatly emphasized the objective pole of knowledge which is right, but he has done this at the expense and at the annihilation of the subjective pole. His great aversion for psychologism has led him

into a dry and arid formalism and logicism.

We cannot deny Popper's great contributions to human knowledge, his insight into the idea of falsifiability, and of the falsity of historicism, his great concern for freedom and individuality, and for a liberated and creative healthy human community. These themes are important and need to be preached more and more in this our decadent and inhuman civilization.

But this paper also tries to remind us of the dark side of Popper's thought. We contend that Popper's ideal of objectivism and impersonal knowledge is not only fallacious but also dangerous. We maintain that Popper's vehement and dogmatic argumentation in favour of an epistemology without a knower, that is "knowledge without a knowing subject" is tantamount to a reification and dehumanization of human knowledge. This and his solution to the problem of induction - which are in fact connected - although partially true, do not give us the whole story and taken as they are, properly lead us into a deadly pyrrhonian scepticism - the implications of which Paul Feyerabend, one of Popper's disciples, has clearly grasped and developed into an anarchistic theory of knowledge. Unfortunately, Popper himself has failed to see this serious consequence of his epistemology. Although he frequently implies it obliquely in his assertions, he consistently evades it. Whereas in political and social theory and life he comes near to affirming a notion of complete pluralism and anarchy he qualifies it in his doctrine of the paradoxes of freedom, democracy, tolerance and sovereignty. One would imagine that where he restricts this in socio-political life, he would affirm this radical pluralism in epistemology as a

logical consequence of his idea. What he infact does is to lay down a methodological rule to determine what shall pass as valid scientific knowledge. Moreover Popper tends to equate scientific rationality with rationality in general.⁷

While Popper is in many ways opposed to positivism in general, especially to logical positivism and he himself denied being a positivist, we shall argue that although it is difficult to categorize Popper as a positivist in the same way the Frankfurt critical theorists do - he can only be clearly understood in the context and in the spirit of positivism as a whole. As a matter of fact Popper has been greatly influenced by positivistic thinking. Positivist thinkers were in a greater measure his colleagues, his mentors, and his primary audience. Most of his key writings assume this mood and context.⁸

We shall also argue that Popper's criterion of falsifiability in the final analysis distorts most of Popper's positive contributions. We maintain that it is the criterion of demarcation between critical and uncritical theories that can properly restore Popper's ideas to their rightful place. This could be called a criterion of criticizability. In fact we argue that the epistemology which Popper enunciates following this criterion of falsifiability reduces epistemology to philosophy of science and finally to methodology. And science is reduced to just a game, the "game of science" - dependent on 'arbitrary' methodological rules.

Bearing in mind that Popper has often accused his critics of

misunderstanding and distorting his ideas and views, I have taken the liberty to quote extensively and frequently from his various books and papers, and therefore to use his own words in stating his position. Even this does not guarantee accuracy and agreement. Nonetheless, we have been conscientious that we state his position as accurately as we understand it.


We have, in addition, insisted throughout this essay that Popper's useful insights can be rehabilitated within the context of a satisfactory epistemology. To do this, I have attempted, - drawing on my own personal intuitions and convictions, and from many quarters - a sketch of the outlines of such an epistemology which tries to write the objective and the subjective poles in a dynamic or even a dialectical striving for knowledge.

I am greatly indebted to the writings of Michael Polanyi, Thomas Kuhn, and to a certain extent Jürgen Habermas and the Frankfurt critical theorists.

From these sources, I have gained many insights - most of which are acknowledged in the course of the essay. I have in the process fused them with my own insights to evolve what may be roughly called - a sketchy outline of my own position.

We hope that our critique of Popper's position will be taken as a contribution toward a more balanced position and not at all as a total rejection of his views and his fruitful insights.

Lastly, we conclude by quoting a passage from Popper, which like our opening lines, maintain the same point, namely the significance and relevance of epistemology to the concerns of our



time. He writes,

"I believe that epistemology is important not only for the individual sciences, but also for philosophy, and that the religious and philosophical uneasiness of our time, which surely concerns us all, is, to a considerable degree, the result of uneasiness about the philosophy of human knowledge. Nietzsche called it the European nihilism, and Benda the treason of the intellectuals. I should like to characterize it as a consequence of the Socratic discovery that we know nothing that is, that we can never justify our theories rationally. But this important discovery which has produced, amongst many other things the malaise of existentialism is only half a discovery; and nihilism can be overcome. For although we cannot justify our theories rationally and cannot even prove that they are probable, we can criticize them rationally. And we can often distinguish better from worse theories." 10.

The last remarks of this quotation lead us directly to the question of the next chapter.

FOOTNOTES

1. See the Bibliography at the end of this essay.
2. Hilary Putnam, 'The 'Corroboration of Theories'', in P.A. Schlipp:
The Philosophy of Karl Popper (1974) p. 221
3. Imre Lakatos, "Popper on Demarcation and Induction," in P.A. Schlipp:
ibid. p. 241
4. Y. Bar-Hillel, 'Popper's Theory of Corroboration,' in P.A. Schlipp,
ibid. p. 331
5. Quoted in Brian Magee, Popper, Fontana/Collins 1973, p.9
6. See back-cover of K.R. Popper's Logic of Scientific Discovery,
Hutchinson, 1972, and attributed to Times Literary Supplement
7. We consider this point a bit more later, especially in our
Chapter 4.
8. See also our Chapter 4.
10. K.R. Popper, "The Logic of the Social Sciences", in TW Adorno
et al The Positivist Dispute in German Sociology, Heinemann,
1976, p. 104.

ch.2. The Problem of Knowledge

If we imagine the philosophical discussion of the modern period reconstructed as a judicial hearing, it would be deciding a single question: how is reliable knowledge (Erkenntnis) possible.

Jurgen Habermas, Knowledge and Human Interests

P.3

Indeed this crucial question, "how is reliable knowledge possible?" cannot be confined to the modern period, it has plagued philosophical minds for centuries. This question arises when we begin to examine the nature of knowledge, its limits, and bounds, its method, and its validity. It arises whenever we reflect on the ability of the human mind to attain certitude. This is the epistemological problem. But before we can ask the epistemological question - we must assume certain things. For example, we must assume that we are there to know and that there is something to be known. This is the metaphysical problem. Descartes' radical methodic doubt, which is the subject of his Meditations and his Discourse on Method¹ in which he doubted everything except his own existence (Cogito ergo sum), illustrates how the epistemological and the metaphysical problem are related. In fact the interrelationship is so close that it is difficult for us to say which is prior to the other - epistemology or metaphysics. Hence we find that

Popper's two basic problems of epistemology, do in fact inevitably get into metaphysics (ontology). Similarly it was G.E. Moore's rejection of the metaphysics of British idealism which led him to the common-sense theory of knowledge. On the other hand, the logical positivists set out to eradicate metaphysics altogether. They admitted as knowledge only those assertions or propositions which satisfied the conditions of their verifiability criterion. Ironically, this criterion also turned out to be a piece of metaphysics. It is surprising that Rudolf Carnap in his paper "The Rejection of Metaphysics"² dismisses epistemology as part and parcel of metaphysics, yet logical positivism which he championed was essentially preoccupied with epistemology and hence with the question: how is reliable knowledge possible? Popper admits the validity of the metaphysical problem. It is in fact his preference of certain metaphysical positions, such as common-sense realism as opposed to the common-sense theory of knowledge which to a great extent determines the direction of his answer to the epistemological problem.

II

A Brief Historical Overview

Some epistemological reflection is evident in the work of the early Milesian and Eleatic philosophers: Thales,

Anaximander, Anaximenes, Heraclitus, Parmenidas. Popper does not hide his admiration of their pionner efforts and love for rational and critical methods in the advancement of knowledge. These thinkers disregarded the evidence of the senses, and rejected the stock answers of tradition and mythology. Instead they searched for coherent answers that could be defended on the basis of reason.

It is however the Sophists who directly deal with the problem of knowledge. Gorgias and Protagoras borrowing themes from the earlier philosophers, such as Heraclitus' thesis that everything is always in motion, develop their thought toward extreme subjectivism and relativism. The famous statement "Man is the measure of all things, of those that exist and of those that do not exist," is due to Protagoras. The sophists concluded that certain knowledge is impossible. In actual fact the systems of Socrates, Plato, and Aristotle, are an attempt to overcome and go beyond the skepticism and relativism of the Sophists. Thus Socrates in his search for the universal, lent partial acceptance to the thesis that sense knowledge alone cannot guarantee certitude. Epistemology leads Socrates to ethics. Plato develops the Socratic tradition. His Thaetetus, Meno, Cratylus, Protagoras, Phaedrus and the Republic are an attempt to give a definitive answer to the problem of knowledge.

His answer is along Socratic lines. He argues that knowledge is attainable and is both infallible and of the real. He in fact tries to reconcile Parmenidas view and the Heraclitean view which Protagoras took over. Accordingly he postulates two types of knowledge - "'episteme": which is knowledge of the universal, the true, the unchanging, the good. "Episteme" is concerned with originals or the 'Forms, the 'archetypes' (archai), the ideas. The second type of knowledge is "doxa" - which is concerned with images or the objects of the senses. "Doxa" is merely opinion. In his simile of the line and also in his allegory of the Cave, both in the Republic, Plato gives pictorial form to the ideas.

Aristotle's answer to the epistemological problem was an attempt to support the common-sense theory of knowledge. Thus in his Metaphysics (1011b, 25-28) he offers a conception of truth, which has gained wide currency in the 20th century, mainly through Tarski's formulation of it. Aristotle's formulation of the correspondence theory is given as follows: "To say of what is that it is not, or of what is not that it is, is false, while to say of what is that it is, or of what is not that it is, is false, while to say of what is not that it is not, is true." As to the theory of the universal, Aristotle argued that it exists only through the particular and is given to us in sensible reality. Moreover Aristotle shows that we cannot prove everything, for to prove everything is impossible

(Met. 1006a, 9) since this would lead us to an infinite regression. However having established certain principles through sense-knowledge and induction we can infer, using the rules of logic, from them certain consequences or facts. Aristotle argues that skepticism contradicts itself and refutes itself in practical daily life (Met. 1005b, 25). The certainty which Aristotle established was later questioned in the field of ethics by Epicurus and in the field of epistemology by Pyrrho. Pyrrho's epistemology of course directly led to his ethical "ataraxia" which was both virtue and happiness. He contended that we can know nothing of the nature of things (skepticism) and that we must consequently suspend our judgement. This is the condition for virtue and happiness.

We will not mention the Eclectics, Sextus Empiricus, the problem of universals in the middle ages, etc, as this survey is basically brief and cursory. We will therefore proceed directly to Descartes.

Descartes resuscitated the problem of knowledge for the modern period. What Descartes sought for was a method which could place knowledge and the sciences on a firm and secure foundation. Medieval scholastic philosophy had lamentably failed in this task in its varied contradictory answers which led to skepticism. Neither was revelation a satisfactory answer for Descartes. He lays faith and revelation aside and is at once confronted with skepticism, which he employs as

a method. We must mention here that Descartes was impressed by the certainty and consistency that was explicit in the deductive method of Euclid's geometry - which starts off from only a few axioms. He therefore hoped that starting from a few axioms, (postulates or 'clear and distinct ideas') he could generate truths or theorems, whose validity was indubitable. Descartes' methodic doubt therefore starts off from skepticism. From doubting everything he arrives at the idea of the existence of the thinking subject, "I think therefore I am", (see 2nd meditation). Hence he writes: ".....as I strove to think of everything as false, I realized that, in the very act of thinking everything false, I was aware of myself, as something real; and observing that the truth: I think, therefore I am, was so firm and so assured that the most extravagant arguments of the skeptics were incapable of shaking it, I concluded that I might have no scruple in taking it as that first principle of philosophy for which I was looking."³ Descartes established further the general rule that "the things we conceive very clearly and distinctly are all of them true."⁴ From this Descartes established the existence of God using both the cosmological and the ontological argument. He argued that God was the guarantor of all truth whatsoever. In this regard he writes:

"In the first place, the very rule I have already

stated, namely, that everything we conceive very clearly and distinctly is true, is only assured by the fact that God exists, that He is the perfect being, and that whatever we possess comes from Him. It follows that our ideas or notions, as they are real, and as they come from Him, insofar as they are clear and distinct, cannot but be true"5

In this way Descartes demonstrated the reality of body, matter and the external. We thus have the ideas of mind, reality and God.

Descartes' approach and quest for certainty was followed by his fellow continental thinkers such as Malebranche, Spinoza, Leibniz and Wolff. This approach was essentially rationalistic and axiomatic.

In Britain, represented by Locke, Berkeley and Hume, the quest for certainty in knowledge took a different direction and approach - yet retained the same aims. Locke's general aim and avowed purpose in writing the Essay Concerning Human - Understanding was "to enquire into the original, certainty, and extent of human knowledge, together with the grounds and degrees of Belief, Opinion and Assent" (1.:2) and also to determine the "measures of the certainty of our knowledge, or the grounds of those persuasions which are to be found amongst men, so various, different, and wholly contradictory" (1.:2). Locke therefore sets out to justify claims to knowledge as well as to determine the limits of human knowledge. In chapter 11 of

of Part I, he right at the outset refutes Descartes' idea "that there are in the understanding certain innate principles; some primary notions.....characters, as it were stamped upon the mind of man, which the soul receives in its very first being, and brings into the world with it." (1.ii.1) The way we come to know anything is sufficient to disprove this idea. In Book II he postulates the origins of knowledge employing what he calls the "historical, plain method". He borrows the Cartesian term "idea" and takes it to mean the atomic element of knowledge. The term covers the mental objects of sensation and imagination, as well as intellection. However, the idea is a sign for what is directly experienced through sensation and reflection. Ideas are divided into simple and complex; and qualities into primary and secondary. Locke also considers modes of thinking, association, relation, memory, words, degrees and extent of human knowledge, faith and reason etc. In this short space we cannot give a detailed exposition of his theory. We will however mention that this theory generally called representational is the first clear argument for a common-sense theory of knowledge. Locke's rejection of innate ideas led him to regard the mind as a "tabula rasa", or an empty slate on which all contents are derived from experience. This is what Popper calls the "bucket theory of the mind". To Locke then, sense knowledge was the final arbiter in all determinations of truth.

George Berkeley came after Locke and proceeded to construct his epistemological edifice on the foundation already laid down by Locke. He too desired to avoid skepticism and establish certainty. To this end, Berkeley adopted his New Principle according to which "To be is to be perceived" or "Existence is percipi or percipere or velle". In fact this principle was advocating immaterialism. In his first Dialogue between Hylas and Philonous, Berkeley writes: "That there is no such thing as what philosophers call material substance, I am seriously persuaded: but if I were made to see anything absurd or sceptical in this, I should then have the same reason to renounce this, that I imagine I have now to reject the contrary opinion".⁶ It is on the basis of this idealism or immaterialism that Berkeley sought to refute and reject the case for scepticism, atheism and irreligion, establishing in their place certainty and religion. For he thought "the doctrine of matter or Corporeal Substance to have been the main pillar and support of Scepticism, so likewise upon the same foundation have been raised all the impious schemes of Atheism and Irreligion."⁷ He however vindicates the common men's faith in common-sense, real bodies or sensible things. "That the things I see with my eyes and touch with my hands do exist, really exist, I make not the least question. The only thing whose existence

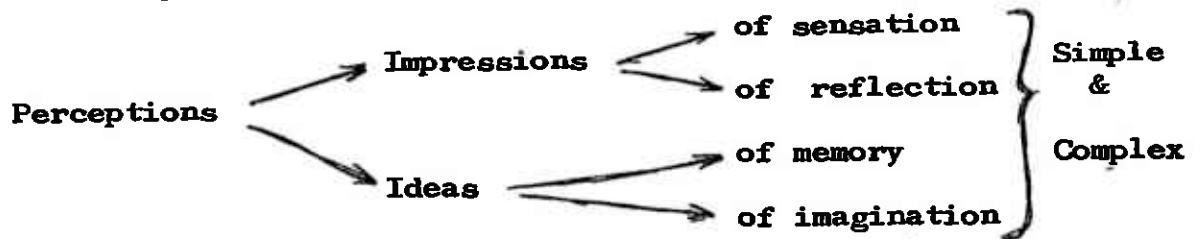
we deny is that which philosophers call Matter or corporeal substance. And in doing of this there is no damage done to the rest of mankind, who, I dare say, will never miss it." (1.35)⁸

If all is spirit, and to be is to be perceived, it would follow, and Berkeley makes this point, that all our knowledge must of necessity come to us through sense perception. To avoid the logical conclusion of this argument, (that I am the logical conclusion of this argument), that I am the only being that exists, Berkeley posits God, as the infinite, omnipresent spirit who perceives everything, "all alike are perceived by, and exist in the mind of God." The idea of God then saves us from solipsism and guarantees the reality of other beings. Having established his position thus, Berkeley goes on to develop his bucket theory of how we come to know. It is basically similar to Locke's position, without his "materialism."

Hume, takes further Locke's basic ideas which are also as we noted also developed by Berkeley, albeit with different motives. The key idea in this school of thought is its "tabula rasa" theory of knowledge based on sense-perception. Hume opens his A Treatise of Human Nature with the idea that "All the perceptions of the human mind resolve themselves into two distinct kinds, which I shall call: IMPRESSIONS and IDEAS. The difference between ^{eeen} these consists in the

degrees of force and liveliness, with which they strike upon the mind and make their way into our thought or consciousness."⁹

Thus the perceptions which enter with more force and violence are the impressions, whereas ideas are the faint images of impressions in thinking. Simple perceptions (impressions) and ideas admit no distinction or separation, but complex ideas or impressions may be distinguished into parts as follows:



Hume's basic thesis then is that all our knowledge derives ultimately from impressions which are the immediate data of experience, and that all valid knowledge can be completely analysed in terms of the above primary elemental structure.

Hence the complex idea of Nairobi, can be broken down into simple ideas and this further into the corresponding simple impressions. Hume writes: "I venture to affirm that the rule here holds without any exception, and that every simple idea has a simple impression which resembles it, and every simple impression a correspondent idea".¹⁰ It would follow therefore, that such ideas as God, spirit, unity, substance, devil etc are devoid of meaning in so far as they cannot be reducible to simple impressions. Hume's empiricism leads him to the assertion that all our ideas are derived from experience. This is the essence of his general proposition "that all our simple ideas in their first appearance are derived from simple impressions,

which are correspondent to them, and which they exactly represent."¹¹

Hume interprets the mental operations of thinking in terms of imagination and memory. An impression which has been in the mind may reappear as an idea of memory or as an idea of imagination. An idea of memory is more vivid and livelier than an idea of imagination. Memory preserves the order and position of the simple ideas. Imagination functions under a measure of freedom to combine ideas. However as Hume argues, there is also a uniting principle, some associating quality by which one idea naturally introduces another. Hume calls this principle, "a gentle force which commonly prevails." To explain this somewhat, Hume writes, "The qualities, from which this association arises, and by which the mind is after this manner convey'd from one idea to another are three, viz. Resemblance, contiguity in time or place and cause and effect." ¹² Thus the imagination tends to connect ideas which resemble one another and those which are contiguous immediately or mediately in space and time. In relating these considerations to the idea of substance, Hume find that this idea has no grounds in ideas or impressions, i.e. it is neither derived from impressions of sensation nor of reflection. The result is to reject the idea of substance as devoid of meaning. He writes "The ideas of a substance is nothing but a collection of simple ideas, that are united by imagination, and have a particular

name assigned them, by which we are able to recall, either to ourselves or others, that collection".¹³

At the beginning of Section IV, Part I of An Inquiry Concerning Human Understanding, Hume divides all the objects of human reason or inquiry into two kinds, 'relations of ideas' and 'matters of fact'. This is similar to the Kantian division of 'analytic' and 'synthetic' judgements respectively. The truths of logic and mathematics fall into the first group and are usually tautological. On the other hand impressions and ideas derived from experience fall in the latter. Hume has this in mind, when at the end of Enquiry he makes this radical remark:

"When we run over libraries, persuaded of these principles, what havoc must we make? If we take in our hand any volume - of divinity or school metaphysics, for instance - let us ask, Does it contain any abstract reasoning quantity or number? No. Does it contain any experimental reasoning concerning matter of fact and existence? No Commit it then to the flames, for it cannot contain nothing but sophistry and illusion.¹⁴

We will examine how this analysis bears on the idea of causality. Hume has argued that "all reasonings concerning matter of fact seem to be founded on the relation of cause and effect. By means of that relation alone we can go beyond the evidence of our memory and senses."¹⁵ As opposed to logical inference in relations of fact, Hume is suggesting that all reasoning in matters of fact

is based on the causal inference or on induction.

He asks of what impression or impressions the idea of causation is derived. His answer is: contingency, temporal priority and constant conjunction or togetherness. He concludes

that there is no necessary connection between ideas but only factual spatio-temporal relations. Yet it is this idea of necessary connexion which is basic to the principle or idea of causality. Clearly from Hume's analysis, this idea of necessary connexion is not derived from any impressions. If that is so, the question would arise: What are the grounds for the widespread belief in the idea of causality? Hume's thesis is that there are no rational grounds for this principle. It is neither intuitively certain nor demonstrable. Moreover the popular supposition that the future resembles the past is also false for it "is not founded on arguments of any kind, but deriv'd entirely from habit, by which we are determin'd to expect for the future the same train of objects, to which we have been accustomed."¹⁶ Hume therefore rejects the principle of causality and the general principle of induction. He writes:

"Let men be once fully persuaded of these two principles, that there is nothing in any object considered in itself, which can afford us a reason for drawing a conclusion beyond it; and that even after the observation of the frequent or constant conjunction of objects, we have no reason to draw any inference beyond those of which we have had experience" ¹⁷

With the destruction of the grounds for the principle of causality and of induction, Hume demolished the foundations of empiricism, of his own philosophy and indeed of all knowledge, whatever. There were at this stage no grounds for

asserting the validity of his initial assumptions, or of knowing that impressions and ideas represent objects in reality. No wonder Hume has it that custom and habit are the guide of human life. "It is that principle alone which renders our experience useful to us.....", he concludes. To this Bertrand Russell has written: "The growth of unreason throughout the nineteenth century and what has passed of the twentieth is a natural sequel to Hume's destruction of empiricism."¹⁸ He argues that without an answer to Hume within the framework of a philosophy that is wholly or mainly empirical, then there is no difference between sanity and insanity. Hume proved the bankruptcy of pure empiricism. In fact he proved the impossibility of science given the foundation of pure empiricism. Russell argues that what Hume's arguments prove "and I do not think the proof can be controverted, is that induction is an independent logical principle incapable of being inferred either from experience or from other logical principles, and that without this principle, science is impossible."¹⁹

We will examine later how Kant set out to overcome Hume's dangerous pyrronian skepticism. Later British empiricists without ever refuting Hume's radical skepticism, simply evaded it and happily built upon his foundation. Ayer and the logical positivists are a case in point. They are directly Hume's intellectual heirs. They stuck to his distinction of knowledge between analytic and synthetic a priori judgements refusing to admit any synthetic judgements at

all (to borrow Kantian terminology). These philosophers sought to justify claims to knowledge on the basis of sense experience and logic alone. Hence the verifiability criterion of the logical positivists which A.J. Ayer defines as "the criterion which we use to test the genuineness of apparent statements of fact."

According to this criterion, "we say that a sentence is factually significant to any given person, if, and only if, he knows how to verify the proposition it purports to express - that is if he knows what observations would lead him, under certain conditions, to accept the proposition as being true, or reject it as being false".²⁰ Of course the verifiability criterion destroys itself. Nevertheless, it represents a desperate attempt and quest for sure and indubitable knowledge i.e. the need for certainty and a secure basis for knowledge. We have traced this quest in the thought of Descartes, Locke, Berkeley and Hume; and very briefly, in passing, in Bertrand Russell.

Popper follows and builds on this tradition, although he rejects many of its assumptions. He grew up in the Vienna of Wittgenstein, Carnap, Schlick, Feigl, and could hardly escape their influence. His work however centres around the problem of induction and the problem of demarcation - both of which can be traced to Hume's skepticism (induction) and Kant's attempt to answer Hume (demarcation). Indeed Popper's work is an attempt to resolve Hume's dilemma. We will go on now to describe Popper's approach to the problem of knowledge.

