

thought. More detailed treatment of relevant issues - with which I do not necessarily agree - is given, inter alia, by Ross (1953), Sinaiko (1965) and Stenzel (1964), with regard to Plato, Dancy (1975), Hartman (1977), and Leszl (1975) with regard to Aristotle, and Long (1971), Rist (1969) and Zeller (1962) with regard to Stoicism. Merlan (1975) offers relevant discussion ranging from Plato to neoplatonism.

In the subsequent development the original models associated with the Platonic, Aristotelian and Stoic philosophies underwent more or less extensive modification and variation but the basic approaches to epistemology persisted.

Using the categories as defined in the last sub-section the epistemology associated with Plato is clearly intellectualist in character, the primary cognitive objects being the Ideas as intelligible entities apprehended by the intellect. The type associated with Stoicism is clearly empiricist, the primary cognitive objects being the impressions as sensory data registered in the subject through the senses.

Stoic empiricism may be further described as "sensationalist" (or "sensualist") since the sensory impressions, and these alone, appear to function as the immediate objects of knowledge. However it seems to me that this is best regarded as a further refinement within the broader empiricist category, sensationalism being regarded as a sub-type of empiricism. Similarly we can distinguish sub-types within the intellectualist type of epistemology.

The type of epistemology associated with Aristotle - rational abstraction from sensory experience - is less straightforward. At first sight the origin of knowledge in sensory experience suggests an empiricist epistemology of some sort. And, indeed, it may well be that at a certain stage of his thought Aristotle did entertain a kind of empiricism.

However, when we look more closely at the epistemological scheme as

developed by Aristotle in the references cited above it becomes clear that what we have is an intellectualism, not an empiricism, though of a type distinct from the intellectualism of Plato.

While the knowing subject has access to the objects of knowledge only through sensory experience the sensory data in no sense constitute cognitive data; the primary objects of knowledge are not given as empirical data. In order to obtain any cognitive data the intellect must abstract the intelligible forms from the sensory data. This abstraction involves a discarding of the sensory given - the sensible form - in order to secure the cognitive data - the intelligible form. The cognitive data are the intelligible forms that are accessible only to the intellect.

The importance of this Aristotelian disjunction of the intelligible and the sensible may be elucidated if we compare it with Hume's impressions and ideas. Hume's position is decidedly empiricist since the sensible data as original impressions constitute the primary cognitive data (Hume, 1978:1-7, 275-277). Secondary impressions and ideas arise from the original impressions of sensation proceeding from them either directly or indirectly, and remaining inseparably related to them. The ideas, which are distinguished from all impressions are "faint images" or copies of the impressions that exist in thought always in an inseparable relation to the impressions (Hume, 1978:1, 72, 163).

In contrast to this, the sensible forms of Aristotle, unlike Hume's sensory impressions, do not constitute cognitive data but must be discarded in cognition. The original cognitive objects are the intelligible forms, not the sensible. Cognition begins not with the sensible but with the intelligible. Further, in sharp contrast to Hume's ideas that proceed or arise from the sensory impressions and remain inseparably associated with those impressions, Aristotle's intelligible forms, though given with the sensible are independent of and,

indeed, ontically prior to the sensibles, functioning as cognitive data only as they are dissociated from the sensible by intellectual abstraction.

This type of epistemology that we encounter in Aristotle, then, is as decidedly intellectualist as is that associated with Plato. The difference, which is important, is that whereas in the Platonic scheme the intelligibles, existing wholly apart from the sensible world, can be apprehended only as the subject transcends the sensible, in the Aristotelian scheme, the intelligibles, being the essential inner core of the sensible world, can be apprehended only as the subject abstracts them from that world. We may speak, therefore, of a transcending intellectualism in the Platonic scheme - with "transcending" indicating that the subject must transcend the sensible in order to apprehend the intelligible data - and an abstractive intellectualism in the Aristotelian scheme.

In the three types of epistemology identified above in Greek/Hellenistic philosophy then, we have two types of intellectualism and a sensationalist empiricism. Underlying these significant differences, however, there are important common features.

In the first place, they are all rationalist in character in the sense in which I use the term "rationalist"; they all locate subjective cognitive authority in a self-authenticating, universal rationality of the subject. It is not an autonomous rationalism since, in each case the ultimate authority is external to the rationality of the subject. Yet each is clearly rationalist in the broader sense discussed earlier.

I reiterate that "rationalist" and "empiricist" are not to be taken as mutually exclusive