III. Popper and the Problem of Knowledge

The foregoing historical sketch shows that the basic epistemological question: how is reliable knowledge possible? constitutes a problem that has not to date been solved. Karl Popper's work is a significant contribution toward its solution. . Indeed his classic work Logik der Forschung (1934) translated as the Logic of Scientific Discovery (1959) and elaborated in the papers collected in Conjectures and Refutations (1963), Objective knowledge (1972) among others, is dedicated to the problem of knowledge. However, unlike modern philosophers who reduce philosophical problems to semantics and linguistic puzzles, Popper places the epistemological problem in the context of the "problem of cosmology".

Accordingly he writes:

"....there is at least one philosophical problem in which all thinking men are interested. It is the problem of cosmology: the problem of understanding the world-including ourselves, and our knowledge, as part of the world. All science is cosmology, I believe, and for me the interest of philosophy no less than of science, lies solely in the contributions which it has made to it. For me at any rate, both philosophy and science would lose all their attraction if they were to give up that pursuit." 21

Secondly Popper approaches the epistemological problem not as the problem of ordinary or common-sense knowledge but as the problem of scientific knowledge. He writes: "The central problem of scientific knowledge has always been and still is the

problem of the growth of knowledge. And the growth of knowledge can be studied best by studying the growth of scientific knowledge!"²²

This distinction is extremely important because it distinguishes Popper's approach from that of philosophers who see epistemology as basically concerned with common-sense knowledge and experience.

Initially Popper adopts certain basic assumptions, or, if you like, ontological commitments such as belief in realism - the thesis of an objective reality existing independently of mind. Although he admits that realism is neither demonstrable nor refutable (as is the case for idealism), he nonetheless accepts it as the more plausible alternative. He also assumes there is no secure starting point, though "our starting point is common-sense and that our great instrument for progress is criticism."²³ His justification for this starting point is simply because science, philosophy and rational thought are all predicated upon common-sense, in addition to the fact that they are in themselves "enlightened common-sense". Realism on the other hand, Popper maintains, is essential to common-sense, one is the corollary of the other. It follows from this standpoint that Descartes, Locke, Berkeley, Hume, logical positivism, etc. erred in their choice of a secure starting point. These men sought to base justification for knowledge on subjective experiences which they thought secure and stable and therefore suitable as a starting point. Popper states categorically that the quest for certainty and for a secure basis for knowledge must be abandoned. "Security and justification of claims to knowledge are not my problem"

error

he says.

Following from Popper's central thesis that "the fundamental problem of the theory of knowledge is the clarification of investigation of this process by which it is here claimed, our theories grow or progress",²⁴ is his theory of evolutionary epistemology and conjectural knowledge. To this he erects the metaphysical idea of Absolute Truth. According to this belief, Popper holds that previous or existing knowledge is modified, rejected, improved on, added on, in the hope of approaching nearer to the Truth. This he argues is the 'method of science' which is essentially "the method of bold conjectures and ingenious severe attempts to refute them",²⁵ i.e. Conjectures and Refutations. (In this method, the 'revered' principle of induction is not only unnecessary but is shown to ^{be} logically invalid. ~~What is needed then is luck, ingenuity and the purely deductive rules of critical argument.~~ Popper accepts the results of Hume's analysis including his destruction of induction. He however, steers clear of his skepticism and develops the idea of purely hypothetical and conjectural knowledge. Arguing that verification is impossible, there is only falsification which is both practicable and logically valid. Drawing on the logical rule of inference, the modus tollens (i.e. $p \rightarrow q, \neg q, \therefore \neg p$) and the asymmetry between verifiability and falsifiability in relation to the logical form of universal statements, Popper builds a theory of deductivism which allows scientific status to theories which are capable of being falsified, refuted or tested. This idea becomes the basis of his

demarcation criterion. It is to be noted that Popper thinks he can evade Hume in this way. Ironically, Paul Feyerabend, a former disciple of Popper was led into the same Humean skepticism on the basis of Popperian assumptions. Thus opposed to verification and justification of theories, Popper writes:-

"the main concern in philosophy and in science should be the search for truth. Justification is not an aim.....
We should seek to see or discover the most urgent problems, and we should try to solve them by proposing true theories... or at any rate by proposing theories which come a little nearer to the truth than those of our predecessors."²⁶

Here again Popper relates his theory to the idea of truth. It seems to me that on the basis of his deductivism alone, truth remains always a conjecture, unknowable and easily dispensable. We will however examine this problem later.

IV The distinction between subjectivist and objectivist epistemology

Popper holds that there is a world of difference between subjectivist and objectivist epistemology. In the preface to his Objective Knowledge (1972) he writes, "Since Descartes, Hobbes, Locke and their school, which includes not only David Hume but also Thomas Reid, the theory of human knowledge has been largely subjectivist: knowledge has been largely subjectivist: knowledge has been regarded as a specially secure kind of human belief...."²⁷ To this list he includes modern positivists and many modern empiricists. Popper calls ^{this} trend or development a "blunder" based on what he terms "the commonsense theory of knowledge" in contrast to his "common-sense realism". The former also called the "bucket theory" leads to subjectivism, while the latter also called the

"searchlight theory" leads to objectivism.

Subjectivism begins with the idea that all or most of our knowledge comes to us via the senses. The mind is a blank or a bucket which is ^{imprinted} fed with data or information received through the senses. This is stored in the form of ideas, impressions, sense data, elements, atomic experiences etc. Immediate or direct knowledge is pure and unadulterated sense-data which is not yet digested. Knowledge of the universal is established by the association of ideas or elements. Repetition reinforces association. It is this which gives rise to expectations and beliefs. True beliefs consist in trust in an unfailing association, whereas erroneous belief is belief in an association, between ideas which might have occurred in the past but no longer occur together in a consistent manner. This subjectivism, Popper holds, is also still widespread in logic,

probability theory and even physical science. This is exemplified by such formulae in epistemic logic as "a knows p" or "a believes p" usually symbolized as "Kap" or "Bap". Popper argues that this has nothing to do with scientific knowledge, where the scientist neither knows nor believes. He would however do the following:- If we call him "s" and "p" the proposition then -

"s"tries to understand"p"

s tries to think of alternatives to p

s tries to think of criticisms of p

s proposes an experimental test for p

s tries to axiomatize p

s tries to derive p from q

s tries to show that p is not derivable from q

s proposed a new problem x arising out of p

s proposes a new solution of the problem x arising out of p

s criticizes his latest solution of the problem x etc, etc²⁸

Popper thus rejects subjectivism completely. His refutation is based on the following arguments. First, it is based on the false assumption that we are involved in the "quest for certainty". This assumption leads on to the idea that sense-data or impressions or immediate experiences can provide a stable and secure basis of all knowledge. But, "far from being this, these data or elements do not exist at all. They are

inventions of hopeful philosophers who have managed to bequeath
them to psychologists" ²⁹ What happens is that right from
childhood we are involved in the process of learning to
decode the chaotic messages which reach us from the environment.
This process, moreover proceeds by means of conjectures and
refutations or by trial and error elimination. In this process
we formulate theories which are later falsified or disconfirmed.
We learn from our mistakes. We learn our fallibility. Dogmatism
is untenable in the context of Popper's fallibilism.

The second argument follows from the first and holds
that all knowledge is theory-impregnated ^{led er} This includes our
observations. Growth of knowledge consists in the modification
or improvement or rejection of existing knowledge toward the
goal of truth. Certainty and a secure starting point are dismissed
given the idea of absolute fallibilism, contained in this
argument.

According to objectivism, the observer or knowing subject
"plays an important but only a very restricted role".³⁰
Knowledge from this standpoint consists of the logical content
of our theories, conjectures, guesses and refutations.
It is contained in or exemplified by theories published
in books, monographs, journals, or stored in microfilms, computers,
etc. Knowledge in this "objective" sense constitutes what Popper
calls "World 3" and is said to be autonomous. It nonetheless

remains a man-made product and is formulated in language. This knowledge grows by elimination or modification of the linguistically formulated conjecture. It can be submitted to critical discussion. But knowledge in the subjective sense can be eliminated only by killing the carrier; and defies critical discussion. Subjective knowledge is by some knowing subject, whereas objective knowledge is not. The latter is purely hypothetical and conjectural while former demands that its carrier establish its truth with certainty (i.e. giving it the status of justified belief) A look at Popper's idea of the "Three Worlds" will further elucidate this distinction.

V. Popper's "Three-Worlds Concept" or Epistemology Without a Knower

Although the "three-world concept" is a late development in Popper's thought, it is implied in his earlier thought. More explicitly it first appears in his 1967 address to the Third International Congress for Logic, Methodology and Philosophy of science and also in his 1968 Vienna lecture. These addresses are respectively "Epistemology Without a Knowing Subject" and "On the Theory of the Objective Mind"³¹. The three-world concept is basically opposed to Cartesian dualism (the mind-body problem) or to the view of the 'belief-philosophers' who see knowledge as justified belief: a view which leads to subjectivism and relativism.

According to this concept, then, World I consists of physical objects and states, inorganic matter and energy, biological structures and actions of all living beings including human brains. It also includes tools, machines, books, works of art and all material artefacts of human creativity. World 2 is the mental world, or world of states of consciousness and hence includes subjective knowledge, experience of perception, thinking, emotions, dispositional intentions, memories, dreams, creative imagination etc. World 3 is the world of objective knowledge, theoretical systems, problems and problem situations, critical arguments and the contents of journals, books and libraries. Sir John C. Eccles, a disciple of Karl Popper has represented this diagrammatically in his book Facing Reality (1970) where he discusses the concept in some detail.³²

We reproduce below one of his tabular representations of the three worlds:

<u>World I</u>	<u>World 2</u>	<u>World 3</u>
<ol style="list-style-type: none"> 1. Physical objects and states 2. Biology: structure and actions of all living being incl. human brains 3. Artefacts: Material subtrates of human creativity tools, machines books, works of art music 	<p>states of consciousness subjective knowledge</p> <p>Experience of: perception thinking, emotions dispositional intentions</p> <p>memories dreams creative imagination</p>	<p>Knowledge in objective sense</p> <ol style="list-style-type: none"> 1. Records of: intellectual efforts philosophical theological scientific historical, literary artistic technological 2. Theoretical Systems Scientific problems critical arguments

↔ lines of interaction

In support of this theory Popper proposes two thought experiments as follows:

"Experiment 1 : All our machines and tools are destroyed and all our subjective learning, including our subjective knowledge of machines and tools and how to use them. But libraries and our capacity to learn from them survive. Clearly, after much suffering, our world may get going again.

Experiment 2: As before, machines and tools are destroyed and our subjective learning, including our subjective knowledge of machines and tools, and how to use them. But this time, all libraries are destroyed also, so that our capacity to learn from books becomes useless!"³³

Commenting on these two experiments, Popper writes:

"If you think about these experiments, the reality, significance, and degree of autonomy of the third world (as well as its effects on the second and first worlds) may perhaps become a little clearer to you. For in the second case there will be no re-emergence of our civilization for many millenia"³⁴. These two experiments emphasize the significance and autonomy of World 3. They also indicate that World 2 is the mediator between World I and World 3, and that World 3 affects World 1 by the application of the consequences of these theories through the intervention of engineers and technologists. The third-world is

autonomous but it still remains a man-made product, resulting many times from the unplanned products of human action. The activity of thought or understanding consists in dealing with third-world objects. But although the theories of World 3 are never fully justifiable or verifiable, they should be testable. Their "objectivity" consists in the fact that they can be intersubjectively tested or submitted to rational discussion and criticism. Thus in The Open Society and Its Enemies vol. 11 (1966) Popper writes: "what we call 'scientific objectivity' is not a product of the individual scientist's impartiality, but a product of the social or public character of scientific method, and the individual's scientist's impartiality is, so far as it exists, not the source but rather the result of this socially or institutionally organized objectivity of science"³⁵. Hence for scientific criticism and scientific progress, co-operation intersubjectivity and the publicity of method play a very important role. The bearing of this on World 3 should be fairly obvious.

This process or activity by which knowledge progresses has been represented by Popper in terms of his general schema of problem-solving by the method of imaginative conjectures and severe attempts at refutation or criticism. This is given in the general formula:

$$P_1 \rightarrow TT \rightarrow EE \rightarrow P_2$$

where P_1 stands for the initial problem, TT the tentative theory or imaginative conjectural solution, EE attempted error elimination or several critical examinations of our conjecture and P_2 is the problem situation after attempts to solve it. This problem is continuous and goes on ad infinitum.³⁶

Human language belongs to all three worlds; to World 1 in its use of physical actions or symbols; to World 2 in its expression of subjective or psychological states; and to World 3 in its descriptive and argumentative function. The concept of Truth emerges in connexion with the descriptive and argumentative function. Moreover, the argumentative function merely presupposes the descriptive function. Logic, defined by Popper as "the organon of criticism" and by Bastable as "the depth grammar of rationality",³⁷ together with criticism belong to the argumentative dimension of language. The importance of language is evident in the fact that without it communication is severely limited. In fact without it World 3's existence would be questionable, since the theories, propositions, or statements of the third world are formulated in language.

This three-world concept of Popper helps to throw light on his contention that "the traditional epistemology of Locke, Berkeley, Hume and even of Russel, is irrelevant a large part of contemporary epistemology is irrelevant also"³⁸.

Traditional
epistemology



The reason being that they fail to distinguish between (a) knowledge or thought in the subjective sense consisting of a state of mind or of consciousness or disposition to behave or to act in certain ways and (b) knowledge or thought in an objective sense, consisting of problems, theories and arguments. For Popper, (a) is not in the province of epistemology but it could be of interest to the psychologist. But (b) is the subject matter of epistemology. Knowledge in this objective sense "is totally independent of anybody's claim to know: it is also independent of anybody's belief, or disposition to assent; or to assert, or to act. Knowledge in the objective sense is knowledge without a knower: it is knowledge without a knowing subject"³⁹ - the product of an "epistemology without a knowing subject."

Preliminary Critique

The critical considerations contained here are simply preliminary and tentative. Most of the points mentioned below will be developed in some detail later, after delving a bit more into Popper's thought. They will however indicate the general trend our critique will take throughout the rest of this essay.

Epistemology, then from Popper's viewpoint is "the theory of scientific knowledge" hence his assertion that: "what is relevant for epistemology is the study of scientific problems

and problem situations, of scientific conjectures (which I take as merely another word for scientific hypotheses or theories), of scientific discussions, of critical arguments, and of the role played by evidence in arguments; and therefore of scientific journals and books, and of experiments and their evaluation is scientific arguments⁴⁰. This is indicative of a general trend in Popper's work to reduce epistemology to philosophy of science and thereby to dismiss traditional epistemology as irrelevant. This procedure is readily understood if we remember Popper's close and dialectical relationship to logical positivism in particular and to modern empiricist thought in general. Logical positivism (we will deal with this in detail later) admitted as knowledge only that which satisfied the conditions of their verification principle. Unfortunately they in this way excluded a large number of propositions including scientific laws and theories, certain assumptions of science such as the uniformity of nature, and even their own criterion. What the logical positivists actually wanted to admit as knowledge was scientific knowledge in general insofar as it is grounded in the empiricist and positivistic belief in the primacy of experience or sense knowledge. Logical positivism however contained its own death warrant. It was however in its formulation a criterion of meaningfulness and a criterion of demarcation. The death of positivism, and Popper

claims responsibility for killing it,⁴¹ gave way to linguistic analysis in the manner of the later Wittgenstein, Ryle, Ramsey and others. I think Popper's positivism (if we call it so) superseded the positivism of the Vienna Circle and was more sophisticated than its predecessor. For Popper rejected not only the criterion of verifiability but also its use as a criterion of meaningfulness. He argued that this led to a false demarcation of science and metaphysics and excluded from the realm of meaning all scientific theories. Popper displaced this criterion with his own criterion of falsifiability whose purpose was not so much to distinguish between meaningfulness and meaninglessness but between science and non-science or between science and metaphysics. This criterion was not based on meaningfulness at all, rather it was based on testability or refutability. Hence those statements which could be tested, refuted or falsified were scientific and those which could not were unscientific. "Testability is therefore the same as refutability, or falsifiability. And since we should call 'empirical' or 'scientific' only such theories as can be empirically tested, we may conclude that it is the possibility of an empirical refutation which distinguishes empirical or scientific theories".⁴² This leads Popper to declare that "Irrefutability is a vice". We shall examine this later in detail. Popper's

24³
24²

positivism does in fact have its starting point in Humean empiricism although it avoids the intractable problems which Hume posed with his rejection of induction. The criterion of falsifiability derives directly from that rejection. Popper argues that he can restore rationality without that principle. I think, however, that Bertrand Russell really grasped the implications of empiricism - without - induction. He argued that without a principle of induction empiricism, rationality or knowledge becomes rationally impossible. Without it we cannot even speak of a growth of knowledge or even know that deductive inference in real life will lead to true conclusions. In any case, commitment to the validity of logic as "an ontology of the possible"⁴³ is a metaphysical commitment that can only be validated along inductive grounds.

Nonetheless, Popper writes: "I had held in my hands for many years a better criterion of demarcation: testability or falsifiability. Thus I could discard induction without getting into trouble over demarcation. And I could apply my results concerning the method of trial and error in such a way as to replace the whole inductive methodology by a deductive one. The falsification or refutation of theories through the falsification or refutation of their deductive consequences was clearly a deductive inference (modus tollens). This view

implied that scientific theories are either falsified or forever remain hypotheses or conjectures. Thus the whole problem of scientific method cleared itself up, and with it the problem of scientific progress. Progress consisted in moving towards theories which is more and more - theories of ever greater content".⁴⁴

This passage captures the core of Popper's epistemology. From it we can infer that the only thing possible in science is falsification, and therefore never verification. From this it follows that even when we hit upon truth we will never recognise it as such - it will remain forever a hypothesis or a conjecture. This further implies that a "scientific statement" which cannot be falsified ceases to be regarded as such and is classified as metaphysical. The fact that scientific theories and therefore knowledge remains forever hypothetical or conjectural implies that it is pointless or unnecessary to talk about truth in this system - granting that Popper has successfully overcome Hume's skepticism. This proposition derives from the fact that in Popper's thought we are not allowed any grounds for asserting with certainly that anything exists. Certainty becomes an illusion, replaceable by infinite conjecture, for even the refutations are themselves conjectures. Moreover on the basis of this system one has no way of knowing or asserting that data is data, or that what is reaching him from outside is data which reflects that outside reality (if that reality really is there), Hence in this system

there is really no difference between reality and fantasy. This is Hume's basic problem and stumbling block which Popper does not even seem to appreciate. Feyerabend does to some extent draw these implications out from Popper's thought. It follows then, that insofar as Popper system yields these results, it only leads to a dangerous and tragic skepticism. He refuses to admit this. But he forgets that even the very possibility of falsification is questionable.

There is yet another basic weakness in Popperian epistemology which derives from his positivistic presuppositions. We noted that he has reduced epistemology to philosophy of science, and this in turn to methodology or "an inquiry into the rules of the game of science".

This reduction has many implications. It has totally ignored the traditional tension between knower and known, as worthy of consideration with regard to the question of valid and reliable knowledge. This result moreover has given us an "objectivity" that radically undercuts human subjectivity and its role in the determination of valid and reliable knowledge. Instead it gives us "an epistemology without a knowing subject." This divorce is a tragic element of Popperian epistemology. It is inadequate because it refuses to consider the knower of what is known. It does completely overlook the knower. But even assuming that he did, Popper would have no ground that there is correlation between what the subject 'observes and the thing or object observed.

Methodological procedures or principles are not enough in validating knowledge. How do we determine between one set of principles and another? On what basis do we appraise them? It is a pity that Popper has not given a satisfactory answer to Imre Lakatos' question: "Under what conditions would you give up your demarcation criterion?"

These critical considerations will recur throughout the essay, as we hope to develop them and establish them in our further analysis of Popper's epistemology, in the next chapters. Of course new issues will also be raised in the process. As a concluding remark, we will observe that truth is more than just a question of logic. It involves ontological or metaphysical commitments and consideration on the part of the knower. It would also involve a metaphysical acceptance of the validity of logic, (logicism or deductivism) as applicable to the real world. It involves the personal character and integrity of the knower and commitment to certain necessary human values, such as truth itself, honesty, love, justice etc. A reduction of epistemology to "method of science" is a scandal. We cannot reduce epistemology to either "the logic of scientific discovery" or the "psychology of discovery". Epistemology includes both and the interaction between them, and more. We will look into this more later.

Nevertheless, inspite of the above and forthcoming critical

remarks on Popper's epistemology, I still concede and will maintain that Popper's contribution to epistemology is significant and exceedingly fruitful, as it yields many insights into the nature of knowledge; although we admit his picture is far from complete.

Footnotes

1. Descartes, Discourse on Method and Other Writings,
(Penguin Books 1960)
2. In: Moritz Weitz, ed. 20th Century Philosophy: the
Analytic Tradition p. 211
3. Discourse on Method, 4th Part, p. 61
4. Ibid. p. 62
5. Ibid. p. 66
6. Berkeley, The Principles of Human Knowledge with Other
Writings (Fontana 1962) p. 150
7. Principles of Human Knowledge, p. 111
8. Ibid. p. 81
9. David Hume, A Treatise of Human Nature (Penguin Books 1969)
p. 49
11. Ibid. p. 52
12. Ibid. p. 68
13. Ibid. p. 63
14. Enquiry Concerning Human Understanding 12.3.132 in R.P.
Wolff Ten Great Works p. 297
15. Ibid. p. 197
16. A Treatise of Human Nature, p. 184
17. Ibid. p. 189
18. B. Russell, History of Western Philosophy, (Unwin
Univ. Books 1961) p. 646

19. *Ibid.* p 647
20. A.J. Ayer, Language, Truth and Logic, (Penguin Books 1971)
p. 48
21. K.R. Popper, Logic of Scientific Discovery (1972)
p. 15
22. *Ibid.*
23. K.R. Popper, Objective Knowledge (1972) p. 34
(Hereinafter referred to as "O.K.")
24. O.K. p. 35
25. *Ibid.* p. 81
26. O.K. p. 44
27. O.K. p. vii
28. O.K. pp. 140-141
29. O.K. p. 63
30. *Ibid.* p. 73
31. Included in O.K. chapters 3 and 4
32. Sir John C. Eccles, Facing Reality (1970) pp. 163-172
33. O.K. pp. 107-108
34. *Ibid.*
35. The Open Society, Vol. 2 p. 220
36. See O.K. p. 287
37. P.K. Bastable, Logic: Depth Grammar of Rationality
pp. 270-275.
38. O.K. p. 108

39. O.K. p. 109
40. O.K. p. 111
41. Popper, "Intellectual Autobiography" (1974) p. 69
42. Popper, "Conjectures and Refutations" (1965) p. 197
(Hereinafter called "C&R")
43. Bastable, Logic , op.cit. pp. 275-278
44. Popper, "Intellectual Autobiography," op.cit. p. 62
45. Logic of Scientific Discovery, p. 53 (herein after called
"LSC.D")

CHAPTER 3

The Problem of Induction

"The results of this book appear to me completely untenable..... I cannot understand how Popper could possibly believe that with respect to the problem of induction his investigations mean even the slightest advance"

H. Reichenbach Erkenntnis

Quoted on back-page of LSc.D.

Believing himself to have solved the problem of induction, Popper has written, "I think that I have solved a major philosophical problem: the problem of induction. (I must have reached the solution in 1927 or thereabouts.) This solution has been extremely fruitful, and it has enabled me to solve a good number of other philosophical problems."¹

Since Hume, the problem of induction has been a thorn in the flesh of both scientists and philosophers. It has constantly evaded a full and satisfactory widely accepted solution. The truth of the matter is that it has not been possible to justify it deductively. "That the whole of science, of all things should rest on foundations whose validity it is impossible to demonstrate has been found uniquely embarrassing. It has turned many empirical philosophers into sceptics or irrationalists, or mystics. Some it has led to religion"² So writes Magee, who goes on to argue that Popper's solution is what we have been waiting for. Thus although Bertrand Russell has argued that a refutation of induction deals a death blow to rationality, empiricism and scientific procedures, Popper claims to have rejected or dismissed

induction while at the same time retaining or restoring rationality. He has, if he is right accomplished what Russell and others thought impossible. As a matter of fact Popper is so convinced of his own achievement that he can confidently write:

"So far I have been able to give

an outline of epistemology and the methods used in science to further the growth of knowledge without even mentioning induction - neither the word nor the alleged phenomenon. This I think is significant. Induction can be solved in a negative but none-the-less straightforward manner, induction turns out to play no integral part in epistemology or in the method of science and the growth of knowledge."3

Popper takes the general understanding of induction as that process by which we pass from the particular to the general, or from the less general statements, such as the accounts of the results of observations or experiments to universal statements, such as hypotheses or theories. Or the process of concluding from the fact of something being true of a certain number of members of a class that the same thing will be true of unknown members of that class also. This process, as already noted, has defied justification or validation. It has posed insuperable problems central to epistemological inquiry.

The problem of induction has been called Hume's problem. This is probably because it was Hume who raised it in this acute form, showing induction to be logically invalid: and untenable. Since Hume, philosophers have tried to solve this

riddle of induction. In this paper, we will not pay much attention to these attempts at solving the problem of induction.^{2/3} We will however mention them briefly in passing. Our main primary concern will be to examine critically Popper's solution and its implication. The basic answers to the problem of induction could be summarised as: 1) the metaphysical or a priori justifications of induction 2) the rejection or dissolution of the problem as itself unreasonable 3) pragmatic vindications of induction and 4) the deductive reconstruction. Thus, R.B. Brathwaite, Max Black, Charles S. Peirce and others have argued that although induction cannot be validated, it can be vindicated for example in the use of inductive policies. The proponents of this position on practical grounds argue that although there is no guarantee that inductive techniques or policies will succeed in giving us true knowledge they are the only means we have since all other alternatives ultimately depend or rest on induction. Moreover, induction is further vindicated, argued Charles S. Peirce, because of its experimental, provisional and self-corrective character. Thus he wrote, "The true guarantee of the validity of induction is that it is a method of reaching conclusions which, if it be persisted in long enough, will assuredly correct any error concerning future experience into which it may temporarily lead us."⁴ Others like J.M. Keynes and Carnap have attempted

a justification of induction by reconstructing inductive logic in terms of deductive logic and by interpreting inductive statements, as probability statements. Some like Peter Strawson, from the linguistic analysis school, have tried to dissolve Hume's problem, asserting that it derives from linguistic muddles and conceptual confusions. This group would conclude that those who consider it a problem are therefore mistaken. J.S. Mill, on the other hand takes a justification of induction which depends on the principle of the uniformity of nature. He writes: "Whatever may be the most proper mode of expressing it, the proposition that the course of nature is uniform, is the fundamental principle, or general axiom, of induction."⁵ This position is essentially metaphysical or aprioristic like that of Kant which we shall examine in some detail below. Without hopefully prejudicing the reader, we will state our position as a combination of the aprioristic and pragmatic alternatives.

Popper on the other hand contends that his is the solution, because he avoids both apriorism and the infinite regress to which all the positions named above are bound to lead. We will consider his position in due course. Meanwhile we will give a brief resume of Kant's solution, first because of its historical significance as the first attempt to overcome Hume's skepticism, and secondly because of its influence to some extent on Popper's position.

II. Kant's Answer to Hume's Problem

Kant is generally rated as one of the greatest philosophers in history. Yet I think without Hume's skepticism, this might not have been possible. For it was Hume's skepticism that led him into his meditations, reflections and explorations into new frontiers of knowledge hitherto untouched. He admits this debt to Hume when he writes in his Prolegomena to any Future Metaphysics, "I openly confess, the suggestion of David Hume was the very thing, which many years ago first interrupted my dogmatic slumber, and gave my investigations in the field of speculative philosophy quite a new direction."⁶ Kant's philosophical orientation had been rationalist grounded in the dogmatic metaphysics of Leibnitz, Spinoza, Descartes and Wolff. Kant's attempt to overcome Humean skepticism led him to a position which was a sort of bridge between empiricism and rationalism. It is this note which Kant strikes right at the beginning of his Critique of Pure Reason:-

"That all our knowledge begins with experience there can be no doubt.....But though all our knowledge begins with experience, it by no means follows, that all arises out of experience. For on the contrary, it is quite possible that our empirical knowledge is a compound of that which we receive through impressions, and that which the faculty of cognition supplies from itself....."7

The task of Kant's first Critique is primarily epistemological. He sets out to determine the limits of human knowledge, by means

of reflection on knowledge itself, the knowing process, the nature of reason, etc. His intention to answer the question: WHAT CAN I KNOW? is set in the context of three other questions - WHAT OUGHT I TO DO? WHAT MAY I HOPE FOR? and WHAT IS MAN? Kant in fact reduces the first three questions to the fourth - that is he grounds all his reflections in philosophical anthropology, the problem of man. Thus he writes: "The whole interest of reason, speculative as well as practical is centred in the three.....questions"⁸

Elsewhere in the LOGIC where the fourth question is included he writes: "The first question is answered by metaphysics, the second by morals, the third by religion, and the fourth by anthropology, since the first three questions relate to the fourth."⁹

Kant naturally starts off with the assumption that knowledge is possible. He refutes the empiricist idea that knowledge consists only in receiving sense impressions. He argues that sense impressions are subject to certain a priori conditions without which knowledge as such would be impossible. To this end he asked: How are synthetic judgements possible a priori possible? How is science possible?

In answering this question, Kant proposed his "Copernican revolution" which ran counter to the ideas of the empiricists, Locke, Berkeley and Hume. Copernicus

had explained the movements of the stars by suggesting that their apparent movements are to some extent due to the movement of the observer, so Kant suggests that it is not the mind as such which conforms to the independent world of objects, but rather the "objects which conform to the mind". In effect Kant is saying that what we know is a product of what reaches us from the external world of objects sieved or processed through the structures of our cognitive faculty.

In order to understand Kant's reasoning we shall clarify some of Kant's important distinctive terms. He states for example that judgements or propositions can be either a priori or posteriori, analytic or synthetic. But they can also be synthetic a priori. A priori knowledge is known completely independently of experience. It is necessary, universal and prior to all experience and can be stated with certainty by pure reason. A posteriori knowledge on the other hand is wholly dependent on experience. On the other hand, analytic statements or judgements are those in which the predicate is already contained in the concept of the subject and hence their truth or falsehood is decidable by the use of logic alone and that without appeal to empirical evidence. Synthetic statements are those which tell us about experience, about the external world of objects and unlike the analytic

judgement do not have the predicate contained in the concept of the subject. They are empirical judgements and their truth depends on empirical evidence. Clearly then synthetic judgements are same as posteriori judgements. It follows then that the statement "All bachelors are unmarried" is analytic whereas the statement, "The present Manager of E.S.A. Bookshop is a Kenyan" is synthetic or posteriori. With these distinctions in mind, Kant writes: "the proper question upon which all depends, when expressed with scholastic precision, is therefore: "How are Synthetic Propositions a priori possible?"¹⁰ This is a key question in Kantian epistemology. In attempting to answer it, Kant goes on in his Transcendental Aesthetic to demonstrate that the ideas of time and space are presupposed a priori in any experience of temporal and spatial objects and that they cannot be derived or generalised from experience at all. He calls time and space, the pure forms of sensuous intuition "in which all the manifold content of the phenomenal world is arranged and viewed under certain relations".¹¹ They are moreover, not a product of sensibility for they remain even after we have taken away "from our representation of a body, all that the understanding thinks as belonging to it, as substance, force, divisibility, etc, and also whatever belongs to sensation, as impenetrability, hardness, colour, etc,. Yet there is still something left us from this empirical intuition....."¹² Kant in this way shows that space and time are a priori. Kant

goes on to show in the Transcendental Analytic, the categories or concepts of metaphysical deduction which are the necessary conditions of knowledge. He lists twelve categories of unity, plurality, totality; reality, negation, limitation, substance, causality, community; possibility-impossibility, existence - non-existence, and necessity - contingency.¹³ It is by means of the categories that we comprehend and understand, or even interpret what is given in space and time.

However, what is of interest to us is the category of causality, which can be generalised into the principle of induction. We can see now that although Hume failed to identify this process (category) as either "a matter of fact" or a "relation of fact" following his reduction of knowledge into these two (which are equivalent to Kant's "synthetic" and "analytic" judgements), Kant solved his resulting skepticism by positing the existence of synthetic a priori judgements, of which the categories are a sub-set. Causality then is given validity by the structure of the mind and is used in understanding and interpreting events in the external world. It is in this connection that Kant goes on to argue in his Transcendental Dialectic that it is in the nature of reason to employ the categories beyond that which is given by sensibility in space and time in trying to pose and answer metaphysical questions. Kant therefore established in this inquiry that "the understanding does not derive its laws (a priori) from, but prescribes them to

nature".¹⁴ This in essence is what constitutes the Copernican revolution of which Kant himself writes:

"We here propose to do just what Copernicus did in attempting to explain celestian movements. When he found that he could make no progress by assuming that all the heavenly bodies resolved round the spectator, he reversed the process, and tried the experiment of assuming that the spectator revolved, while the stars remained at rest. We may make the same experiment with regard to the intuition of objects. If the intuition must conform to the nature of the objects, I do not see how we can know anything of them a priori. If on the other hand, the object conforms to the nature of our faculty of intuition, I can then conceive the possibility of such an a priori knowledge.....15

Kant's answer then to Hume's problem is given in the content of this Copernican revolution. Hence causality is not just due to habit, Kant answers Hume, it is valid a priori. Kant's solution called for "a half-way house between the realism of intellectus ectypus or passive mind and the idealism of intellectus archetypus or creative mind"¹⁶. These investigations, however, also led to another skepticism. For Kant had postulated that reality-as-it-is-in-itself (the noumenon) was in fact unknowable. What we could know was reality-as-it-appears-to-us (phenomenon). This tragic distinction in Kantian epistemology resulting from his critique of pure reason, far from solving the problem of skepticism, magnifies it. We will argue that Popper takes it but adapts and modifies it into his scheme. Naturally he too fails to solve the epistemological problem.

Popper agrees with Kant that the laws of nature are our own

invention, genetically a priori but not a priori valid. They are, he says, conjectures which we test in nature. Sometimes they survive, sometimes they are falsified. This is of course a modification of Kant. Thus in his paper "Kant's Critique and Cosmology", Popper writes:

"By emphasizing the role played by the observer, the investigator, the theorist, Kant made an indelible impression not only upon philosophy but also upon physics and cosmology. There is a Kantian climate of thought without which Einstein's theories or Bohr's are hardly conceivable; and Eddington might be said to be more of a Kantian, in some respects, than Kant himself. Even those who, like myself, cannot follow Kant all the way can accept his view that the experimenter must not wait till it pleases nature to reveal her secrets, but that he must question her. He must cross-examine nature in the light of his doubts, his conjectures, his theories, his ideas, and his inspirations. Here, I believe is a wonderful philosophical find. It makes it possible to look upon science, whether theoretical or experimental, as a human creation, and to look upon its history as part of the history of ideas on a level with the history of art or of literature".¹⁷

Popper thus transformed Kant's synthetic a priori judgements into conjectures, on the same level as synthetic ^{po}propositions. He rejects Kantian apriorism. In the same way, he rejects the validity of the principle of induction. He does not even grant it the

status of a conjecture. He argues that induction leads either to this apriorism or to an infinite regress. It ^{is} superfluous, invalid and has no function in a logic of science. Popper then states his position vis-a-vis Kant's as follows:

"(Kant) assumed correctly I think that the world as we know it is our interpretation of the observable facts in the light of theories that we ourselves invent. As Kant puts it: 'Our intellect does not draw its laws from nature.....but imposes them upon nature'. While I regard this formulation of Kant's as essentially correct, I feel that it is a little too radical, and I should therefore like to put it in the following modified form: 'Our intellect does not draw its laws from nature, but tries with varying degrees of success - to impose upon nature laws which it freely invents.' The difference is this. Kant's formulation not only implies that our reason attempts to impose laws upon nature, but also that it is invariably successful in this. For Kant believed that Newton's laws were successfully imposed upon nature by us: that we were bound to interpret nature by means of these laws, from which he concluded that they must be true a priori..... Yet we know that since Einstein that very different theories and very different interpretations are also possible, and that they may even be superior to Newton's. Thus reason is capable of more than one interpretation. Nor can it impose its interpretation upon nature once and for all time. Reason works by trial and error. We invent our myths and our theories and we try them out: we try to see how far they can take us. And we improve our theories if we can. The better theory is the one that has the greater explanatory power: that explains more; that explains with greater precision; and that allows us to make better predictions."¹⁸

III. Popper's solution to the Problem of Induction

We have already in our concluding remarks on Kant's position indicated the direction of Popper's solution. More specifically, his solution is both negative and creative. Popper calls the problem of induction, "the problem of human knowledge". In our consideration of Popper's solution, we will firstly look at his formulation of the problem. He rejects the traditional formulations of this problem, which he maintains are based on a mistake. He thus represents them as follows:

1. What is the justification for the belief that the future will resemble the past?
2. What is the justification for inductive inferences?

In reference to this formulation, Popper argues that it is mistaken. For if induction is invalid, then the question of justification does not arise, neither does the question of inductive inferences arise. Strawson on the other hand rejects justification for a different reason. He holds that the validity of inductive logic is of the same status as that of deductive logic. For him inductive inference is inductively valid just as deductive inference is deductively valid - and hence needs no justification.

Popper holds with Hume that induction is invalid and unjustified. For him, the traditional formulations are wrong in demanding a justification because by the nature of the case,

induction is unjustifiable. Like Hume he interprets induction on two levels - the psychological and the logical. He reformulates Hume's logical problem of induction (to be called H_L) as follows:

H_L : Are we justified in reasoning from repeated instances of which we have experience to other instances (conclusions) of which we have no experience? 19

To H_L Hume answered that however great the number of instances or repetitions, the answer is NO. This led Hume to his Psychological problem of induction (to be called H_{PS}) which Popper formulates as follows:

H_{PS} : Why nevertheless do all reasonable people expect and believe that instances of which they have no experience will conform to those of which they have experience. That is, why do we have expectations in which we have great confidence?

To this, question, Hume answered - "CUSTOM or HABIT" coupled with the process of association of ideas. Moreover, habit and custom are necessary for our survival.

The results of H_L and H_{PS} led Hume, as we argued earlier, to an irrationalist epistemology and to a pyronian skepticism. Popper, however, holds that he can accept Hume's answer to H_L and at the same time avoid Hume's pessimistic and irrational consequences. Popper's initial step is to adopt his "principle of the primacy of the logical solution" in order to eliminate the psychological problem. This principle which he also calls the "principle of transference" holds that what is true in logic must be true in psychology. If we grant the validity of the primacy

of logic at the expense of other factors, it would follow that Hume's H_{PS} does not arise and that "there is no such thing as induction by repetition".

Popper takes a further step in salvaging Hume from his skepticism by reformulating Hume's H_L in his version (to be called L_1) as follows:

L_1 : Can the claim that an explanatory universal theory is true be justified by "empirical reasons," that is by assuming the truth of certain test statements or observation statements (which it may be said, are 'based on experience')?

Popper's answer to L_1 is similar to Hume's answer to H_L . Popper further generalizes L_1 into L_2 as follows:

L_2 : Can the claim that an explanatory universal theory is true or that it is false be justified by "empirical reasons", that is, can the assumption of the truth of test statements justify either the claim that a universal theory is true or the claim that it is false?

To L_2 Popper answers that assuming the truth of test statements, can allow us to affirm the claim that an explanatory universal theory is false. L_2 and its answer are based on the notion of the logical asymmetry which obtains between verification and falsification in the context of the logical form of universal statements. The argument goes that universal statements can never be derived from singular statements, but can instead be contradicted

by a singular statement. This argumentation is based on the logical rule of modus tollens of the form.

$p \rightarrow q$

$\neg q$

$\therefore \neg p$

According to this argumentation, verification is impossible. We can only falsify. This in effect contradicts the assumptions of logical positivism. We shall examine in some detail, later on, the relationship between Popper and the Vienna Circle.

From L_1 and L_2 , then, Popper moves to L_3 which he formulates in view of the problem of choosing between rival or competing universal theories. He therefore gives the following formulation of L_3 :

L_3 : Can a preference with respect to truth or falsity, for some competing universal theories over others ever be justified by such 'empirical reasons'?

On the basis of the answer to L_2 , Popper again answers positively. It may be possible to refute some which would mean that we shall make a preference for those theories which have not been falsified.

Popper's negative answer to L_1 yields the conclusion that human knowledge or scientific knowledge is permanently hypothetical or conjectural. Popper himself point this out, for example in this quotation:

"I think that we shall have to get accustomed to the idea that we must not look upon science as a "body of knowledge" but rather as a system of hypotheses; that is to say, as a system of guesses or anticipations which in principle cannot be justified, but with which we work as long as they stand up to tests, and of which we are never justified in saying that we know that they are 'true' or 'more or less certain' or even 'probable'²⁰.

This brings us to Popper's idea of conjectural knowledge and evolutionary epistemology or the growth of knowledge. We shall examine these in some detail later. Popper painstakingly maintains that his formulations and solutions to L_1 , L_2 and L_3 are consistent with the canons of deductive logic. He also notes that these are consistent with the positivistic principle of empiricism which holds that only experience can lead us to affirm or deny the truth or falsity of any factual statement. Moreover, this idea of conjectural knowledge is consistent with Popper's common-sense realism to which we have already referred, and which is opposed to the quest for certainty or certitude which is characteristic of the common-sense theory of knowledge. For Popper certainty is unattainable, every piece of knowledge is conjectural or merely guess-work - even basic observation statements, or test-statements are conjectural.

IV: Preference for Theories, Corroboration and Verisimilitude

From Popper's formulations and answers to L_1 , L_2 and L_3 we arrived at the result that all human knowledge consists of guesses, conjectures and hypotheses. We also arrived at the

inference that although we can never verify any conjecture or hypothesis as true, we can falsify it or say that it is false. This means that it is possible on purely logical empirical grounds to prefer some conjectures to others. Naturally a testable and a not-yet falsified theory, if it has greater explanatory power than its predecessors will be preferred to its refuted rival theories. But since this theory may also be false, attempts will be made to test and refute it. Thus a theory which has withstood many severe tests is said to be well 'corroborated'. The theory in question should also be compatible with certain "accepted basic statements" which in turn can be derived from it.²¹ The degree of corroboration does not however depend on the number of corroborating instances but on 'the severity of the various tests to which the hypothesis in question can be, and has been subjected. But the severity of tests, in its turn, depends upon the degree of testability, and thus upon the simplicity of the hypothesis: the hypothesis which is falsifiable in a higher degree, or the simpler hypothesis, is also the one which is corroborable in a higher degree"²² Popper has schematized this as follows: testability = high prior improbability = paucity of parameters = simplicity. It follows therefore that degree of corroboration is not synonymous with probability, for a well corroborated theory may be the less probable on the given evidence. It is then on the basis

of corroboration that we make a preference between competing theories in the light of how they have stood up to tests, and how severe these tests were. But says Popper, we cannot project these results into the future. We know nothing about the future. We must restrict preferability of a theory to the present in the light of its degree of corroboration at that time. Neither does this tell us anything about the reliability of a theory. More pessimistic still, we can never be sure that we are progressing toward better theories, or that our knowledge is growing. That may perhaps be entertained as a conjecture. "There is no assurance that we shall be able to make progress towards better theories."²³

In spite of this pessimism, this process of preference and corroboration is propelled by the idea of truth, which is the "general aim of rational discussion". But this idea is mainly regulative. In any case truth is illusive, and would not be discerned even if attained. For that matter, Popper would prefer to speak of verisimilitude or approximation to truth. Thus, a theory with greater content and explanatory power will also possess greater verisimilitude, if it is the best corroborated. It follows that this theory will have a higher truth content than falsity content. Popper here takes Tarski's idea of truth as correspondence with facts, as we noted earlier. Popper writes: "the search for verisimilitude is a clearer and a more realistic aim than the search for truth."²⁴

V. Critical Considerations

What we have already said in the preliminary critique actually anticipates what we have outlined as Popper's position. It is also relevant and applicable to the issues raised in the foregoing. We will proceed to critically examine Popper's ideas along similar lines. At the outset we shall ask the question: "How does Popper's reconstruction of the problem of knowledge fair on, given his rejection of the validity of the principle of induction? On the surface of it he seems to have evolved a viable and successful reconstruction. At bottom I would suggest he has utterly failed. What Popper has called to question is the validity of any universal whatsoever, including human language itself. He has called to question even the postulates or 'absolute presuppositions' (Collingwood)²⁵ which underlie knowledge - that is to say those assumptions which are non-empirical but are nonetheless presupposed in our struggle for survival and meaning. Their negation would make non-sense of all rationality and human enterprise.

Popper admits this to some extent when he says for example, that "scientific method presupposes the immutability of natural processes, or the 'principle of the uniformity of nature'..... It expresses the metaphysical faith in the existence of regularities in our world (a faith which I share, and without which practical action is hardly conceivable)."²⁶ This admission is in my

thinking very significant. It is because Popper assumes these metaphysical propositions that his ideas on induction can make some sense. Although he does in fact reject induction he retains it in this veiled form, because as J.S. Mill argues in his A System of Logic quoted above, it is possible to derive the principle of induction from some of the principles Popper cites above, and of which he says, without them "practical action is hardly conceivable." This significant admission then if followed further would no doubt show that Popper's contentions in epistemology are mistaken. Given that the foundation of science is metaphysical and neither verifiable nor falsifiable in Popper's sense, one can argue that in itself renders what is built upon it, a partaker of this evasiveness in relation to verification or falsification. Reducing this foundation to some sort of methodological structure, as Popper tries to do appears an unjustifiable step which evades the real issue. This is alluding to the fact that Popper's whole epistemological exercise is buttressed by a set of "methodological rules" which are neither falsifiable nor testable on his own criteria. They turn out to be if not arbitrary, influenced by a certain interest — positivistic, technical, "objectivistic" or any other.

My thesis is that without an idea of induction, Popper's epistemology is totally untenable, that it leads us back to Humean skepticism which it poses as a solution. I hold that

without the idea of induction, even in a hidden sense, Popper's ideas are meaningless and totally irrational. In fact the idea of corroboration and preference for theories, and even of verisimilitude is only meaningful on the basis of induction or some form of verification. For we cannot even talk of the growth of knowledge without it. A characteristic passage from the Logic of Scientific Discovery will help to pinpoint the contradictions in Popperian epistemology. He writes:

"Science is not a system of certain, or well established statements, nor is it a system which steadily advances towards a state of finality. Our science is not knowledge (episteme): it can never claim to have attained truth, or even a substitute for it, such as probability.....
We do not know: we can only guess. And our guesses are guided by the unscientific, the metaphysical.....faith in laws, in regularities which we uncover - discover"²⁷

This passage would lead us to conclude that we do not even know whether what Popper is saying in this passage or in the Logic of Scientific Discovery is true or false. We cannot guess either since it is not falsifiable in his sense. Secondly, we do not know whether knowledge grows or not. We hope and conjecture that it does, but we do not actually know. And of course we do not know even what truth is, for when we arrived at it we would not know. Thirdly, even in falsification we cannot positively affirm that what is being negated is in fact so, for a falsified theory can stand up again. It may even overthrow a very well corroborated theory. Hence

both falsification and verification end in a cul-de-sac. Moreover if we start on a conjecture, everything else built on it remains a conjecture - we cannot even assign a probability on it - and this Popper rightly concedes. This position logically and inevitably leads us to a tragic pessimism and skepticism - although Popper does avoid this option. He is neither skeptical nor pessimistic. Nonetheless, this tragic note underlies his utterances. To illustrate this point we will cite another passage to underscore this underlying pessimism:

"...no theory of knowledge should attempt to explain why we are successful in our attempts to explain things.

Even if we assume that we have been successful - that our physical theories are true - we can learn from our cosmology how infinitely improbable this success is: our theories tell us that the world is almost completely empty, and that empty space is filled with chaotic radiation. And almost all places which are not empty are occupied either by chaotic dust or by gases, or by very hot stars - all these conditions which seem to make the application of any method of acquiring physical knowledge locally impossible."²⁸

This passage as clearly as any exposes Popper's underlying pessimism and skepticism. Yet it seems that Popperian skepticism as shown above is worse than Hume's. In Hume you could be certain of the simple ideas, and of impressions. In Popper these are conjectural if not non-existent. His observation statements are not certain or true either - they are mere guesses. In Hume the problem was the universal that would validate these discrete and unrelated individual events. In Popper it is not only

this, but that there is no universal to validate even one discrete event - on the basis of which we can assert or affirm that it is so. This is the Popperian dilemma.

Imre Lakatos, a brilliant logician and philosopher, and also a former student of Popper clearly understood this point - which Popper himself has refused to see. To this end, Lakatos writes: "the 'logic of the growth of knowledge' must include - in addition to Popper's logico-metaphysical theory of verisimilitude - some speculative genuinely epistemological theory connecting scientific standards with verisimilitude"²⁹. Lakatos has rightly judged that without such a speculative metaphysical principle Popper's theory would lead to total skepticism. He argues that "only some such conjectural metaphysics connecting corroboration and verisimilitude would separate Popper from the skeptics and establish his point of view, in Feigl's words 'as a tertium quid between Hume's and Kant's epistemologies!"³⁰ Lakatos is in fact a Popperian fallibilist, but realising the skepticism and pessimism inherent in Popper's epistemology, tries to reconstruct it within the context of a conjectural principle of induction. He does this for example in his paper "Falsification and the Methodology of Scientific Research Programmes".³¹ Popper however has rejected Lakatos' suggestions. He considers Lakatos' work as "unreliable and misleading".³² The point is that Popper avoids answering Lakatos

criticism of his views on induction. He surprisingly takes the verificationist approach of issuing a chain of references to his writing which does not in fact answer the problem.

It is possible that Popper's scientific preoccupations and his reduction of epistemology to methodology - a point which Albrecht Welmer has clearly underscored and argued out in his Methodologie als Erkenntnistheorie (1967) - which is responsible for his mistaken epistemology. Feyerabend's anarchistic epistemology also bears this out. It seems to me that in spite of himself, and by the nature of the case Popper could not avoid unconsciously assuming induction. How else could he justify any of his brilliant ideas - corroboration, growth of knowledge, science etc. Popper in point of fact employs a "hidden" principle of induction, without which he himself would not make sense of what he was saying. Of course he has denied this - which does not change anything. Herbert Feigl making the same point has written: "Popper's policy of the critical, rational approach must (and does) leave open the possibility that the Michelson-Morley type of experiment might give positive results beginning tomorrow and forever after. It is only by induction that we can assume that a well-refuted theory will stay refuted. After all, it is logically conceivable that such a 'knocked-out' theory might begin to 'stand up' at any time; and from there on out for all future concerns this would be just as good as a theory which had never been refuted."³³

Popper does unconsciously presuppose induction - and several times this comes on the surface in his writings. Thus he writes: ".....science would stagnate and lose its empirical character, if we should fail to obtain verifications of new predictions"³²(my underlining). Elsewhere he writes: "I admit that there may be a whiff of verificationism here; but this seems to me a case where we have to up with it....."³⁵. Clearly then Popper cannot avoid use of induction.

Our thesis is that the knowing process oscillates between verification and falsification. This is to say like C.S. Peirce that induction is self-corrective through the dialectic of verification and falsification. That is : "The true guarantee of the validity of induction is that it is a method of reaching conclusions which, if it be persisted in long enough, will assuredly correct any error concerning future experience into which it may temporarily lead us."³⁶ We should be grateful to Popper for emphasizing the place of falsification, but we cannot accept his rejection of verification and therefore of induction. For the truth is - there are certain things we can be said to know with certainty although we may not be able to prove this. That is, we know certain things tacitly. For example I know that I am Mojola and not somebody else, and that this is not a conjecture but a fact, a truth. I could similarly affirm certain objects to be "a tree", "a human being" " a house", etc., and this with certainty.

In fact language takes this for granted and operates on this assumption. Similar assumptions are a common-place in regarding everyday experience. Popper is negating the very basis on which every-day life is built - and this he cannot in all honesty do, because no man can function without the assumptions of everyday life.

I think, although, Popper denies being a positivist, his epistemology is based on the positivistic search for "total objectivity" in human knowledge, an idea which is not only unattainable but fallacious. Popper's search for an epistemology without a knowing subject" is thoroughly mistaken. It is simply impossible to overlook the subject in human knowing. Polanyi, Roger Poole, Habermas, Marcuse among others have definitively exploded the positivist ideal of a wholly explicit, wholly objective knowledge. In human knowledge there is always the tacit pole, the subjective pole. This is the whole point of Michael Polanyi's work. Polanyi's work gives due place to both subject and object. Thus Polanyi grounds knowlege on the person's activity. He distinguishes between focal and subsidiary awareness, bodily and conceptual activity, knowledge by attending to and knowledge by relying on, tacit knowing and explicit knowing. Polanyi shows that explicit or objective knowledge is only intelligible on the basis of tacit knowledge, which in turn is grounded on our bodily and cultural existence, that is our being. He argues that we cannot account for every factor in knowledge, there is always

"the unaccountable element". Even Kant admitted this in his Transcendental Analytic, when he describes the act of judgement. He writes: "if understanding in general is to be viewed as the faculty of rules, judgement will be the faculty of subsuming under rules; that is, of distinguishing whether something does or does not stand under a given rule (casus datae legis).....If it sought to give general instructions how we are to subsume under these rules, that is, to distinguish whether something or does not come under them, that could only by means of another rule. This in turn, for the very reason that it is a rule, again demands guidance from judgement. And thus it appears that though understanding is capable of being instructed, and of being equipped with rules, judgement is a peculiar talent which can be practised only and cannot be taught. It is the specific equality of so-called mother-wit....."³⁷ Kant is pointing to the purely personal element which cannot be accounted for by rules - present in all acts of judgement. Kant argues that this faculty of judgement is inscrutable. Thus Kant holds that the act of induction, of applying the scheme of a class to particulars, "is an art concealed in the depth of the human soul, whose real modes of activity nature is hardly likely ever to allow us to discover, and to have open to our gaze."³⁸ Indeed this 'secret power of our nature' which the subject cannot objectivise points to the fact that in knowing we rely on clues hidden inside our body.

Even in simple perception, not everything seen can be identified "objectively". We must admit that there is more to knowing that we will ever know. Thus Polanyi refers to five indeterminacies which belong to tacit knowing:- 1. the indeterminacy of empirical knowledge in its bearing on reality 2. the unspecifiability of rules for establishing truth, as distinct from illusory coherence, 3. the indeterminacy of the grounds on which knowledge is held to be true, 4. the unspecifiability of the process of tacit integration by which knowledge is achieved; 5. the unspecifiability of the existential changes involved in modifying the grounds of scientific judgement.³⁹

The fourth indeterminacy listed above includes the process of empirical induction by which we give meaning to a set of particulars through certain powers of integration. This has been the topic of this chapter. This process, Polanyi holds, oscillates between movements of analysis and integration, but where integration gains the upper hand. We could say it oscillates between movements of falsification and verification, but with verification gaining an upper hand. This process in turn depends on a certain foreknowledge, a certain general conception of the nature of things a tacit knowing - without which no discovery is possible. In this sense then Polanyi's theory differs from Popper's because Polanyi "accredits man's capacity to acquire knowledge even though

he cannot specify the ground of his knowing, and it accepts the fact that his knowing is exercised within an accidentally given framework that is largely unspecifiable"⁴⁰. Polanyi recognises the personal participation of the knower in all acts of knowing. He rejects the very idea of wholly explicit knowledge, asserting its impossibility, for "while tacit knowledge can be possessed by itself, explicit knowledge must rely on being tacitly understood and applied"⁴¹. For tacit knowledge is not acquired through analysis and argument, but through imitation, empathy and practice. It can only be grasped through participation in a "form of life". It is in this sense that knowledge or "knowing is an indwelling: that is, a utilization of a framework for unfolding our understanding in accordance with the indications and standards imposed by the framework. But any particular inwelling is a particular form of mental existence..... All thought is incarnate, it lives by the body and by the favour of society. But it is not thought unless it strives for truth, a striving which leaves it free to act on its own responsibility, with universal intent."⁴²

Having rejected Popper's one-sided view in regards to verification, falsification, and induction - we maintain that Popper's useful insights can be rehabilitated and restored within the context of Polanyi's thought whose outline we have endeavoured to give. This is our thesis.

Footnotes:

1. O.K. p. 1
2. Brian Magee, Popper (Fontana Books 1973) p. 21
3. O.K. p. 85
4. Quoted in E.H. Madden, The Structure of Scientific Thought (1960) p. 290. See in same work C.S. Peirce's, "Induction as Experimental and Self-Corrective" p. 296-298.
5. J.S. Mill, A System of Logic: Ratiocinative and Inductive * (London: Longmans 1956) p. 201
6. Kant, Prolegomena in R.P. Wolff, Ten Great Works, op.cit.p.302
7. Kant, Critique of Pure Reason (Everyman edition 1974) p. 25
8. See Critique of Pure Reason op.cit. p. 457 where only the first appear.
9. See Lucien Goldman, Kant p. 130
10. Kant, Prolegomena, op.cit. p. 314
11. Critique of Pure Reason p. 42
12. Ibid. p. 42
13. See Ibid. pp. 77-85
14. Prolegomena op.cit. p. 349
15. Critique of Pure Reason p. 12
16. Ibid. p xvi
17. C & R p. 181
18. C & R p. 191

19. For this and other formulations which follow see O.K. ch. 1
20. LSc.D. p. 317
21. See LSc.D. p. 226
22. LSc.D p. 267
23. O.K. p. 17
24. O.K. p. 57
25. LSc.D p. 252
26. See R.G. Collingwood, An Essay on Metaphysics, (Oxford 1940)
27. LSc.D, p. 278
28. O.K. P. 23
29. I. Lakatos, "Popper on Demarcation and Induction" in
P.A. Schlipp, op.cit. p. 261
30. Ibid. p. 260
31. In: I Lakatos & A. Musgrave (eds) Criticism and the Growth of
Knowledge
32. Quoted in P.A. Schlipp, op.cit. p. 999
33. Quoted in Wellmer, A, Methodologie als Erkenntnistheorie (1967)
p. 210.
34. C & R p. 244
35. C & R p 248
36. Quoted in E.H. Madden (ed.) op.cit., p. 290
37. Critique of Pure Reason (N.K. Smith translation) A. 133
(Macmillan 1968) p. 177
38. Ibid. A. 141, p 183

39. M. Polanyi, Knowing and Being ed.M. Grene (London: R&KP)
p. 120
40. Ibid. p. 133
41. Ibid. p. 144
42. Ibid. p. 134

CH-4. The problem of Demarcation

"In so far as a scientific statement speaks about reality, it must be falsifiable: and in so far as it is not falsifiable, it does not speak about reality"

Popper, LScD p.314

Popper traces his interest in the problem of demarcation to almost sixty years ago - arising mainly from his confrontation with the theories of Einstein, Marx, Freud and Adler. A consideration of the nature and differences between these theories led him to the problem of demarcation, that is, of demarcating between scientific theories such as those of Marxism, Freud and Adler. His experiences with Freudians, Marxists and Adlerians had led him to the conclusion that these theories seemed to be confirmed by each and every conceivable event within its universe of discourse. He writes: "The study of any of them seemed to have the effect on intellectual conversion or revelation, opening your eyes to a new truth hidden from those not yet initiated. Once your eyes were thus opened you saw confirming instances everywhere: the world was full of verifications of theory. Whatever happened always confirmed it. Thus its truth appeared manifest; and unbelievers were clearly people who did not want to see the manifest truth ; who refused to see it because it was against their class interest, or because of their repressions, which were still 'un-analysed' and crying loudly for treatment"¹. Thus wherever a Marxist opens a newspaper

every page confirms his point of view: content and form, what is said and what is not said reveals the class leanings of the paper. Freudian theory or Adlerian theory is no different in this respect.

Einsteinian theory on the other hand was a real contrast. Following in tradition of Galileo, Kepler, and Newton, his theory was both bold and daring. It was hypothetical and risked itself through the fate of possible falsification. It was surprisingly offered in spite of the great success of the then ruling Newtonian theory, which had been "verified" times without number and had virtually buttressed and created the technological West. But what impressed Popper most in his consideration of Einstein's theory was Einstein's suggestion that if the predictions derived from his theory did not agree with his precise theoretical calculations then he would take it that his theory had been falsified; and that even if observations confirmed his theory² he would still regard it as an approximation which though better than Newton's was nonetheless false. Lord Eddington's African expedition of 1919 to test Einstein's theory that light is attracted by heavy bodies, confirmed in the eclipse experiment Einstein's gravitational theory. Further tests have continued to confirm Einstein's theory. It is clear that any theory of this nature risks itself - in that it is not compatible with each and every event. Certain events must be compatible with it. These considerations led Popper to some conclusions which I

will quote in extenso below:-

1. It is easy to obtain confirmations, or verifications for nearly every theory - if we look for confirmations.
2. Confirmations should count only if they are the result of risky predictions; that is to say, if unenlightened by the theory in question, we should have expected an event which was incompatible with the theory - an event which would have refuted the theory.
3. Every 'good' scientific theory is a prohibition: it forbids certain things to happen. The more a theory forbids, the better it is.
4. A theory which is not refutable by any conceivable event is non-scientific. Irrefutability is not a virtue of a theory (as people often think) but a vice.
5. Every genuine test of a theory is an attempt to falsify it, or to refute it. Testability is falsifiability; but there are degrees of testability: some theories are more testable, more exposed to refutation, than others; they take, as it were, greater risks.
6. Confirming evidence should not count except when it is the result of a genuine test of the theory; and this means that it can be presented as a serious but unsuccessful attempt to falsify the theory. (I now speak in such cases of 'corroborating evidence'.)

7. Some genuinely testable theories, when found to be false, are still upheld by their admirers - for example by introducing ad-hoc some auxilliary assumption, or by re-interpreting the theory ad-hoc in such a way that it escapes refutation. Such a procedure is always possible but it rescues the theory from refutation only at the price of destroying or at least lowering, its scientific status. (I later described such a rescuing operation as a 'conventionalist twist' or a 'conventionalist stratagem')².

Popper sums up all these by saying that "the criterion of the scientific status of a theory is its falsifiability, or refutability, or testability"³.

These 1919-1920 conclusions of Popper constitute his falsifiability criterion which is to distinguish or to demarcate empirical, non-metaphysical systems of thought from non-scientific or pseudo-scientific metaphysical systems of thought. Thus, whereas in traditional theory, it is the inductive method which separated science from metaphysics, in Popperian theory it is falsifiability which is the distinguishing mark of science. Popper calls the problem of demarcation 'Kant's problem' as it was the central problem of his epistemology, and thinks that of the two problems - induction and demarcation - the latter is more fundamental.

It is clear that Popper's criterion of demarcation is not itself a scientific statement, it is metaphysical. Popper regards it as "a proposal for an agreement or convention"⁴ or simply as a methodological rule. Its choice, he says is "ultimately a matter of decision, going beyond rational argument". This is an extremely significant point.

II Demarcation and the case of the Logical Positivists

The doctrine that the logical positivists preached in 20th century philosophy was not all that new. It has antecedents or roots in the past. However in its modern dress it sprung from the seminars of the Vienna Circle around 1923 under the leadership of Moritz Schlick. It attracted outstanding scholars such as F. Waissmann, Herbert Feigl, Hans Hahn, Otto Neurath, Victor Kraft, Felix Kaufmann, Kurt Godel, A.J. Ayer, C.G. Hempel among others. Carnap's The Logical Structure of the World (Der Logische Aufbau der Welt) and Wittgenstein's Tractatus Logico Philosophicus exercised a tremendous influence on the ideas of the Circle. Among the forerunners of logical positivism are those philosophies which have evinced an anti-metaphysical skeptical spirit. In this group we could name Bacon, Hobbes, Locke, Hume, Bentham, J.S. Mill, Comte, Poincare, Bolzano, Mach - to name only a few.

Hume had reduced all statements to two categories - 'relations of ~~fact~~^{ideas} matters of fact', Kant had re-named /and these 'analytic propositions' and 'synthetic propositions' respectively, and added a third one - 'synthetic a priori

propositions'. The logical positivists rejected the latter and stuck to the Humean distinction within a Kantian terminology. Characterised by a deep love for mathematics and physics and a hatred of metaphysics the positivists tried to show that metaphysical statements were meaningless and non-sensical. They postulated a criterion of verifiability whose major task was to distinguish between the meaningless statements of metaphysics and those of empirical science. Rudolf Carnap's The Logical Syntax of Language (1934) and A.J. Ayer's Language, Logic and Truth (1936) attempted to articulate the views of the Vienna Circle to a wider public,

As we have already mentioned, Wittgenstein's Tractatus (1921) in which he tried to show that many traditional philosophical problems were due to logical and linguistic muddles or as he puts it in 4.003, "Most of the propositions and questions to be found in philosophical works are not false but non-sensical. Consequently we cannot give any answer to questions of this kind, but can only establish that they are non-sensical. Most of the propositions and questions of philosophers arise from our failure to understand the logic of our language....."⁵, was pivotal in the development of logical positivism. Even Carnap has written, "I, as well as my friends in the Vienna Circle, owe much to Wittgenstein, especially as to analysis of metaphysics"⁶ In fact Popper himself tends to group Wittgenstein together with the logical positivists - for example in his paper "The

Demarcation between Science and Metaphysics". There is of course this tendency in Wittgenstein's work although the contrary is also present in his work. Thus in favour of the former, one can cite such statements: (1) "The world is all that is the case", 2.063". The limits of my language mean the limits of my world" given that the task of language is to mirror the world. On the basis of similar such statements Wittgenstein defines the task of philosophy as follows: 4.0031. "All philosophy is a 'critique of language'".

It is possible that Wittgenstein in the Tractatus was establishing some sort of demarcation criterion based on meaning and language - hence his idea that the limits of language are the limits of the world and vice-versa. According to this idea, language must be limited by the reality which it pictures. Consequently anything transcending the world cannot be pictured in language, since there is nothing to picture. Thus Wittgenstein tried to solve the difficult problems of metaphysics, theology, ethics and aesthetics by simply dissolving them. In 6.52 he says - "We feel that even when all possible scientific questions have been answered, the problems of life remain completely untouched. Of course there are then no questions left, and this itself is the answer", or in 6.521 where he thinks that "The solution of the

How do you know that you
know you wrote a thesis?
18/03/98.

problem of life is seen in the vanishing of the problem". This exposes the contradictions in Wittgenstein's thought. But it may also be pointing to his ambiguous stand in relation to metaphysics. He has in fact been called a mystic.

It is very likely that Wittgenstein did not reject metaphysics, he only questioned /possibility of formulating /the metaphysical propositions in language. He however consigned these to silence - to "what cannot be said". This is clear from 6.421, 6.522 and 7 which we quote as follows:

"It is clear that ethics cannot be put into words.
Ethics is transcendental....."

"There are, indeed, things that cannot be put into words.
They make themselves manifest. They are what is mystical".

"What we cannot speak about we must pass over in silence".

Although, it is abundantly clear that the early Wittgenstein was a primary influence on the logical positivists - we cannot group him with them in the same category. Hence, though the logical positivists thought that they had derived their verification principle from the Tractatus, this is still a disputed issue as to whether this claim was justified. Wittgenstein himself rejected this claim.

In any case, the logical positivist criterion of verifiability was in fact a demarcating principle between meaningful

and meaningless statements. Popper argues rightly that verifiability, meaningfulness and scientific character all coincide in the positivist camp. The formulation of the verifiability criterion has been quite problematic for logical positivists. Nonetheless we shall take Ayer's definition to be characteristic of the movement. He writes:

"The criterion which we use to test the genuineness of apparent statements of fact is the criterion of verifiability. We say that a sentence is factually significant to any given person, if and only if, he knows how to verify the proposition which it purports to express - that is, if he knows what observations would lead him, under certain conditions, to accept the proposition as being true, or reject it as being false. If on the other hand, the putative proposition is of such a character that the assumption of its truth, or falsehood, is consistent with any assumption whatsoever concerning the nature of his experience, then, as far as he is concerned, it is, if not a tautology, a mere pseudo-proposition. The sentence expressing it may be emotionally significant to him, but it is not literally significant"⁷

Carnap in his essay, "Rejection of Metaphysics" has elaborated on it as follows:

"The meaning of our antimetaphysical thesis may be more clearly explained. This thesis asserts that metaphysical statements - like lyric verses - have only an expressive function, but no representative function. Metaphysical statements are neither true nor false, because they assert nothing, they contain neither knowledge nor error, they lie completely outside the field of knowledge, of theory, outside the discussion of truth or falsehood. But they are like laughing, lyrics and music, expressive. They express not so much temporary feelings as permanent or volitional dispositions....."⁸

This positivistic criterion of meaning has at the same time ontological implications. It tells us what there is and can be, and what there is not and ~~CANNOT~~ be. That is, it is also a demarcation criterion. It is possible and very likely that this ontological commitment preceded their epistemological locutions.

III Popper and Logical Positivism

Popper grew up in Vienna and was greatly influenced by the Vienna Circle. Their problems were his problems - even though he was not officially a member of the Circle. Nonetheless, the association was so close that many have come to associate him with logical positivism. Some even claim that he replaced the positivist criterion of falsifiability - cum- meaning. This idea is mistaken and definitely false. An old member of the Vienna Circle, Victor Kraft has written: "Popper never belonged to the Vienna Circle, never took part in its meetings, and yet cannot be thought of as outside it."⁹ He continues....." Popper confronted the Vienna Circle from the first with his own ideas, from which he naturally developed a critical attitude towards them; but Popper did not only stand in opposition to them, there was also far-reaching agreement among them. If Popper was called the 'opponent' of the Vienna Circle, his opposition still rested on a

common ground on which the dispute took place. There were not only common questions which were answered differently, but also common viewpoints regarding the answer"¹⁰. Kraft has moreover argued that Popper's work cannot be genetically understood without reference to the Vienna Circle, for the Circle was of essential significance for his own development. Popper does in fact admit this when, alluding to Carnap's Logical Syntax of Language, he writes: "the book (Carnap's book).....marks the beginning of a revolution in my (Popper's) own philosophical thinking."¹¹

Popper's connexion with the Circle has given rise to what Popper calls "the Popper legend", which identified his views with those of the Vienna Circle. The legend however assigned him the task of restoring logical positivism by means of his new criterion of falsifiability - which was wrongly taken to be a criterion of meaning. The legend is so widespread that one very popular Christian writer badly misunderstands Popper when he writes that "Karl Popper.....has until recently argued that a thing is meaningless unless it is open to verification and falsification. But in a recent book he has taken a step backwards. He now says there is no possibility of verification",¹² This is of course a distortion of Popper probably based on the so-called legend. This legend as Popper himself notes goes back to such authorities as A.J. Ayer, R. Carnap, C.G. Hempel, J. Jergensen among others. It is therefore not surprising for people who depend on secondary

sources to take as valid this distortion.

The logical positivists start off with the preconception that metaphysical statements are empty of cognitive content and therefore cannot refer to reality as such. They are simply meaningless and non-sensical, neither true nor false. The positivist criterion of verifiability was thus invented to validate and give a methodological procedure for isolating 'sense' from 'non-sense' or more precisely meaningful statements from 'metaphysics' so defined. It is this anti-metaphysical thesis which dominated positivist discourse. This notion was also in a sense a demarcation criterion. Referring to Popper's paper, "The Demarcation between Science and Metaphysics" in C & R, Paul Bernays has tried to clarify this issue as follows: "In this paper Popper explains the main point of his highly effective criticism of positivism. Positivist philosophy declares to be meaningless everything that is not scientific. In a convincing argument Popper insists that it will not do to identify the distinguishing criterion of what is scientific with the criterion of what is meaningful. The restricting criteria for meaningfulness proposed by the positivists are all shown to be inadequate, and Popper presents a criterion of demarcation between scientific and unscientific statements which is quite independent of the question of meaning, namely the criterion of 'refutability' or 'falsifiability'. This comment of Bernays

brings out Popper's rejection of the positivist's use of the criterion of verifiability and meaningfulness as a criterion of demarcation. Popper maintains that metaphysics is not necessarily meaningless. On the contrary, he holds that it has great heuristic value in scientific discovery. For many scientific theories and discoveries of far-reaching consequences have in fact originated as metaphysical speculations. Indeed Popper has labelled himself a "metaphysical realist", and argues that fruitful discussions can be conducted on questions of metaphysics. His admiration of the Presocratics derives from this belief.

The basic weakness of logical positivism was manifest in its exclusion of even those statements which it wanted to retain -- such as the theories of natural science, and even ironically the verifiability criterion itself. This led Popper to write in his Logic of Scientific Discovery, "Theories are therefore never empirically verifiable. If we wish to avoid the positivist's mistake of eliminating, by our criterion of demarcation, the theoretical systems of natural science, then we must choose a criterion which allows us to admit to the domain of empirical science even statements which cannot be verified."¹⁴ But he nonetheless still remains within the circle of empiricist thinking. This is made clear by such statements as: "But I shall certainly admit a

system as empirical or scientific only if it is capable of being tested by experience."¹⁵ Elsewhere he writes: "I was, and still am, an empiricist of sorts, though certainly not a naive empiricist who believes that 'all knowledge stems from our perceptions or sense data'. My empiricism consisted in the view that, though all experience was theory-impregnated, it was experience which in the end could decide the fate of a theory, by knocking it out; and also in the view that only such theories which in principle were capable of being thus refuted merited to be counted among the theories of 'empirical science'".¹⁶

Popper's criterion of demarcation was not based on a verification -cum-meaningfulness thesis, but while remaining avowedly empiricistic, postulated a criterion based on testability, falsifiability or refutability in the context of inter-subjective 'observation statements'. For, Popper writes: "criteria of refutation have to be laid down before-hand: it must be agreed which observable situations, if actually observed, mean that the theory is refuted," that is "it must be possible for an empirical scientific system to be refuted by experience".¹⁸ It is this underlying empiricism together with the criterion of falsifiability which leads Popper to a radical remark which is of far-reaching significance in evaluating his epistemological thought. He asserts:

"In so far as a scientific statement speaks about reality, it must be falsifiable: and in so far as it is not falsifiable, it does not speak reality."19

The connexion here of falsifiability and reality raises some thorny problems. If falsifiability was restricted to defining what would pass as a scientific statement and not what would pass as pertaining to reality - that would have lessened our problems. But as it stands it appears that Popper is using falsifiability in the narrow sense characteristic of logical positivism. This would further imply that Popper and the logical positivists actually share similar basic ontological presuppositions about reality. But this is not clear.

IV: Popper on the Scientific Status of Marxist Theory

The scientific status of the natural sciences such as physics, biology, astronomy, chemistry, etc. is hardly questioned by Karl Popper. It is assumed. But in his The Poverty of Historicism (1961)(P.H.) and The Open Society and Its Enemies (1966) (O.S.&I.E.) Popper brings to task all those disciplines which construct an historicist thesis in the name of science. He suggests that the above books which we have cited may be "described as a collection of marginal

notes on the development of certain historicist philosophies".²⁰ He takes these philosophies to be those which seek to predict the state of the future by an understanding of the laws of historical development. He gives this definition of historicism: "I mean by 'historicism' 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 "rhythms" or the 'patterns', the 'laws' or the 'trends' that underlie the evolution of history."²¹ Thus in OS&IE, Popper tries to reconstruct and present historicism in its best light through a study of Plato, Aristotle, Hegel and Marx. He then goes on to argue in this and also in PH that besides its inherent weaknesses and dangers, historicism is at best a poor method which has no scientific validity. Thus while affirming the positive contributions of Plato, Hegel, Aristotle and Marx, Popper isolates their historicist doctrine which he vehemently discredits. His basic refutation of historicism is logical and fairly conclusive. It is given at the beginning of PH in five propositions formulated in argument form - as follows:

1. The course of human history is strongly influenced by the growth of human knowledge. (The truth of this premise must be admitted even by those who see in our ideas, including

our scientific ideas merely the by-products of material development of some kind or other).

2. We cannot predict, by rational or scientific methods, the future growth of scientific knowledge.
3. We cannot therefore, predict the future course of human history.
4. This means that we must reject the possibility of a theoretical history, that is to say, of a historical social science that would correspond to theoretical physics. There can be no scientific theory of historical development serving as a basis for historical prediction.
5. The fundamental aim of historicist methods is therefore misconceived and historicism collapses.²²

The fundamental thesis of PH, "that the belief in historical destiny is ~~sheer~~ ^{sheer} superstition and that there can be no prediction of the course of human history by scientific or any other rational methods"²³ is also traced to 1919 -1920, which is the same time as the criterion of demarcation is said to have arisen. The argument given above, however came much later. This argument does not rule out every type of prediction, of course - it only refutes the prediction of future history insofar as it is influenced by the growth of knowledge and its application. This is clarified by the distinction Popper makes between "prophetic prediction" and

and "technological prediction". The latter is hypothetical and scientific, and gives to man a basic role in determining historical events depending on his will, knowledge, technology, decision. This is what Popper calls social engineering. The former is fatalistic and deterministic and is opposed to the latter. Those who adhere to this view, hold that ^{will be,} /will be_λ and that we can do nothing to /what change history. They accordingly advise us to study and interpret history in order to discover the laws of its development.

Activists in this school, admonish us to co-operate with historical currents and to direct our energies in the direction of history, for "social midwifery is the only perfectly reasonable activity open to us, the only activity that can be based upon scientific foresight".²⁴ This is summarised by Popper as follows: "The historicist can only interpret social development and aid it in various ways; his point however, is that nobody can change it".²⁵ Popper argues that historicism naturally leads to fatalism, holism and/or utopianism. Without going into a more detailed examination of Popper's critique of historicism in general, we shall examine it with specific reference to Marxist theory.

Popper describes Marxism "as the purest form of historicism that has so far arisen",²⁶ and also as "the most developed and the most dangerous form of historicism".²⁷ It follows then that the

arguments developed in PH against historicism equally apply to Marxist theory. It would follow also that insofar as historicism is a very poor method which does not yield any fruits, so also "the Marxist method..... ...(is) very poor indeed."²⁸ Marx was, says Popper, a false prophet of the course of history, and his prophecies were all falsified. He misled many into subscribing to the view that scientific method entails historical prophecy, Moreover, the false belief that a rigidly scientific method must be based on a rigid determinism is totally untenable in the light of modern developments in science. This does not necessarily mean that Marx has no positive contribution - he certainly made many fruitful insights of vital importance. His argument against psychologism or the view that the problems of society are ultimately reducible to the psychological laws of 'human nature' (i.e. "it is not the consciousness of man that determines his existence, rather it is his social existence that determines his consciousness" (Marx) is important. Marx's positive contributions are innumerable and Popper generously concedes this fact. He sympathises with Marx's economism or "materialism", that is, "the claim that the economic organization of society, the organization of our exchange of matter with nature, is fundamental for all social institutions and especially for their historical development."²⁹ Popper stresses the importance of economic conditions or factors, but

argues that Marx's economism is ill-conceived since it can be shown
(that there is ~~bidirectional~~ ~~interaction~~ ~~between~~ ~~the~~ ~~base~~ ~~and~~ ~~the~~ ~~superstructure~~) that there is
"an interaction between economic conditions and ideas, and not
simply a unilateral dependence of the latter on the former. If
anything, we might even assert that certain 'ideas', those which
constitute our knowledge, are more fundamental than the more
complex material means of production....."³⁰

Drawing on his "three-world" concept, which we have already described
above, Popper shows that this is easily proven.³¹ Moreover the
history of Marxism itself falsifies this "exaggerated economism."
Even Marx's belief that "all history is a history of class struggle"
is a dangerous over-simplification, for even within a class one will
find struggles and divergent interests. For example in Medieval
history, the fight between the popes and the emperors exemplifies
a divergence of interests, or dissension within the ruling class
which cannot be narrowly explicated on the basis of class struggle.³²

Marx's thesis that all politics is impotent in that like
the legal, religious, moral and social systems it belongs to the
superstructure which is wholly determined by the underlying base of
actual productive forces of the economic system - has, as we noted
above in his economism, been shown to be untenable. This thesis

implies that we cannot at all change economic realities via political action and planning, legal reforms etc. That Marx actually propounded this doctrine is ironical and a fatal mistake. How is ^{it} that the base does change? Popper in contrast asserts the primacy of political power - a view which he thinks is validated by an objective study of history.

Marx claimed to be introducing a new science of society, one that claimed to have discovered the laws of historical development. Consistent with this claim, Marx distinguished his socialism from that of so-called "Utopian" socialists such as Fourier, Saint-Simon, Owen etc. The Utopians emphasized the role of human action and man's responsibility for the creation of a new social order based on socialist principles. The Marxists claimed that our actions cannot alter historically predetermined realities. We ought only to assist the 'locomotive of history'. In this vein, Marx made certain prophetic statements in the name of science. Popper describes Marx's historical prophecy as a closely knit argument which he analyses in "three steps".³³

The 'first step' is elaborated in Capital and describes the economic forces of capitalism and their relationship to class structure. The 'second step' argues for the necessity or

inevitability of a social revolution. The 'third step' predicts the necessary emergence of a new society - socialist, class-less free-of-exploitation and inhumanity, etc. Popper examines Marx's argument closely and in depth and shows that all of his important predictions have been falsified. Thus in Marx's periodisation of history, he prophesied that socialist society would follow naturally and inevitably from advanced capitalist society. History has shown otherwise. Nearly all so-called socialist societies have been created by ingenious planning and violence in backward countries. The proletarian, working class of capitalist society whom Marx gave the role of revolutionary agent or bearer of the new order, has nowhere played it. It has been marred by the sons of the bourgeoisie, or bourgeois intellectuals turned revolutionary. In a few other countries the revolution has been based on the peasant. Popper shows that this prophecy of the inevitable coming of socialism is not only unscientific, but can also lead to awful results in terms of practical action.

Marx's prediction that capitalism must necessarily lead to the rich becoming richer and the poor becoming poorer (i.e. the radical polarization of classes) has also been falsified. Developments in advanced capitalism have in fact blunted this polarization and created new forms of ownership, new groups.

of entrepreneurs and bureaucratic professionals. Moreover, lack of revolutionary consciousness among the proletariat, even in advanced capitalist societies, and their failure to become class-conscious i.e. a class-for-itself does falsify Marxist theory.

The acceptance in Marxist theory of such metaphysical ideas as dialectical materialism has no basis in science inspite of the "immunizing stratagems" of Marxist apologists such as Maurice Cornforth whose book "The Open Philosophy and the Open Society is directed against Popper's The Open Society and Its Enemies. In his paper "What is Dialectic" in C&R, Popper shows the falsity of all dialectical ways of thinking. He says "they are without the slightest foundations. Indeed, they are based on nothing better than a loose and wooly way of speaking."³⁴ His own answer to this is: a strict adherence to the rules of formal logic in argument and criticism in the context of evolutionary growth. That Marxism is a product of 19th century modes of thinking, philosophy and science, goes without saying. But 19th century assumptions have been superseded in many areas. Development in all the disciplines implies that many of these ideas have been outgrown and rendered obsolete. Lysenkoism in Soviet genetics represents this general demand in Marxist thinking to hold onto the outmoded assumptions of the nineteenth century.

We can hardly do justice to Popper's arguments and refutations of orthodox Marxism in this short space. We will quote in some length a passage of Alexander Solzhenitsyn, which is an echo of Popper:-

"This ideology that fell to us by inheritance is not only decrepit and hopelessly antiquated now; even during its best decades it was totally mistaken in its predictions and was never a science.

A primitive, superficial economic theory, it declared that only the worker creates value and failed to take into account²₃ the contribution of either organizers, engineers, transport or marketing systems. It was mistaken when it forecast that the proletariat would be endlessly oppressed and would never achieve anything in a bourgeois democracy - if only we could shower people with as much food, clothing and leisure as they have gained under capitalism! It missed the point when it asserted that the prosperity of the European countries depended on their colonies - it was only after they had shaken the colonies off that they began to accomplish their 'economic miracles! It was mistaken through and through in its prediction that socialists could only ever come to power by an armed uprising. It miscalculated in thinking that the first uprisings would take place in the advanced industrial countries - quite the reverse. And the picture of how the whole world would rapidly be overtaken by revolutions and how states would soon wither away was sheer delusion, sheer ignorance of human nature. And as for wars being characteristic of capitalism alone and coming to an end when capitalism did - we have already witnessed the longest war of the twentieth century so far, and it was not capitalism that rejected negotiations and truce for fifteen to twenty years; and God forbid that we should witness the bloodiest and most brutal of all mankind's wars - a war between two communist super-powers.....

Marxism is not only not accurate, not only not a science, has not only failed to predict a single event in terms of figures,

quantities, time-scales, or locations (something that electronic computers today do with laughable ease! in the course of social fore-casting, although never with the help of Marxism) - it absolutely astounds one by the economic and mechanistic crudity of its attempts to explain that most subtle of creatures, the human being, and that even more complex synthesis of millions of people, society. Only the cupidity of some, the blindness of others and a craving for faith on the part of still others can serve to explain this grim humour of the twentieth century.....35

Solzhenitshyn ends these critical remarks in this way: "I am certainly not proposing that you go to the opposite extreme and persecute or ban Marxism, or even argue against it (nobody will argue against it for very long, if only out of sheer apathy). All I am suggesting is that you rescue yourselves from it, and rescue your state system and your people as well. All you have to do is to deprive Marxism of its powerful state support and let it exist of itself and stand on its own feet. And let all who wish to do so make propaganda for it, defend it and din it into others without let or hindrance - but outside working hours and not on state salaries." It is surprising how very Popperian Solzhenitshyn's remarks are. He even advocates for an open society in Popper's sense.

Given all these refutations, Popper argues that Marxist theory has been rendered falsified and therefore unscientific //
But Popper makes it clear that he is not referring to the socialist ideal as such. He is mainly concerned with the historicist content that has been made part and parcel of that utopian vision. In fact Popper himself comes out somewhat in favour of the utopian socialists

and offers his own theory of "democratic piecemeal interventionism". This is basically a social - democratic theory, which seeks to protect both individual freedom and to promote economic justice. It is equally structured to safeguard itself against threats to its existence - an idea which leads to what Popper calls the "paradox of democracy", the "paradox of tolerance", and the "paradox of freedom." Furthermore this theory supports and encourages state intervention to control unrestrained capitalism. It is based on the idea of minimising dangers to misrule, totalitarianism and unfreedom. It is similarly built around the idea of minimising unhappiness through planned and co-ordinated efforts at reform and social welfare.³⁶

Popper's whole critique of Marxism, it is to be noted hinges upon his falsifiability criterion. He therefore argues that Marxism was offered as a scientific theory similar to the Newtonian theory of gravitation, for example. Although as a scientific theory in this sense, it has been falsified, Popper maintains that later Marxists have immunized it against falsification. This in Popper's view has reduced it to the level of a metaphysical theory. This critique of Marxism has earned Popper wide acclaim from such prominent western scholars as Isaiah Berlin who refers to his The Open Society and Its Enemies as "the most scrupulous and formidable criticism of the philosophical and historical doctrines of Marxism by any living writer".³⁷ Maurice Cornforth, the Marxist apologist who has written a critique of Popper's The Open Society

in his The Open Philosophy has called Popper "perhaps the most eminent of our contemporary critics"³⁸. However, the validity of Popper's interpretation of Marx has been questioned by many Marxists, for example by Helmut Fleischer in his Marxism and History (1973)

Critical Comments

What we have already said before by way of critical remarks is even more pertinent to the present discussion on the demarcation criterion.

At the outset it is worthy noting that this demarcation criterion is not based on a falsifiable proposition. It is based on a methodological rule which is to all intents and purposes metaphysical and therefore "unscientific". What is more, this criterion leads us to a shaky and very uncertain conception of human knowledge. In Popper's words: "Science does not rest upon solid bedrock. The bold structure of its theories rises, as it were, above a swamp. It is like a building erected on piles. The piles are driven down from above into the swamp, but not down to any natural or 'given' base; and if we stop driving the piles deeper, it is not because we have reached firm ground. We simply stop when we are satisfied (my underlining) that the piles are firm enough to carry the structure, at least for the time being".³⁹ That is

to say in the final analysis, it is we who have to evaluate science, to judge science, to be satisfied with its validity. Here Popper is no doubt admitting, though indirectly, that the whole "game" depends on us - our subjectivity, interests, values. For the question immediately raises itself - on the basis of what do we get satisfied with science, do we evaluate science? Obviously not on the basis of itself, since in any case it does not possess any certain criteria, or rest upon any solid bedrock. This is all in the line with Popper's admonition, already referred to, "to get accustomed to the idea that we must not look upon science as a 'body of knowledge' but rather as a system of guesses or anticipations which in principle cannot be justified, but with which we work as long as they stand up to tests, and of which we are never justified in saying that we know that they are "true" or "more or less certain" or even 'probable'"⁴⁰. Yet in spite of this uncertainty, Popper still insists that we elevate the propositions of science over and above any other statements which are not so privileged as to speak under the auspices of empirical science.

On the basis of Popperian theory of science no theory can be conclusively falsified, it can stand up again and overthrow

the current theory inspite of the current theory's degree of corroboration or even 'conjectured' verisimilitude. Given this proposition, one can argue that Marxist theory may be truer than any present alternative - and this possibility is not closed. Corroboration without verification is not sufficient ground to argue anything to the contrary with cogent justification.

I am here stressing a point I have already underscored that knowledge and its growth proceeds on the basis of the dialectic between verification and falsification - in the context of induction and critical argument. Secondly we cannot fully and exhaustively understand this process. Thirdly, empirical science itself is based or rooted in the intuitions, needs, and interests of daily life. This 'raw experience' or 'naive experience' of common life has a validity all its own, certainties, meanings, values - which are the basic and fundamental essentials of human existence itself. Moreover these emanations of the human spirit transcend categorisation and elude the distorting formulas of "OBJECTIVITY".

These considerations lead us to a rejection of Popper's demarcation criterion, at least in the context of his thought; although it may be argued that there is a general current in his thought which also negates this criterion. We are therefore in agreement with W.W. Bartley III who argues

that Popper's "falsifiability criterion of demarcation is relatively unimportant, at least for purposes of evaluation and criticism"⁴¹, and that, "if the problem of the demarcation between science and non-science is taken in Popper's sense, the problem of demarcation is an unimportant problem".⁴² This criterion per se can inspite of Popper's qualifications and explanations be interpreted in a positivistic way (though not necessarily according to logical positivism). It has certainly led to a distortion of Popper's thought and may be responsible, as Bartley points out, "for the misunderstandings and controversies between him and the members of the Vienna Circle as well as more recent philosophical thinkers".⁴³

It is clear that Popper has repudiated the case for logical positivism. He has discredited their anti-metaphysical spirit by affirming the meaningfulness of metaphysics, (and the reality of rational - critical discourse outside of the empirical-analytic sciences. He has in addition taken sides in controversial arguments relating to metaphysical doctrines. He has for example come out strongly in favour of metaphysical realism, indeterminism, empiricism among others. He has given us a very positive assessment of the Presocratics and argued clearly and convincingly that a choice can be made between two irrefutable

metaphysical theories purely on rational-critical terms, without lapsing into irrationalism or unreason.⁴⁴ In fact most of Popper's basic assumptions cannot be falsified within his solution to the problem of demarcation. His own criteria in the Logic of Scientific Discovery cannot specify the conditions which would lead him to give up the demarcation criterion. This criterion is metaphysical or more precisely ontological. Popper makes it acceptable to science by calling it a 'methodological convention'. Barry Barnes has asked a very pertinent question in this regard: "What is it that gives Popper's conventions their appeal. In the last analysis, the answer is clear, it is that Popper is able to present what we already regard as great scientific achievements as being the product of conformity to these same conventions. The Logic of Scientific Discovery does not justify science at all, it is justified by science as Popper presents it. Whether or not, it is desirable to use science to justify epistemology we may leave the epistemologists themselves to decide".⁴⁵ Barnes is not saying anything new at all. Popper himself made the same point as follows: "My only reason for proposing my criterion of demarcation is that it is fruitful: that a great many points can be clarified and explained with its help"⁴⁶

All these considerations noted above would lead us to suggest an alternative criterion of demarcation - first proposed

by W.W. Bartley a former student of Popper. We will use his words to underscore our point that, the problem is not "to demarcate scientific from non-scientific theories but to demarcate critical from uncritical or from theories that are protected from criticism - particularly pseudo-critical theories."⁴⁷ In this we are also saying that the demarcation of science and non-science, is in itself, unimportant and unnecessary. Indeed this criterion we are proposing, between critical and uncritical theories is capable of transforming Popperian epistemology to a sounder status. In fact, it is implied in Popper's writings to varying extents. Otherwise, the epistemological value of Popper's criterion of demarcation is nil. No wonder Lakatos wrote: "Popper's demarcation criterion has nothing to do with epistemology."⁴⁸ This is the thesis of Wellmer's book Methodologie als Erkenntnistheorie. Using slightly different assumptions, Feyerabend too rejects Popper's criterion. He writes: "We need a dream world in order to discover the features of the real world we think we inhabit (and which may actually be just another dream-world). The first step in our criticism of familiar concepts and procedures, the first step in our criticism of 'facts' must therefore be an attempt to break the circle. We must invent a new conceptual system that suspends or clashes with the most carefully established results, confounds the most

plausible theoretical principles, and introduces perceptions that cannot form part of the existing world..... My intention is not to replace one set of general rules by another set: my intention is, rather, to convince the reader that all methodologies even the most obvious ones, have their limits".⁴⁹

Feyerabend, then takes Popper on his own terms and argues that empirical science is an anarchistic enterprise closer and similar to myth. He in this way rejects Popper's "law and order" alternative which he finds untenable and unnecessary. It follows then that the contradictions inherent in the use of Popper's criterion of demarcation lead us to abandon it, and to take on the wider criterion suggested by Popper himself between critical and uncritical theories or theories that are protected against criticism. Indeed Popper's emphasis on this notion pervades through his works.

If we accept the distinctions made concerning the sciences made by the Frankfurt school and principally by Jurgen Habermas - which I do, then it will follow that the narrowness of Popper's demarcation criterion is mainly due to the fact that he is operating within the limitations and confines of technical reason and positivistic science. Habermas contends that "knowledge" is determined by interests, and that there are three types of science depending on the three fundamental interest - orientations .

In the "empirical analytic sciences", which Popper is mainly concerned with, the motif of technical control is predominant. Thus Popper talks of "social piecemeal engineering" in the social order. In the empirical analytic sciences, the transcendental frame of reference lays down rules for determining "the meaning of possible statements,.....the construction of theories and.....their critical testing".⁵⁰ Moreover, empirical analytic knowledge must possess predictive value, in a hypothetico-deductive manner. This approach to knowledge displays a technical interest in cognition. It strives for detachment, 'objectivity' and universality. The mistake that Popper makes is to absolutize the criteria of the empirical-analytic sciences and to make them applicable to validation of all human knowledge.

In the historical - hermeneutic sciences, the methodological framework is different and the meaning of the validity of propositions is not related to the frame of reference of technical control, Here 'practical interests' predominate and the act of understanding and interpretation gains supreme importance. Detachment and "objectivity" are not necessary ideals - as Popper would have it. For while the empirical-analytic sciences tend to ignore the knower and his grid of assumptions and

prejudices, the hermeneutic sciences must consider the interpreter's pre-understanding, his world, culture, language, initial situation etc. Hence as Habermas has it, "The world of traditional meaning discloses itself to the interpreter only to the extent that his own world becomes clarified at the same time. The subject of understanding establishes communication between both worlds. He comprehends the substantive content of tradition by applying tradition to himself and his situation."⁵¹

The 'systematic sciences of action' or the 'critically oriented sciences' such as economics, sociology and political science are determined by an emancipatory cognitive interest through the power of self-reflection. These sciences produce nomological knowledge, but they ought not to stop there. They are also concerned "with going beyond this goal to determine when theoretical statements grasp invariant regularities of social action as such, and when they express ideologically frozen relations of dependence that can in principle be transformed".⁵² Based on self-reflection as their methodological frame of reference, these sciences seek to release man from "dependence on hypostatized powers". These sciences of action share the emancipatory cognitive interest with philosophy.

It follows then that orientation toward technical control,

toward mutual understanding in the conduct of life, and toward emancipation from oppressive structures and repressive forces supplies the various perspectives from which we can understand reality and ourselves. Horkheimer, Adorno and Marcuse have advanced a similar thesis in various ways. It is obvious that these three orientations of Habermas, go beyond the one orientation of Popper - which is common to positivist thinking as such. Marcuse has given a devastating attack of this narrow approach in his One Dimensional Man.

We will conclude this analysis by examining Habermas' concluding five theses of his essay expressing the determinate relationship between knowledge and interests. First he states that: "The achievements of the transcendental subject have their basis in the natural history of the human species", implying that knowledge is dependent on the evolution, development and struggle of man in society and nature. Secondly: "knowledge equally serves as an instrument and transcends mere self-preservation", it functions to maintain and extend human existence. The next three theses describe how interests actually guide knowledge. Hence the third thesis which states: "knowledge-constitutive interests take form in the medium of work, language, and power" where these three media yield the three categories of possible

knowledge: information that expands our power/technical control, /of interpretations that make possible the orientation of action within common normative traditions, and analyses that free consciousness from its dependence on hypostatized or reified powers. Fourthly: "in the power of self-reflection, knowledge and interest are one" and that standards of self-reflection possess theoretical certainty because of their basis in language, which raises us out of nature, and through whose structure, autonomy and responsibility are posited to us. Hence "in self-reflection knowledge for the sake of knowledge attains congruence with the interest in autonomy and responsibility". Fifthly: "the unity of knowledge and interest proves itself in a dialectic that takes the historical traces of suppressed dialogue and reconstructs what has been suppressed." This implies that only in an emancipated society, whose members' autonomy and responsibility has been realized would communication be universally free dialogue with a universal and unconstrained consensus. Habermas moreover relates this to the idea of truth, holding that "the truth of statements is based on anticipating the realization of the good life," or the life without repression. Consequently any theory which hides the interests guiding knowledge actually mystifies reality and becomes ideological promoting "the fiction that Socratic dialogue is possible everywhere and at any time". We will note in passing that in Habermas' essay

201
1/2
30

"Science and Technology as Ideology"⁵⁴ he argues that capitalism produces knowledge that is consistent with the interest of technical control and therefore with the goal of reificatory rationalization. It would follow from this analysis that Popper's thought unconsciously serves the goal of reificatory rationalization ; insofar as it based on the all-embracing ideal of technical control. Thus, although, it is true that Popper is intensely concerned about "practical" or ethical interests, and emancipatory interests, he tragically conceives them through his positivistic glasses.

Our use of Habermas' ideas does not necessarily mean a wholesale agreement with his ideas besides the ones included here. Neither was our purpose to give an exposition of Habermas' theory, stimulating as it is. It is however interesting to note that Habermas and Popper do not see eye to eye. Popper dismisses Habermas' theory as holistic and offers his own piece-meal social engineering alternative. Popper's hatred for classical Marxist historicism including Hegelianism extends to modern neo-Marxists such as Lucacs, Adorno, Habermas, Marcuse, Goldman etc⁵⁵.

In concluding therefore we shall reiterate most emphatically that our problem does not lie in the demarcation of science from non-science for that demarcation renders itself meaningless

and trivial even from within Popperian theory itself by virtue of its contradictions. We therefore explicate and state another criterion implied and emphasized in Popperian theory namely the demarcation between rational-critical from irrational uncritical theories, that is demarcation between theories which are open to criticism and those which are closed and immunized from criticism. We maintain that this criterion, which Popper also subscribes to, is broad and more meaningful and does justice to the diversity and depth of human life and experience. Moreover, it even contains or becomes the basis for Habermas' three categories of knowledge according to the interests that guide them.

Footnotes:

1. C & R pp. 34-35
2. C&R p. 36-37
3. Ibid. p. 37
4. LSc.D. p. 37
5. Tractatus, Logico-Philosophicus. (Routledge & Kegan Paul:
London 1961)
6. In: Moritz Weitz, op.cit., p. 218
7. Ayer, A.J., Language, Logic and Truth (Penguin Books 1946)
p. 48
8. In: Weitz, M. op.cit. p. 215
9. Victor Kraft, "Popper and the Vienna Circle", in
P.A. Schlipp (ed) op.cit. p. 185
10. Ibid: p. 187
11. C&R p. 271
12. Francis Schaeffer, He is There and He is Not Silent (1972) p.57.
13. Paul Bernays, "Concerning Rationality," in P.A. Schlipp
(ed) p. 597
14. LScD p. 40
15. Ibid. p. 40
16. K.R. Popper, "Replies to My Critics", in P.A. Schlipp
(ed) op.cit. p. 71

17. C&R p. 41
18. LScD p. 41
19. Ibid. p. 314
20. K.R. Popper, Open Society and Its Enemies Vol. 1, p. 2
21. The Poverty of Historicism p.3
22. PH p. 52
23. PH p. iv
24. PH p. 49
25. PH p. 52
26. OS&IE II p. 60
27. Ibid. p. 81
28. Ibid. p. 84
29. Ibid. p. 106.
30. Ibid. p. 107
31. See Ch. 2 , v
32. OS & IE vol. 2. p. 116
33. See OS&IE vol. 2 p. 136
34. C&R p. 316
35. A Solzhenitsyn, Letter to Soviet Leaders (Fontana 1974)
p. 42-43
36. See Os & IE vol. II pp. 193, 178, 124-125, 130-133, 140,
143, 178-9, 182 etal.
37. Isaiah Berlin, Karl Marx (1963) London, Oxford University
press, 287

38. M. Cornforth, The Open Philosophy p.
39. LScD p. 111
40. LScD p. 317
41. Bartley, W.W. "Theories of Demarcation between Science and Metaphysics", in Lakatos & Musgrave (eds) Problems in the Philosophy of Science (1968) p. 43
42. Ibid. p. 43
43. Ibid. p. 44
44. See C&R esp. pp. 193-200
45. Barnes, B. Scientific Knowledge and Sociological theory (1974) 32-33.
46. LScD p. 55
47. Lakatos & Musgrave (eds) op.cit. p. 49
48. In: P.A. Schlipp (ed) op.cit. p. 254
49. P. Feyerabend, Against Method (1975) p. 32
50. J. Habermas, Knowledge and Human Interests (1971) p. 308
51. Ibid. p. 310
52. Ibid.
53. Ibid.
54. In: J. Habermas, Towards a Rational Society, .
(London: Heinemann 1971) pp. 81-122
55. see for example Reflexive Water (ed) op.cit. p. 120-123

Ch. 5. Evolutionary and Conjectural Knowledge, and the
Correspondence - Theory of Truth

"The fundamental problem of the theory of knowledge is the clarification and investigation of this process by which it is here claimed, our theories may grow or progress."

O.K. p. 35

Making the idea of growth of knowledge - the central aspect of epistemological reflection/a key notion in Popperian /is thought. This idea is regarded by Popper as the central problem in epistemology. Thus in his Logic of Scientific Discovery, he wrote:

"The central problem of epistemology has always been and still is the problem of the growth of knowledge, And the growth of knowledge can be studied best by studying the growth of scientific knowledge. I do not think the study of the growth of knowledge can be replaced by the study of linguistic usages or of linguistic systems".¹

Hence the importance of the problem of induction in Popperian thought and its solution must be seen or understood in these terms. It could be said that it is precisely this solution to the problem of induction that yields the key to understanding how knowledge grows. In our discussion of this problem we inevitably looked at this idea. It is not therefore without reason that Donald T. Campbell has called Popper, "the modern founder and leading advocate of a natural-selection epistemology..... (whose) characteristic focus is on the growth of knowledge".²

II. Induction and the Growth of Knowledge

Having destroyed the foundations of an inductivist epistemology from logical considerations alone, Popper began to reconstruct an evolutionary epistemology on the basis of his solution to the problem of induction. He had shown that no number of confirming instances could prove with certainty and categorically the truth of any synthetic proposition; which is in any case always theory impregnated. He argued that though verification is impossible, falsification or falsifiability can be accepted, also on purely logical grounds, as the only way of admitting a system as scientific or empirical, and furthermore on the basis of which preference for theories can be made.

Hence while traditional epistemologies retain the concept and possibility of 'knowing Truth,' 'being certain or sure', Popperian epistemology maintains that the ideal of Truth cannot be realized in practise, because even if it was attained we would not know it. The concept of Truth is only a regulative idea in Popperian theory - more or less in a Kantian sense. In its place Popper talks of 'verisimilitude' or 'truthlikeness', "approximation to truth" or 'high truth content' - grounded or based on degree of corroboration, that is, on appraisal of theories and the severity of falsifying tests

they have withstood. This is relative to the time of their critical discussion. Moreover, while in traditional epistemology, the growth of knowledge can be compared to solving puzzles by finding clues in new knowledge thus getting the total picture clearer, in Popperian epistemology we are constantly in a state of uncertainty, continually modifying, altering or rejecting our theories in the light of critical discussion of them. Knowledge thereby grows through a method of trial and error elimination, common to man and animal alike. The paradigm for knowledge - growth is taken to be the Darwinian theory of evolution through natural selection. Our knowledge at any particular historical moment, is then taken to be those hypotheses and theories which have survived in their own struggle for recognition and acceptance. Thus to the question: "How and why do we accept one theory in preference to others?", Popper gives the answer.

"The preference is certainly not due to anything like an experiential justification of the statements composing the theory; it is not due to a logical reduction of the theory to experience. We choose the theory which best holds its own in competition with other theories, the one which by natural selection, proves itself the fittest to survive. This will be the one which not only has hitherto stood up to the severest tests, but the one which is also testable in the most rigorous way. A theory is a tool which we test by applying it, and which we judge as to its fitness by the results of its applications."³

This 'natural-selection hypothesis' of the growth of knowledge has been called by Popper and also by D.T. Campbell, "evolutionary epistemology". For this theory the dividing line between animal knowledge, pre-scientific knowledge and scientific knowledge is very thin and consists in the fact that the former grows by the elimination of the animal or the man, while the latter (scientific knowledge or objective knowledge) grows by the elimination of the unfit theory through criticism. Thus says Popper: "From amoeba to Einstein, the growth of knowledge is always the same: we try to solve our problems, and to obtain by a process of elimination, something approaching adequacy in our tentative solutions"⁴.

We see then that Popper's principle of falsification as solution to the problem/induction leads to purely conjectural and /of evolutionary knowledge; which basically consists of the method of learning by trial and error, of learning from our mistakes - a method which is "fundamentally the same whether it is practised by lower or by higher animals, by chimpanzees or by men of science".⁵ His theory seems to me to be no different from pragmatism or instrumentalism. "According to my proposal, what characterises the empirical method is its manner of exposing to falsification, in every conceivable way, the system to be tested. Its aim is

not to save the lives of untenable systems but, on the contrary to select the one which is by comparison the fittest, by exposing them all to the fiercest struggle for survival"⁶.

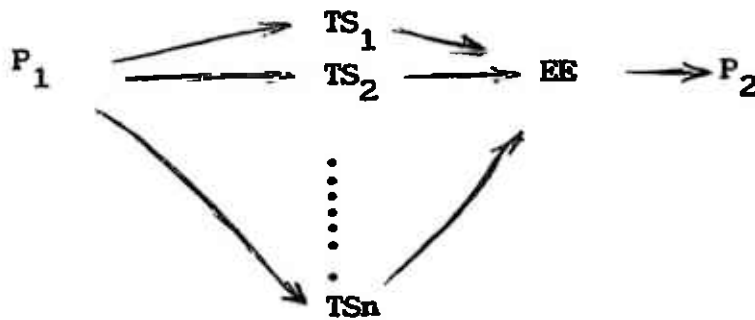
**III: The Neo-Darwinist theory of evolution and the
Growth of Knowledge**

Popper assumes the modern theory of evolution which combines the theory of natural selection with the discoveries of Mendelian genetics. According to this theory the composition of a population during the course of time is determined and controlled by natural selection, through which certain variants are eliminated and others become more prevalent. This has sometimes been called the 'survival of the fittest'. Evolutionary change and direction is determined in this way. Popper adopts and restates this theory. He sees it as a growing hierarchical system of plastic controls which organisms incorporate.

"Mutations" in this view are seen to be 'more or less accidental trial-and-error gambits' and 'natural selection' as a method of control through error elimination. The following statements from Popper's essay 'Evolution and the Tree of Knowledge' will further clarify what he means:-

1. All organisms are constantly, day and night, engaged
in problem-solving.

2. These problems must be viewed in an objective sense.
3. Problem-solving always proceeds by the method of trial and error, wherein new reactions, new forms new organs, new modes of behaviour, new hypothesis are tentatively put forward and controlled by error - elimination.
4. Error elimination may proceed either by the complete elimination of unsuccessful forms (the killing-off of unsuccessful forms by natural selection) or by the (tentative) evolution of controls which modify or suppress unsuccessful organs, or forms of behaviour, or hypotheses.
5. Controls developed during evolution are telescoped and used in future adaptation and problem-solving.
6. Using 'P' for problem, 'TS' for tentative solutions 'EE' for error elimination, we can describe the fundamental evolutionary sequence of events as follows:
$$P_1 \rightarrow TS \rightarrow EE \rightarrow P_2$$
7. To give an idea of the multiplicity of the tentative solutions, or trials possible, the scheme could be re-written as:



The above scheme⁷, $P_1 \rightarrow TS \rightarrow EE \rightarrow P_2$, Popper argues is valid for the animal world, primitive man and modern man, and accurately describes how knowledge grows through error elimination and systematic rational criticism. It is only in this way, says Popper, that we can grope for 'Truth'. This scheme is of supreme importance in Popperian epistemology because it captures in a formula his basic thesis on evolutionary epistemology. In his words: "It gives a rational description of evolutionary emergence, and of our self-transcendence by means of selection and rational criticism."⁸

What then is an error, in Popper's theory? It looks like an error is what does not serve our desire or struggle to survive. Truth on the other hand seems to be what promotes our struggle for survival. Although, this is clearly implicit in this theory Popper denies it, and espouses a correspondence theory of Truth.

On the basis of the foregoing, we can restate Popper as saying that knowledge grows by moving from old problems to new problems, through the instrument of criticism, by means of conjectures and refutations. This process, the growth of knowledge consists mainly in the modification of existing knowledge. Indeed, no knowledge can be regarded as free from criticism or pure - for all knowledge is theory - impregnated and this includes even our observations. There are no secure starting points, no solid foundations, and no 'data' which can be taken for granted. Everything is a conjecture and everything could be false.

It would follow from Popper's theory above that, human knowledge is not different from animal knowledge, or instinct - that it is in the final analysis just an instrument for survival. For, although, says Popper, "I shall confine my discussion to the growth of knowledge in science, my remarks are applicable without much change; I believe, to the growth of pre-scientific knowledge also - that is to say, to the general way in which men, and even animals, acquire new factual knowledge about the world... My interest is not merely in the theory of scientific knowledge, but rather in the theory of knowledge in general." The question we have raised leads us to Popper's ideas on Truth and Verisimilitude.

But before we turn to a discussion of these ideas, we shall briefly consider in which sense we can speak of a growth of knowledge, of progress. That is - what is the criterion of progress in view of the fact that all our theories remain guesses, conjectures, hypotheses? Popper's answer to this question is his "criterion of relative potential satisfactoriness" which isolates as preferable the theory with a higher degree of empirical content, logically stronger, greater explanatory and predictive power, and which can be more severely tested by comparing predicted facts with observations. This criterion, argues Popper, should not be confused with high probability in the sense of the calculus of probability - for content increases with increasing improbability. Hence "since a low probability means a high probability of being falsified, it follows that a high degree of falsifiability or refutability or testability, is one of the aims in fact precisely the same aim as a high informative content. The criterion of potential satisfactoriness is thus testability, or improbability".¹⁰ Popper goes on to argue that the progress of science is actually determined and dominated by this criterion. Hence movement from Kepler and Galileo to Newton, or Fresnel and Faraday to Maxwell, or Newton and Maxwell to Einstein was progressive in the sense that the movement was towards more informative, less

probable theories and highly testable theories. It is quite obvious that this idea of knowledge - growth or progress can function without the notion of truth. Yet inspite of this criterion, Popper can still write pessimistically: "There is no assurance that we shall be able to make progress towards better theories"¹¹ (our underlining).

IV: The Correspondence Theory of Truth and Verisimilitude

Although Popper admits that we can talk and "argue in favour of intuitive satisfactoriness of the criterion of progress in science without ever speaking about the truth of its theories",¹² something he has successfully done, he still surprisingly relates the notion of preference for theories to the general idea of Truth which he holds to be the aim of rational discussion. Popper's conversion to belief in the idea of Truth is due to Alfred Tarski who is said to have rehabilitated the old theory of truth as correspondence with facts - although the present currency of the correspondence theory is due to the discussions of G.E. Moore, B. Russell, F.P. Ramsey, Wittgenstein among others.

We will not go into the trouble of attempting a detailed analysis of that most difficult paper by Tarski namely "The Concept of Truth in Formalized Languages"¹³ or even its simplified Version "The Semantic Conception of Truth"¹⁴. We will only give here a rough sketch and summary. The task of this paper was simply the problem of defining truth. With reference to a given language - a materially adequate and formally correct definition of the term 'true sentence'. Tarski was mainly concerned with clarifying or grasping the intentions contained in the classical Aristotelian conception of truth (wherein true means corresponding with reality). This conception is for example opposed to the pragmatic or utilitarian conception, or even the coherence theory. It is given expression in the well-known words of Aristotle's Metaphysics: "To say of what is that it is not, or of what is not that it is, is false, while to say of what is that it is, or of what is not that it is not is true".

Tarski shows that any attempt to define truth within colloquial or natural languages is doomed to fail as it lands itself in antinomies and contradictions, such as the antinomy of the liar. Having argued his case against the suitability of employing natural languages - that is, that they generate contradictions - Tarski goes on to state that "The problem of the

definition of truth obtains a precise meaning and can be solved in a rigorous way only for languages whose structure has been exactly specified."¹⁶ It followed therefore that this task was possible only within the field of formalized languages of the deductive sciences, such as those of logic and mathematics. Such languages are limited and narrow. They have an exact vocabulary, rules determining what will constitute a sentence, i.e. well formed formulas (wffs) or expressions, rules for deriving propositions must also be made explicit and the axioms or postulates of the system must be clearly stated. So Tarski concludes in this connexion that, "For the languages of this group ('natural' or 'richer' languages) we shall never be able to construct a correct definition of the notion of truth. Nevertheless, everything point to the possibility even in these cases - in contrast to the language of everyday life - of introducing a consistent and correct use of this concept by considering it as a primitive notion of a special science, properties are made precise through axiomatization".¹⁷

In the elaboration of his task, Tarski argues that a sentence is true or false with respect to a particular language i.e. an object language whose structure has been exactly specified, and hence the language which is "talked about" and which is the centre of the whole discussion. But/ second language, the /a

meta-language is also needed in which the sentences of the object language are mentioned and discussed but not used. It is in this second language that we construct the definition of truth such as the following: S is a true sentence if and only if it is satisfied by every infinite sequence of classes. Or simply: a sentence is true if it is satisfied by all objects, and false otherwise.¹⁸ The general scheme for defining truth in this kind of sentence can be depicted as follows:

X is true if, and only if, P, Thus the sentence "snow is white" is true if, and only if snow is white. Similarly: The sentence " Grass is green" is a true sentence if, and only if, grass is green. Having given his definition of truth, Tarski adds that it can be proved in the theory of truth that "All consequences of true sentences are true".

The above is only a very sketchy picture of Tarski's theory of truth as correspondence with facts. Popper learned of it in 1935 and was very excited by its consequences.¹⁹ Indeed this theory seemed to Popper another support for metaphysical realism. Hence, although it defines truth as correspondence to the facts, Popper uses it to define reality as that to which true statements correspond. This leads Popper to assert, that given Tarski's objective theory of truth it would follow that "a theory may be true even though nobody believes it, and even though we have no reason for accepting it, or for believing that it is

true; and another theory may be false, although we have comparatively good reasons for accepting it"²⁰. Another assertion which Popper says can be validly inferred from the objective correspondence theory is this: "even if we hit upon a true theory, we shall as a rule be merely guessing, and it may well be impossible for us to know that it is true "²¹.

In spite of the wide acceptance of Tarski's formulation of the concept of truth, many other philosophers have voiced their dissatisfactions with the theory. It is certainly true that this theory restricts itself to artificial languages and semantics, and consequently fails to make a clean and effective contact with empirical reality and natural languages. DJO'Connor has after an excellent analysis of the theories which go under this name, observed of Tarski's theory that "The conclusion must be that though the semantic theory of truth is a classical achievement in formal semantics, it has no relevance to the problem of empirical truth in everyday natural languages."²² Max Black has also voiced the fact of the philosophical neutrality of Tarski's theory. He writes: "The neutrality of Tarski's definition with respect to competing philosophical theories of truth is sufficient to demonstrate its lack of philosophical relevance (because) neither this, nor any formal definition of truth goes to the

heart of the difficulties which are at the root of the so-called philosophical problem of truth."²³

These negative comments are perfectly justified. Karl Popper, nevertheless, totally disregards them and assumes that Tarski's theory is relevant in the empirical sciences for having restored the correspondence theory of absolute or objective truth. This once again on Popper's criteria is only a conjecture. Its truth is not established although Popper speaks as if it were. So he writes: "the view that this theory is applicable only to formalized languages is, I think, mistaken. It is applicable to any consistent and more or less 'natural' language."²⁴ This statement is of course an unproven guess. We could, however, say generally that Popper's acceptance of Tarski's semantic theory of truth partly derives from his mistaken conviction that any other theory or formulation must be subjective or epistemic, and that this theory in its objectivity leads to the idea that truth is independent of the knower, his thoughts, assertions, beliefs, and acceptance. For "even if we hit upon a true theory, we shall as a rule be merely guessing, and it may well be impossible for us to know that it is true."²⁵

Popper nonetheless admits that his theory of the progress of knowledge can well do without the idea of truth - which is for all practical purposes, - dispensable. His

incorporation of this idea into his theory of knowledge, therefore depended on his redefinition of the aim of science as the search for Truth and therefore true theories. But since, as he says, Truth is hard to come by, as expressed in Xenophanes' poem which follows (which Popper loves very much):

The gods did not reveal, from the beginning, All things
To us, but in the course of time, Through seeking, men
Find that which is better.

But as for certain truth, no man has known it,
Nor will he know it, neither of the gods,
Nor yet of all things which I speak
And even if by chance he were to utter
The final truth, he would himself not know it;
For all is but a woven^{of} guesses".²⁶

it will remain just a Regulative principle or Idea in the Kantian sense. We can continue searching for it, but may never know when we have found it, for there is no criterion of truth.

Nevertheless, says Popper, we can speak of criteria of progress towards truth. This is in itself a questionable idea. But it leads Popper to his idea of approximation to truth, or verisimilitude which is defined in terms of truth-content. Hence he talks of degrees of verisimilitude such that the maximum degree of verisimilitude is achieved only by a theory which corresponds to all the facts (real facts), and therefore

having no falsity-content within it at all, for it is completely and totally true. This idea is unattainable. What we deal with in practice, says Popper, are theories with varying degrees of verisimilitude and hence comparable on the basis of the criterion of relative potential satisfactoriness, examined earlier. Hence a theory with a greater content will also have greater verisimilitude unless its falsity content is also greater. This brings us to Popper's three requirements for the growth of knowledge, which Popper lists as:

1. Theories should be developed with greater content which proceed from some simple, new and powerful unifying idea about some connection or relation between hitherto unconnected things, or facts or new 'theoretical entities.'
2. New theories should be independently testable.
3. The new theory should pass some new and severe tests.²⁷

It seems to me that these three requirements of the growth of knowledge would be quite valueless without a concept of induction or verification, as we have already shown. That is to say, in the dialectic of verification and falsification, or even toward neutrality. As Agassi suggests to Popper, the third and second

requirement for the growth of knowledge contains "a residue of verificationist modes of thought".²⁸ This is only inevitable. Popper himself admits this. He writes: "I admit that there may be a whiff of verificationism here, but this seems to me a case where we have to put up with it".²⁹ Herbert Feigl in a paper "What Hume Might Have Said to Kant," underscores the same point against Popper. He writes, "Popper's policy of the critical, rational approach must (and does) leave open the possibility that the Michelson-Morley type of experiment might give positive results beginning tomorrow and forever after. It is only by induction that we can assume that a well refuted theory will stay refuted. After all it is logically conceivable that such a 'knocked out' theory might begin to 'stand up' at any time; and from there on out for all future concerns this would be just as good as a theory which had never been refuted".³⁰ This shows that for all practical purposes, Popper's theory, has an in-built, implicit, use of induction and therefore of verification. Moreover, it could also be noted that Popper often uses his falsificationism as a weapon against certain ideologies or theories. But this stance cannot in all honesty be assumed, while at the same time asserting that we do not know the truth. This point has been made by W. Bartley, Joseph Agassi and even Feyerabend.³¹

Having said all this, Popper would still argue that there is no guarantee that our knowledge is actually growing. It could all be false. For even as to the question: "how can you be certain that a correspondence between a statement and the fact, obtains, or is true?" To this he gives the answer: "you cannot be sure that a statement corresponds to the facts". Hence we cannot be sure that a statement corresponds to the facts". Hence we cannot be sure that knowledge is growing. Of course, Popper is here contradicting himself. His concept of the growth of knowledge is therefore problematic.

Kuhn's Alternative

It is generally agreed that Kuhn has offered a real alternative to Popper's understanding of how knowledge actually grows. Kuhn's basic thesis or argument is contained primarily in the The Structure of Scientific Revolutions (1962,1970), and centres around the concept of 'paradigm'. Kuhn himself concurs that "the term 'paradigm' points to the central philosophical aspect of my book".³³ This term is however vague and unclear. Margaret Mastermann who sets out to clarify Kuhn's conception of a paradigm, and who holds that Kuhn is "one of the outstanding

philosophers of our time"³⁴, shows that the term "paradigm" is used in at least twenty-one different senses in Kuhn's work cited above. Among these she includes the following as descriptive of a paradigm: - a universally recognized scientific achievement; a myth, a 'philosophy' or constellation of questions, a textbook or classic work, a whole tradition which is in some sense a model, an analogy, a successful metaphysical speculation, a standard illustration, a source of tools, an organizing principle which can govern perception itself, a general epistemological viewpoint, something which defines a broad sweep of reality etc.³⁵

Miss Mastermann reduces these various uses into three main groups which she categorises as metaphysical paradigms or metaparadigms, sociological paradigms and artefact paradigms or construct paradigms. Her general evaluation of Kuhn is positive and objective. Kuhn generally agrees with her, although he himself reduces the three into two, which leaves the metaphysical paradigms and a conflation into one of the sociological and the construct or artefact paradigms. Given in this sense then Kuhn describes a paradigm as "what the members of a scientific community share and conversely a scientific community consists of men who share a paradigm".³⁶ Alternatively Kuhn views "paradigms as the constellation of group commitments "or as shared examples

The use of a paradigm, then, constitutes what Kuhn calls "normal science" as opposed to Popper's "revolutionary science" which is characterised by his theory or method of science.

Kuhn's argument then is that scientific activity normally depends on certain assumptions, world-view or conceptual framework operating in a given society or era. This is central to understanding the working of science, and the way scientific knowledge grows. He argues that "strongly held convictions that are prior to research often seem to be a condition for success in the sciences", and that "scientific education inculcates what the scientific community had previously with difficulty gained, a deep commitment to a particular way of viewing the world and of practising science in it. That commitment can be, and from time to time is, replaced by another, but it cannot be merely given up. And, while it continues to characterize the community of professional practitioners, it proves in two respects fundamental to productive research. By defining for the individual scientist both the problems available for pursuit and the nature of acceptable solutions to them, the commitment is actually constitutive of research. Normally the scientist is a puzzle-solver like the chess-player, and the commitment induced by education is what provides him with the rules of the game

being played in his time. In its absence he would not be a physicist, chemist, or whatever he has been trained to be".³⁷

Kuhn's basic argument is that the game of science presupposes a paradigm (in this broad sense), while the rest consists of puzzle-solving. After some time, a revolution may overthrow the current paradigms, but it will replace the old with a new paradigm. Thus the literature of normal science, empirical as well as theoretical can be reduced to three classes of problems - determination of significant fact, matching of facts with theory and articulation of theory. All these are tackled in the context of the paradigm. For "work under the paradigm can be conducted in no other way, and to desert the paradigm is to cease practising the science it defines".³⁸ However desertions of accepted paradigms occur from time to time as with a Kepler, a Copernicus, a Galileo, a Newton, or an Einstein. Such desertions are the "pivots about which scientific revolutions turn"³⁹. Otherwise, under normal science, the paradigm is a criterion for choosing problems or puzzles that may pass as scientific, or worth the time. "To a great extent these are the only problems that the community will admit as scientific or encourage its members to undertake. Other problems, including many that had previously been standard, are rejected as

metaphysical, as the concern of another discipline....."⁴⁰

Hence, it is significant to note that, "a paradigm can, for that matter, even insulate the community from those socially important problems that are not reducible to the puzzle form, because they cannot be stated in terms of the conceptual and instrumental tools the paradigm supplies".⁴¹ (my underlining)

Furthermore, paradigms are not always amenable to explicit statement. They are often tacitly apprehended. Thus for example a paradigm or "the existence of this strong network of commitments - conceptual, theoretical, instrumental, and methodological"⁴² helps to generate rules and norms for the working scientist, but "paradigms can guide research even in the absence of rules".⁴³ Similarly scientists can agree "in their identification of a paradigm without agreeing on, or even attempting to produce a full interpretation or rationalization of it. Lack of a standard interpretation or of an agreed reduction to rules will not prevent a paradigm from guiding research. Normal research science can be determined in part by the direct inspection of paradigms, a process that is often aided by but does not depend upon the formulation of rules and assumptions. Indeed the existence of a paradigm need not even

imply that any set of rules exists."⁴⁴

Normal science is characterised by commitment, dogma and resistance just as it is characterised by enterprise, creativity and sometimes revolution. Revolution or change of world-view or paradigm sets in when the prevailing paradigm is subjected to a crisis or when a breakdown of the normal technical puzzle-solving activity obtains. Revolution being the resulting transition to a new paradigm. It is characterised by a proliferation of competing articulation, the willingness to try anything, the expression of explicit discontent, the recourse to philosophy and to debate over fundamentals.⁴⁵ Kuhn writes: "It is upon their existence more than upon that of revolutions that the notion of normal science depends."⁴⁶

The concluding remarks of Kuhn's book are "Scientific knowledge, like language, is intrinsically the common property of a group or else nothing at all. To understand it we shall need to know the special characteristics of the groups that create and use it".⁴⁷ In his response to Kuhn's thesis, Popper dubs it the "Myth of the Framework" which he considers to be a logical and philosophical mistake, and as the central balwark of irrationalism in our time. Popper argues that in his view "the 'normal' scientist, as Kuhn describes him, is a person one ought to be sorry for"⁴⁸. His main defense is a

restatement of some of the arguments contained in his books - which we have already examined. Margaret Mastermann in contrast advances a very positive thesis in favour of Kuhn. She writes: "..... far from querying the existence of Kuhn's 'normal science', I am going to assume it.....That there is normal science - and that it is exactly as Kuhn says it is - is the outstanding, the crashingly obvious fact which confronts and hits any philosophers of science who set out, in a practical or technological manner, to do any actual scientific research. It is because Kuhn - at last - has noticed this central fact about all real science (basic research, applied, technological, are all alike here) namely that it is normally a habit - governed, puzzle-solving activity, not a fundamentally upheaving or falsifying activity (not, in other words, a philosophical activity), that actual scientists are now increasingly reading Kuhn instead of Popper: to such an extent, indeed, that in new scientific fields particularly 'paradigm' and not 'hypothesis' is now 'the O.K. word'.⁴⁹

We cannot engage in a full discussion of Kuhn's work here. We can only broadly affirm his major insights, such as that of paradigm use. Indeed in our own analysis we have implied a similar concept or notion. Nonetheless, we cannot

reduce this issue to its simplistic version of either Kuhn or Popper. I think both have given us some very useful and deep insights into the nature of knowledge and its growth - insights which throughout this work we have made explicit. Our own basic position while heavily leaning toward Kuhn's position, can be said to be based on Polanyi's position as a point of departure.⁵⁰ We have given a brief outline of this position elsewhere in this work.

We conclude this section by asserting that Kuhn's thesis does in fact show the inadequacy of Popper's conception of the growth of knowledge.

Comments

Popper naturally calls his position "fallibilistic"⁵¹ and conveys the idea that all men are fallible, and that all our ideas could all be false. This position he contends is quite compatible with his belief in the idea of absolute, objective truth which it is the task of science to aim for. We have on the contrary argued that Popper's anti-inductivist thesis would inevitably lead to skepticism or to pragmatism or instrumentalism. Our argument is based on Popper's thesis that all theories are not only unprovable, but also improbable and undisprovable, including this thesis itself. Even the

idea that our knowledge grows: is not only questionable, it is uncertain and unverifiable. It is however a hope, a conjecture based on other conjectures. Of course Popper talks of corroboration or testability. This is a reasonable and valid idea. But as we have already shown, it is just as meaningless in the context of Popper's anti-inductivist thesis. No wonder, Popper himself admits this idea as containing residues of verificationist modes of thought and sees this as unavoidable. This admission helps to underscore our point.

Lakatos, who is in a certain sense Popperian grappled with this dilemma and ends up adopting a conjectural principle of induction in the context of Popper's fallibilism. Lakatos makes the interesting point that if as Popper implies, "our knowledge can grow but without our knowing it", then, "even Popper's newly found fallibilism is nothing more than skepticism with an eulogy of science", and, "Popper's theory of verisimilitude remains a metaphysical-logical which has nothing to do with epistemology".⁵² Lakatos further quotes Watkins' statement which voices a similar sentiment, as follows - "in critical discussion of Popper's epistemology (we usually find) the suspicion that, far from solving the problem of rational choice between competing hypotheses, his methodology really leads to thorough-going skepticism"⁵³. We have shown

that in the absence of any inductivist thesis, and in spite of Popper's three requirements of the growth of knowledge (which depend in any case on a notion of induction) this conclusion is inescapable. Either Popper incorporates some verificationist procedures or he lands into this skepticism.

But as the situation still stands, Popper has rejected Lakatos proposal in which he (Lakatos) argued that the "logic of the growth of knowledge' must include - in addition to Popper's logico-metaphysical theory of verisimilitude - some speculative genuinely epistemological theory connecting scientific standards with verisimilitude."⁵⁴

Jean Piaget's work also does point to the need for a transcendental argument in Popper's epistemology. In his Psychology and Epistemology, Piaget argues that scientific epistemology or study of the growth of knowledge cannot be confined to purely logical considerations, as Popper tries to do. He insists that we must draw our data from all the disciplines, including psychology and historico-critical analysis. Moreover, Piaget argues, logic and psychology are not as far apart as Popper makes them. The two are very closely related and feed into each other. Hence Piaget maintains that it is possible to

give "a psycho-developmental explanation ^{of} logico-mathematical operations and the nature of logic conceived as an axiomatics of these operations, the problem of the unity of the sciences becomes susceptible to a simple solution in the sense that the system of the sciences is to be thought of as a cyclic order and not as a linear sequences".⁵⁵ Thus instead of having it, as Popper would have it, in the form of the progression:- logic: mathematics - physics - chemistry - biology - psychology - sociology etc, we have a circular system of complementarity. ^{reciprocity} Thus Piaget goes on to argue that:

"Far from being surprising, the existence of such a circle is, on the one hand, quite explicable and on the one hand gives rise to consequences which are welcome as far as the two essential directions of scientific thought are concerned. The explanation of this stems from the circular form of the link between individual and object inevitable in all knowledge and heavily emphasized by Hoeffding: the object is never understood except through the individual's thought processes, but the individual does not understand himself except by adapting to the object. Thus man cannot understand the universe except through logic and mathematics; the product of his own mind; but he can only understand how he constructed mathematics and logic by studying himself psychologically and biologically, or in other words, as a function of the whole universe."⁵⁶

This kind of speculative and transcendent argument is missing in Popper's work. It furthermore exposes the narrowness of Popper's approach. While Popper for example asserts the primacy of logic

over psychology (a position which may be characterised as logicism and its reverse as psychologism) Piaget asserts their interdependence and reciprocity.

In concluding this chapter, we shall reiterate that although we can gain many insights from Popper's understanding of how knowledge grows, we find his conception somewhat inadequate. Besides his conception seems to be excessively influenced by the positivistic conception of knowledge and objectivity. If Popper's picture is not totally false, it is incomplete and therefore misleading.

Footnotes;

1. LScD p. 15
2. D.T. Campbell, "Evolutionary Epistemology", in P.A. Schlipp (ed) op.cit. p. 450
3. LScD p. 108 see also ibid. p. 131 and PH p. 133
4. O.K. p. 261. See also C&R p. 216
5. C&R p. 216
6. LScD p. 42
7. For the complete detailed theses and their elaboration see O.K. pp. 242-244, and also O.K. pp. 119 and 121
8. O.K. p. 121
9. C&R p. 216
10. C&R p. 219
11. O.K. p. 17
12. C&R p. 223
13. In: A. Tarski, Logic, Semantics and Metanathematics (Oxford 1956)
14. In: Leonard Linsky (ed) Semantics and the Philosophy of Language (Chicago 1952)
15. A. Tarski, op.cit. p. 152
16. Linsky (ed) op.cit. p. 19

17. Tarski, op.cit. p. 154
18. Linsky (ed) op.cit. p. 25
19. See O.K. p. 322 or the whole paper "Philosophical Comments
on Tarski's Theory of Truth," O.K. pp 319-340
20. C&R p. 225
21. Ibid.
22. D.J. O'Connor, The Correspondence Theory of Truth
(London 1955) p. 111
23. Max Black, "The Semantic Concept of Truth", Analysis
March 1948, p. 61
24. C&R p. 223
25. Ibid. p. 225
26. Quoted in C&R p. 26
27. See C&R p. 240-242
28. C&R p. 248
29. Ibid.
30. Quoted in A. Wellmer, op.cit. p. 210
31. See for example W.W. Bartley, op.cit. p. 49-54
32. Reflexive Water op.cit. p. 124
33. T.S. Kuhn, "Reflection on my Critics," in Lakatos &
Musgrave (eds) op.cit. p. 234

34. M. Masterman: "The Nature of a Paradigm", in Lakatos & Musgrave (eds) op.cit. p. 59
35. See Ibid. pp 61-65
36. T. S. Kuhn, The Structure of Scientific Revolutions (1970) p. 176
37. T.S. Kuhn, "Scientific Paradigms" (or "The Function of dogma in scientific research") in: B. Barnes, Sociology of Science (Penguin Books 1972) p. 82
38. The Structure of Scientific Revolutions, op.cit. p.34
39. Ibid.
40. Ibid. p. 37
41. Ibid.
42. Ibid. p. 43
43. Ibid.
44. Ibid. p. 44
45. Ibid. p. 91
46. Ibid.
47. Ibid. p. 210
48. K.R. Popper, "Normal Science and its Dangers" in Lakatos & Musgrave, op.cit. p. 52

49. M. Masterman, op.cit. p. 60
50. See for example his Personal Knowledge, The Tacit Dimension and also Knowing and Being.
51. See for example Reflexive Water, op.cit. p. 124
52. I. Lakatos, "Popper on Demarcation and Induction,
"op.cit. p. 257
53. Ibid.
54. Ibid.
55. J. Piaget, Psychology and Epistemology (1952) p. 81
56. Ibid. p. 83

CH. 6. Concluding Unscientific Postscript

"In order to know anything we must assume certain things in faith. Without doing so we would know nothing at all. This means that reason is never able to guarantee itself..... An element of faith is indispensable to all human knowledge..... if faith does not begin, reason will not do so either. There is always more to knowing than human knowledge will ever know."

Os Guinness, Doubt, p. 31

Os Guinness thus sets out the dilemma which every epistemology must face. For to know something we do not start by proving our assumptions and premises before we know it. To know anything we must begin with certain assumptions which may indeed be unproven and incapable of proof, but which nonetheless must be presupposed. Consider the following question which Guinness poses for us:-

" Could you know anything without first presupposing that you are there to know it and that there is something there to be known? Or could you prove the rules of logic without using the same rules to do so? We cannot even conclude that we do not exist without presupposing that we do so. Nor can we fundamentally question the rules of logic, for only when we assume them can we ask a question at all?"

Martin Heidegger reiterates this idea in these terms, -

CH. 6. Concluding Unscientific Postscript

"In order to know anything we must assume certain things in faith. Without doing so we would know nothing at all. This means that reason is never able to guarantee itself..... An element of faith is indispensable to all human knowledge..... if faith does not begin, reason will not do so either. There is always more to knowing than human knowledge will ever know."

Os Guinness, Doubt, p. 31

Os Guinness thus sets out the dilemma which every epistemology must face. For to know something we do not start by proving our assumptions and premises before we know it. To know anything we must begin with certain assumptions which may indeed be unproven and incapable of proof, but which nonetheless must be presupposed. Consider the following question which Guinness poses for us:-

" Could you know anything without first presupposing that you are there to know it and that there is something there to be known? Or could you prove the rules of logic without using the same rules to do so? We cannot even conclude that we do not exist without presupposing that we do so. Nor can we fundamentally question the rules of logic, for only when we assume them can we ask a question at all?"

Martin Heidegger reiterates this idea in these terms, -

"knowing is a kind of being which belongs in the world".²

This notion is what we began with in our reference to the close interconnections and indissoluble unity between epistemology and ontology. Thus, although various philosophers have argued that ontology is prior to epistemology, or that epistemology is prior to ontology, we cannot take such a clear-cut position. In our understanding the relationship between these two is dialectical. Hegel, too writing on this problem asserted: "What is demanded is thus the following: we should know the cognitive faculty before we know. It is like wanting to swim before going in the water. The investigation of the faculty of knowledge is itself knowledge, and cannot arrive at its goal, because it is this goal already".³ This paradox is inescapable and must be squarely faced by any consistent epistemology. It is true Popper faces this dilemma bravely. He arrives at the idea of conjectural knowledge, a form of sceptical fallibilism. But even this as we saw reduces itself to a total scepticism in spite of its basis in another seemingly arbitrary methodological decision. Popper's attempt is nonetheless a very brave attempt indeed. It is a magnificent contribution to epistemology and the philosophy of science, and we can learn a lot from his creative genius.

Granted that the key problem in epistemology is the problem of the growth of knowledge - this problem is yet inextricably tied to the problem of how we come to know. And this is likely to remain a mystery: for we can never exhaustively come to know how we know. The enterprise of knowledge is saddled with risk and uncertainty. It is a process that involves our total being, our faith, among other things. It proceeds not only on the basis of falsifying as Popper tells us, but of verifying also. And the mystery lies in the fact that we do know and that we learn, and we spot out mistakes and also truths.

To know then, there must be someone to know. Knowing in this sense can never be a detached matter. It involves the participation of the subject - his intellect, his will, his emotions and experience, etc. It is both subjective and objective and can never be "knowing without a knowing subject" as Popper would have it. The subject has his grid for sifting and interpreting what reaches him from the external world. Moreover the subject has a reference - point - his own existence, that of the human community of which he is a part, and the reality of the natural world.

In fact all human knowledge assumes this reference

points - hence the reality of human language. Wittgenstein reflecting on this and on language was led to assert that language, and also thought always imply 'a form of life'. Writing on this in his Philosophical Investigations,⁴ he asserted the following:-

"And to imagine a language means to imagine a form of life."

"There are countless kinds (of sentences): countless different kinds of use of what we call 'symbols', 'words', 'sentences'. And this multiplicity is not something fixed, given once for all; but new types of language, new language - games, as we may say come into existence, and others become obsolete and get forgotten..... Here the term 'language-game' is meant to bring into prominence the fact that the speaking of language is part of an activity, or of a form of life....."

"'So you are saying that human agreement decides what is true and what is false?' It is what human beings say that is true and false; and they agree in the language they use. That is not agreement in opinions but in form of life".

This idea is close to Polanyi's view of knowing as an 'indwelling', as "a utilization of a framework for unfolding our understanding in accordance with the indications and standards imposed by the framework". But, Polanyi continues, "any particular indwelling is a particular form of mental existence. If an act of knowing affects our choice between alternative frameworks or modifies the framework in which we dwell, it involves a change in our way

of being. But since such existential choices are included in an act of knowing, they can be exercised competently, with universal intent.....(moreover) all thought is incarnate, it lives by the body and favour of society. But it is not thought unless it strives for truth, a striving which leaves it free to act on its own responsibility with universal intent"⁵.

What Kuhn is saying in his The Structure of Scientific Revolutions is not very different from this.

This way of looking at knowledge is in many ways contrary to Popper's position. It is not only consistent and realistic, but also flexible and admits the mystery and imponderables that constitute the problem of knowledge. Popperians readily dismiss this view as subjectivist and irrational, and contrast it with their own 'objectivist' standpoint. We would maintain that Popperian objectivism is not only a distortion but very inadequate too. Popper, like the logical positivist has consistent to his objectivistic ideal, isolated the language of logic, mathematics and physics as the paradigm of objectivity in human communication. They would therefore admonish that all the other disciplines embrace this ideal. Alan E, Musgrave, for example, has in a very favourable article, "The Objectivism of

Popper's Epistemology"⁶, openly eulogised the Popperian objectivist standpoint. Calling it fallibilistic absolutism, he has accepted it as the cure of the main philosophical malady of our time - namely intellectual and moral relativism deriving from a subjectivistic standpoint in epistemology. Musgrave goes on to eliminate what he considers psychologistic elements in Popper's writings. Among these are Popper's remarks concerning the desirability of 'critical attitudes' among scientists, 'sincerity' in attempting to overthrow a theory, etc. He reformulates 'critical attitude' to 'critical method or policy' and maintains that "the objectivity of science need not rely upon the impartiality or objectivity of scientists", rather what is important are "the methodological rules which focus the attentions of scientists upon certain objective aspects of their knowledge".⁷ Popper's concurrence with Musgrave is explicit. In his reply to Musgrave's criticism, he admits the charges and vows that "in future I should be careful always to write 'critical approach' instead of 'critical attitude' as indeed I have done in the past".⁸ It is clear that Popper is vehemently opposed to the presence of personal or 'psychological' elements in knowledge. His ideal is that of a knowledge shorn of

all personal and subjective factors, leaving us with 'knowledge' or 'epistemology' without a knowing subject, which he has well expounded and defended in his theory of World 3.

I think Popper's ideal of wholly formalizable, wholly explicit knowledge is not just an impossible dream, the idea itself is preposterous. Men are not dead nature, logical machines, robots or computers, and will never be. Merleau-Ponty's 'disavowal of the sciences', and the whole phenomenological school in which he was a prominent figure is in a sense a reaction to this false objectivism. The existentialist revolt, too, could be considered not just as a rebellion against mass civilization and bureaucratic society, but also against objectivistic trends which deny place and role to human subjectivity. Reacting against Hegelian essences and his subjugation of the individual to the notion of the Absolute, the Idea or World spirit, Kierkegaard the Danish thinker reacted against this form of 'objectivism' outrageously. He wrote:

"Almost everything that nowadays flourishes most conspicuously under the name of science (especially as natural science) is not really science but curiosity. In the end all corruption will come about as a consequence of the natural sciences.....
But such a scientific method becomes especially dangerous and pernicious when it would encroach also upon the sphere of spirit. Let it deal with plants and animals and stars in that way, but to deal with the human spirit in that way is blasphemy, which only weakens ethical and religious passion. Even the act of eating is more reasonable than speculating

with a microscope upon the functions of digestion. A dreadful sophistry spreads microscopically and telescopically into tomes, and yet in the last resort produces nothing qualitatively understood, though it does, to be sure, cheat men out of the simple, profound and passionate wonder which gives impetus to the ethical..... The only thing certain is the ethical-religious."⁹

Kierkegaard's reaction to the 'objectivism' of his day led him to an extreme wherein he was able to assert that 'Truth is subjectivity.' There is a sense in which the Hegelian doctrine of the immanentism of Reason in history, a doctrine which dealt a death blow to human individuality and subjectivity - is remotely similar to Popperian objectivism. Both doctrines Popper's and Hegel's elevate the ideas of mass-man, uniformity and conformity. It is true that Popper and Hegel are ideologically miles apart. But there is a sense in which they are strikingly similar. Hence Kierkegaard's affirmation of the irreducibility of human subjectivity, of the single man - "that solitary individual" may convincingly be applied to both. Arguments favouring this view are abundant in existentialist literature, and those relating to Popper may be found for example in the works of Marcuse especially his One Dimensional Man, Roger Poole's Towards Deep Subjectivity, among others.

We are not rejecting Popper's arid objectivism,

in order to affirm its opposite extreme of the maddening subjectivism - as in the Kierkegaardian example. We are simply insisting that the knowing subject is in touch with an objective reality outside of himself and that in the determination of knowledge there is an interaction or an interplay between subjective factors and objective factors. The result being, to use Polanyi's phrase 'personal knowledge.' In his preface to Personal Knowledge: Towards a Post-Critical Philosophy,

Polanyi wrote:

"I start by rejecting the ideal of scientific detachment. In the exact sciences, this false ideal is perhaps harmless, for it is in fact disregarded there by scientists. But we shall see that it exercises a destructive influence in biology, psychology and sociology, and falsifies our whole outlook far beyond the domain of science. I want to establish alternative ideal of knowledge, quite generally.

Hence the wide scope of this book and hence also the coining of the new term I have used for my title: Personal Knowledge. The two words may seem to contradict each other; for true knowledge is deemed impersonal, universally established, objective. But the seeming contradiction is resolved by modifying the conception of knowing.

(Personal participation of the knower in all acts of understanding) does not make our understanding subjective. Comprehension is neither an arbitrary act nor a passive experience, but a responsible act claiming universal validity. Such knowing is indeed objective in the sense of establishing contact with a hidden

reality; a contact that is defined as the condition for anticipating an indeterminate range of yet unknown (and perhaps yet inconceivable) true implications. It seems reasonable to describe this fusion of the personal and the objective as Personal Knowledge".¹⁰

Polanyi shows elsewhere in his writings that no knowledge is wholly explicit, that all knowledge is either tacit or rooted in tacit knowledge, and founded on bodily activity, work and experience. Hence his idea of knowledge as an indwelling. He writes again that "we must now recognize belief

once more as the source of all knowledge. Tacit assent and intellectual passions, the sharing of an idiom and of a cultural heritage, affiliation to a like-minded community: such are the impulses which shape our vision of the nature of things on which we rely for our mastery of things. No Intelligence, however critical or original, can operate outside this fiduciary framework.¹¹

Accepting this framework is the condition for having any knowledge, yet this matrix lays claim to no self-evidence. However what determines personal knowledge is its pursuit with unwavering universal intent. What we discover though will be limited by the scope of our particular calling, framework and intelligence. This perspective is valid in our pursuit of the true, as in our pursuit of the beautiful, or the good.

The foregoing must not be taken to mean that Popper is for tyranny or dehumanization. Far from it - for Popper has excelled himself as a champion of democracy, freedom, tolerance and

the open society. He is a lover of music and art. He writes "Man has created new worlds of language, of music, of poetry, of science; and the most important of these is the world of moral demands, for equality, for freedom, and for helping the weak."¹² We agree with Popper here, but our basic thesis is that ethical and aesthetic ideals and the whole world of values, and, of course, that of facts, cannot be validated or even explicated within the confines of a Popperian epistemology.

Our argument then is that Popper's exaggerated objectivism and ideal of impersonal knowledge - has the tendency of undermining the values he himself apparently espouses, and which generally all men desire. These values, ethical and aesthetic - depend directly on personal and subjective factors, on faith and commitment, on 'frameworks' and 'forms of life' and even knowledge itself. We therefore maintain that what is needed is not so much an objectivist or a subjectivist epistemology - but an epistemology that unites the subjective and the objective poles of knowledge. It is for this reason that we affirm the validity of Polanyi's contribution and take it as our starting point. We would further add that our knowledge will remain partial, for exhaustive knowledge cannot be realized in this existence. Moreover in so far as

our knowledge depends on tacit knowing, on commitment, on risk - taking, on faith, on hope, and therefore on the individual and the totality of his being in a community. We would therefore assert that knowledge or epistemology is closely related to the human situation and man's alienation in society. We would therefore locate the crisis of knowledge within the problem of human alienation. This would lead us to our concluding proposition, that a solution to this problem would have bearings upon human liberation and salvation.

our knowledge depends on tacit knowing, on commitment, on risk - taking, on faith, on hope, and therefore on the individual and the totality of his being in a community. We would therefore assert that knowledge or epistemology is closely related to the human situation and man's alienation in society. We would therefore locate the crisis of knowledge within the problem of human alienation. This would lead us to our concluding proposition, that a solution to this problem would have bearings upon human liberation and salvation.

FOOTNOTES:

1. Os Guinness, Doubt (1976) p. 31
2. Heidegger M, Being and Time (London 1962) p. 88
3. Quoted in Habermas, Knowledge and Human Interest, p. 7
4. See p. 8e, pp 11e - 12e, p. 88e.
5. Polanyi:, M, Knowing and Being p. 134.
6. In: P. A. Schlipp, op.cit. pp 560 - 596
7. Ibid. p. 581
8. Ibid. p. 1079
9. Kierkegaard, S - Concluding Unscientific Postscript, p. xv
10. Polanyi, Personal Knowledge, p. vii
11. Personal Knowledge, Ibid. p. 266
12. OS & IE vol. 1 p. 65

19
169
154
11

CH-7. Appendix: A Summary of Popper's Twenty Seven
Theses on the "Logic of the Social Sciences".

In 1961 the German Sociological Association organised a conference in Tübingen on the logic of the social sciences. This conference was intended to feature the debate between "positivism" and "critical theory". The former was supposed to be represented by Karl R. Popper, while the latter was represented by Adorno and other Frankfurt critical theorists. This debate resulted in the so-called 'the positivist dispute.' Popper himself disclaims being a positivist. He prefers to be called a critical rationalist. We will not get involved in a discussion of this debate. Our main intention here is to give a brief summary of Popper's paper in Tübingen (1961) which was given in twenty-seven theses. Moreover we will not discuss its content since the issues it raises have already been considered. The theses, do however give a clear and explicit picture of Popper's epistemological position, if only briefly.

Below, then, we try to give Popper's argument stated in twenty-seven sharply formulated theses:

Thesis: I — We know a great deal — both details of doubtful intellectual interest and also facts of considerable practical significance.
T.2 — Our ignorance is sobering and boundless. Thus despite our belief in Truth, our attempts to know are never final.

They are only approximations and could be false. For there is no secure and safe ground, all things are, in truth, insecure and in a state of flux.

T.3 - It is the basic and necessary task of every theory of knowledge to clarify the tension and relation between our remarkable and constantly increasing knowledge and our constantly increasing insight that we really know nothing.

T.4 - Knowledge does not start from perceptions or observations or the collection of data or facts, but it starts rather, from problems i.e. from the tension between knowledge and ignorance. This leads to this - no knowledge without problems, but also no problems without knowledge. Or no problems without knowledge but also no problems without ignorance.

T.5 - All the sciences are dependent on the significance or interest of the problems they are dealing with; and their success depends on the honesty, directness and simplicity with which they tackle these problems. Thus it is, such problems as poverty, illiteracy, political suppression, etc., which were important starting points for research in the social sciences.

T.6 - Main Thesis

a) The method of the social sciences as well as the

natural sciences consists not on verification, but on falsification. It consists in trying out tentative solutions to certain problems - the problems from which our investigations start, and those which turn up during the investigation. Solutions are proposed and criticized. If a proposed solution is not open to pertinent criticism, then it is excluded as unscientific although perhaps only temporarily.

- b) If the attempted solution is open to pertinent criticism, then we attempt to refute it; for all criticism consists of attempts at refutation.
- c) If an attempted solution is refuted through our criticism we make another attempt.
- d) If it withstands criticism, we accept it temporarily; and we accept it above all, as worthy of being further discussed and criticized.
- e) Thus the method of science is one of tentative attempts to solve our problems; by conjectures which are controlled by severe criticism. It is a consciously critical development of the method of 'trial and error'.
- f) The so-called objectivity of science lies in the objectivity of the critical method. This means that no theory is beyond attack by criticism; and further, that the main instrument of logical criticism - the logical contradiction - is objective.

T.7 - Thus the tension between knowledge and ignorance is never overcome. Only a misguided and false naturalism in either the social or natural sciences can assert the contrary. Like Kant, Popper holds that there are no bare facts, for all 'facts' are theory - impregnated.

T.8 - There is now a reversed relationship between sociology and anthropology. Social anthropology has been promoted from an applied descriptive discipline to a key theoretical science, and the anthropologist has been elevated from a modest, and somewhat short-sighted descriptive fieldworker to a far-seeing and profound social theorist and social depth-psychologist. The function of the sociologist is to observe and to describe the totems and taboos of white natives in Western Europe and the United States.

T.9 - This reversal denotes the victory of a pseudo-naturalistic method. The truth is that a so-called scientific subject is merely a conglomerate of problems and attempted solutions, demarcated in an artificial way. What really exists are problems and solutions and scientific traditions.

T.10 - The victory of anthropology is a Pyrric victory, of an allegedly observational, allegedly descriptive and allegedly more

objective method - taken to be the method of the natural sciences. It is illustrated by an anecdote wherein an anthropologist attended a conference but remained silent through all the deliberations. At the close, he belatedly commented that he was not interested in the contents of the arguments but in the observable behaviour of the disputants.

T.11 - It is a mistake to assume that the objectivity of a science depends upon the objectivity of the scientist. And it is a mistake to believe that the attitude of the natural scientist is more objective than that of the social scientist.

T.12 - Scientific objectivity depends upon a critical tradition which, despite resistance, often makes it possible to criticize a dominant dogma. It also depends on the social and political circumstances which facilitate this criticism.

T.13 - This point is missed by the sociologist of knowledge who explains non-objectivity from an illusory vantage point. For objectivity can only be explained in terms of social ideas such as competition (both of individual scientists and of various schools); tradition (mainly the critical tradition); social institution (for instance, publication in various competing journals and through various competing publishers;

discussion at congresses); the power of the state (its tolerance of free discussion). Minor details such as for instance, the social or ideological habitat of the researcher tend to be eliminated in the long run; although admittedly they always play a part in the short run.

T.14 - The purity of pure science is an ideal which is presumably unattainable, but it is an ideal for which we constantly fight - and should fight - by means of criticism. For although truth is our regulative principle, our decisive scientific value, it is not our only one. Values such as relevance, interest, significance, fruitfulness, explanatory power, simplicity and precision are of primary importance. But we must not confuse extra-scientific evaluations and values and questions of truth. Our motives and even our purely scientific ideals, including the ideal of a disinterested search for truth, are deeply anchored in extra-scientific and, in part, in religious evaluations. Thus, the 'objective' or the 'value-free' scientist is hardly the ideal scientist. Without passion we can achieve nothing - certainly not in pure science.

T.15 - 18:- Logic is an organon for criticism. It is the theory of the transmission of truth from the premises to the conclusion. It is also the theory of the retransmission of falsity from the conclusion to at least one of the premises. Hence deductive logic is the theory of rational criticism. For

all rational criticism takes the form of an attempt to show that unacceptable conclusions can be derived from the assertion we are trying to criticize. If we are successful in deriving, logically unacceptable conclusions from an assertion, then the assertion may be taken to be refuted.

T.19 - In the sciences we work with theories, that is to say, with deductive systems. This is because a theory or a deductive system is an attempt at explanation and consequently an attempt to solve a scientific problem - a problem of explanation. This is also due to the fact that a theory that is, a deductive system, can be criticised rationally through its consequences. Hence it is a tentative solution which is subject to rational criticisms.

T.20 - The concept of truth is indispensable for critical rationalism. For what is criticised is the claim that a theory is true; and what critics of a theory attempt to demonstrate is that this claim is unfounded: that it is false. The idea of truth used is Tarski's correspondence theory of truth. It is an absolute and objective concept of truth. It leads to the idea of truth as regulative, and to the concept of verisimilitude and approximation to truth. These in turn depend

on the notion of causal explanation, and of the explanatory power or the explanatory content of a theory - in relation to the idea of truth.

T.21 - There is no such thing as a purely observational science; there are only sciences in which we theorize (more or less consciously and critically). This of course also holds for the social sciences.

T.22-24: - Psychology is a social science since our thoughts and actions largely depend upon social conditions. For psychology presupposes social ideas; which shows that it is impossible to explain society exclusively in psychological terms, or to reduce it to psychology. Whereas psychology cannot be a basis of the social sciences, sociology can. Moreover the relationship between psychology and sociology is such that the latter is autonomous. For instance, sociology is constantly faced with the task of explaining unintended and often undesired consequences of human action.

T.25 - Economics is exemplary for the social sciences. It shows that there exists a purely objective method in the social sciences which may be called the method of objective understanding or situational logic. A social science orientated towards objective

understanding or situational logic can be developed independently of all subjective or psychological ideas. This method eliminates psychological motivation, and makes everything explicable within the context of a given situation and what is inherent in its demands. Thus "I in the place of Charlemagne would have done what he did."

T.26 - An oversimplified and overschematized explanation of situational logic is false. This can nevertheless possess a considerable truth content and can be a good approximation to the truth, better than certain other testable explanations, such as those of psychology. For situation analysis is rational, empirically criticizable and capable of improvement. For we may find, for instance, a letter which shows that the knowledge at the disposal of Charlemagne was different from what we assumed in our analysis. By contrast, psychological or characterological hypotheses are hardly ever criticizable by rational arguments.

T.27 - Situational logic assumes a physical world in which we act, a social world populated by other people with goals etc., and social institutions which determine the peculiarly social character of our social environment.

Popper ends at this point. He concludes with his favourite saying taken from Xenophanes, which can also be found in his Conjectures and Refutations p. 152. He also makes this significant comment on epistemology (a comment which we also quoted at the beginning of this essay). He writes:

"I believe that epistemology is important not only for the individual sciences, but also for philosophy, and that the religious and philosophical uneasiness of our time, which surely concerns us all, is, to a considerable degree, the result of uneasiness about the philosophy of human knowledge. Nietzsche called it the European nihilism, and Benda the treason of the intellectuals. I should like to characterise it as a consequence of the Socratic discovery that we know nothing that is, that we can never justify our theories rationally. But this important discovery which has produced amongst many other things, the malaise of existentialism, is only half a discovery; and nihilism can be overcome. For although we cannot justify our theories rationally and cannot even prove that they are probable, we can criticise them rationally. And we can often distinguish better from worse theories."

This concluding comment represents to a certain extent, the ambiguity in Popperian epistemology - and its underlying oscillation between skepticism and optimism. It, as it were, captures the predominating tendency in Popper's theory of knowledge. This tendency comes through here especially in Theses I and 2, 3, 4, 6 and 7. The twenty-seven theses give us the kernel of Popper's basic argument in epistemology.

B i b l i o g r a p h y

A. Writings by K.R. Popper

- K.R. Popper, Conjectures and Refutations: The Growth of Scientific Knowledge, New York, Harper Torchbooks, 1965.
- K.R. Popper, The Logic of Scientific Discovery, London, Hutchinson and Co. Publishers, 1972
- K.R. Popper, Objective Knowledge: An Evolutionary Approach, Oxford, The Clarendon Press, 1972.
- K.R. Popper, The Poverty of Historicism, London, Routledge and Kegan Paul, 1961.
- K.R. Popper, The Open Society and Its Enemies, London, Routledge and Kegan Paul, 1966.
- K.R. Popper, "Normal Science and Its Dangers" in Criticism and the Growth of Knowledge, ed. by I. Lakatos & A. Musgrave, London, Cambridge University Press, 1970.
- K.R. Popper, "Conversations with Philosophers" in Brian Magee, Modern British Philosophy, London; Secker and Warburg, 1971.
- K.R. Popper, "Intellectual Autobiography", in, The Philosophy of Karl Popper, ed. by Paul A. Schlipp,

The Library of Living Philosophers, vol. 14,
La Salle, Illinois: The Open Court Publishing Co.,
1971, Bk. 1. pp 3-181.

K.R. Popper, "Replies to My Critics", *ibid.* Bk11.
pp. 961-1197

K.R. Popper, "The Logic of the Social Sciences," in T.W. Adorno,
et al, The Positivist Dispute in German Sociology,
London, Heinemann, 1976. pp. 87-104.

K.R. Popper, "Reason or Revolution" in T.W. Adorno, *ibid.*
pp. 288-300.

K.R. Popper, and Sir John Eccles, "Falsifiability and Freedom",
a dialogue, in Reflexive Water: The Basic Concerns
of Mankind, ed. by Fons Elders, London: Souvenir
Press, 1974.

For a more comprehensive bibliography of Popper's writings in
English, German and translations in other languages, see
Troels Eggers Hansen's compilation in P.A. Schlipp,
The Philosophy of Karl Popper, *op.cit.* pp. 1201-1287.

The above selection includes only those works which were
available to me and which I have read and frequently consulted
in the course of writing this essay.

B. General Books Consulted

Adorno, T.W., et al - The Positivist Dispute in German Sociology,
London: Heinemann, 1976.

Ayer, A.J. - Language, Truth and Logic , Penguin
Books, 1971.

Bacon, F. - The New Organon and other Related
Writings, ed. by F.H. Anderson,
New York: The Library of Liberal Arts,
1960 .

Barnes, B, (ed.) Sociology of Science, Penguin Books
1972.

Barnett, L. - The Universe and Dr. Einstein, New York,
Mentor Books, 1957.

Bastable, P.K. - Logic: Depth Grammar of Rationality,
Dublin, Gill and Macmillan, 1975.

Baumann, Z. - Towards a Critical Sociology, London,
Routledge Kegan and Paul, 1976.

Berkeley - The Principles of Human knowledge, with
other writings, ed. by G.J. Warnock,
Fontana Books, 1962.

- Berlin, I. - Karl Marx, London: Oxford University Press, 1963.
- Bird, G. - Philosophical Tasks, London: Hutchinson, 1972
- Brathwaite - Scientific Explanation,
- Buchdahl, G. - Metaphysics and the philosophy of Science, Basil Blackwell, 1969.
- Carnap, R. - The Logical Structure of the World, University of California Press, 1967.
- Chisholm, R.M. - Theory of Knowledge, Prentice Hall, Inc. 1966
- Collingwood, R.G. An Essay on Metaphysics, Oxford, 1940.
- Conforth, M. - The Open Philosophy and the Open Society, New York, International Publishers, 1968.
- Cornford, F.M. - Plato's Theory of Knowledge, London: Routledge Kegan and Paul, 1960.
- Descartes, R. - Discourse on Method and other Writings, ed. by A. Wollaston, Penguin Books, 1960.
- Eccles, J.C. - Facing Reality, London: Longman, 1970.
- Elders, F. (ed) - Reflexive Water, London: Souvenir Press 1974.
- Feyerabend, P. - Against Method, London, NLB, 1975

- Fleischer, - Marxism and History, Penguin Press, 1973.
- Gilles, D.A. - An Objective Theory of Probability, London
Methuen and co. Ltd, 1973.
- Goldmann, L. - Kant, London, NLB, 1971.
- " " - The Human Sciences and Philosophy, London, 1969
- Grene, M. - The Knower and the Known, London, Faber and
Faber, 1966.
- Guinness, O. - Doubt, Berkhamsted Herts, U.K., Lion Publishing Co.
1976.
- Habermas, J. - Theory and Practice, Heinemann, 1974.
" - Knowledge and Human Interests, Heinemann, 1971.
" - Towards a Rational Society, Heinemann 1971.
- Hacking, I - Why Does Language matter to Philosophy, Cambridge
University Press, 1975.
- Hamilton, P. - Knowledge and Social Structure, London, R&KP,
1974.
- Hamlyn O.W. - Theory of Knowledge, London, Macmillan 1962.
- Hanfling, O. (ed) - Fundamental Problems in Philosophy,
Basil Blackwell, 1972

- Harre, R. - The Principles of Scientific Thinking, The University of Chicago Press, 1970.
- Heidegger, M - Being and Time, London, 1962
- Hesse M. - The Structure of Scientific Inference, Macmillan 1974.
- Hobbes, - Leviathan, Dent: London, Everyman's Library, (1970)
- Hoffmann, J. - Marxism and the Theory of Praxis, London Lawrence and Wishart, 1975.
- Hume, D. - A Treatise of Human Nature, Penguin Books, 1969.
- " - An Enquiry Concerning Human Understanding, in R.P. Wolff (ed), op.cit.
- Husserl, E. - Phenomenology and the Crisis of Philosophy New York, Harper and Row, 1965.
- Kant, I - Critique of Pure Reason, tr. by J.M.D. Meiklejohn, London, Everyman, 1974.
- " - Critique of Pure Reason, tr. by N.K. Smith, London, Macmillan, 1968.
- " - Prolegomena to any Future Metaphysics, in R.P. Wolff, op.cit.

- Kierkegaard, S. - Concluding Unscientific Postscript,
tr. by D.F. Swenson & W. Lowrie, Princeton
University Press, 1941.
- " - Philosophical Fragments, Princeton, 1944
- Kolakowski, L. - The Alienation of Reason, New York,
Anchor Books, 1969.
- Kuhn, T.S. - The Structure of Scientific Revolutions,
University of Chicago Press, 1970.
- Kwant, R.C. - Encounter, Duquesne University Press, 1965
- Laing, R.D. - Knots , New York, Vintage Books 1972.
- Lakatos, I and
Musgrave, A. - Criticism and the Growth of Knowledge,
Cambridge University Press, 1970.
- Lanczos, C. - The Einstein Decade, 1905-1915, London:
Elek Science, 1974.
- Levi, A.W. - Philosophy as Social Expression, University
of Chicago Press, 1974.
- Linsky, L. (ed) - Semantics and the Philosophy of Language,
University of Illinois Press, 1972.
- Locke, J. - An Essay Concerning Human Understanding,
ed. by A.S. Pringhle-Pattison, Oxford:
Clarendon Press 1924.

- Luchins, A.S. &
Luchins, E.H. - Logical Foundations of Mathematics
for Behavioral Scientists, New York;
Holt, Rinehart and Winston, Inc. 1965.
- Mackie, J.L. - Truth, Probability and Paradox, Oxford,
1973.
- Madden, E.H. - The Structure of Scientific Thought,
London, R&KP 1966.
- Magee, B. - Popper, Fontana Books, 1973
- Marcuse, H. - One Dimensional Man, London: Sphere
Books, 1972.
- " - Eros and Civilization, London:
Sphere Books, 1972
- " - Reason and Revolution, London: R & KP
1941.
- Mill J.S. - A System of Logic, London: Longmans,
Green and Co. 1956.
- Munn, A.M. - From Nought to Relativity, London:
G. Allen and UnWin, 1974.
- Nagel, E. - The Structure of Science. New York, 1961

- O'Connor, D.J.O. - The Correspondence Theory of Truth,
London: Hutchinson & Co. 1975.
- Pascal, B. - Pensees ed. H.F. Stewart, London:
R&KP, 1950.
- Passmore, J. - A Hundred Years of Philosophy, London, 1966.
- Pelz, W. - The Scope of Understanding in Sociology,
London, R&KP, 1974.
- Polanyi, M. - Personal Knowledge - Towards a Post-Critical
Philosophy, London, R & KP , 1962
- " - Knowing and Being, ed. Marjorie Grene,
London, R&KP 1969.
- " - The Tacit Dimension, London, 1967
- Poole, R. - Towards Deep Subjectivity, London,
Penguin Press, 1972.
- Quine, W.V.O. - From a logical Point of View, New York:
Harper and Row, 1963.
- " - World and Object, The M.I.T. Press, 1960
- Rausche, G.A. - Contemporary Philosophical Alternatives
and the Crisis of Truth, the Hague, 1970.

- Rescher, N. - The Primacy of Practice, Oxford: Basil Blackwell, 1973.
- Russell, B. - A History of Western Philosophy, G. Allen and Unwin Books, 1961.
- Schlipp, P.A. (ed) - The Philosophy of Karl Popper, 2 vols, La Salle, Illinois, The Open Court Publishing Co. 1974.
- Smith, J.M. - The Theory of Evolution, Penguin Books, 1958.
- Tarski, A. - Logic, Semantics and Metamathematics, Oxford: The Clarendon Press, 1956.
- " - "Truth" (1969) in Hanfling, (ed) op.cit.
- " - "A Sematic Conception of Truth", in Linsky (ed) op.cit.
- Theobald, D.W. - An Introduction to the Philosophy of Science, London: Methuen & Co. 1968.
- Urmson, J.O. - Philosophical Analysis, Oxford: Clarendon Press, 1956.
- Vavoulis, A. & Colver, A.W. (eds.) - Science and Society: Selected Essays, Sanfrancisco: Holden Day, Inc. 1966

- von Wright, - The Logical Problem of Induction, Oxford
Oxford: Basil Blackwell, 1965.
- Watson, J.D. - The Double Helix.
- Weitz, M. (ed) - Twentieth Century Philosophy: The Analytic
Tradition, London: Collier Macmillan Ltd,
1966.
- Wellmer, A. - Methodologie als Erkenntnistheorie - Sur
Wissenschaftslehre Karl R. Poppers,
Frankfurt-am-Main, Suhrkamp Verlag, 1967.
- White A.R. - Truth, London, Macmillan Press 1970
- Wilder, R.L. - The Foundations of Mathematics, New York,
John Wiley & Sons, Inc. 1965.
- Wittgenstein, L. - Tractatus Logico-Philosophicus, London:
R&KP, 1961.
- " - Philosophical Investigations, Oxford:
Basil Blackwell, 1974.
- Woozley, A.D. - Theory of Knowledge, London: Hutchinson,
1949
- Zuckermann, S. - Beyond the Ivory Tower, London,
Weidenfeld & Nicolson, 1970.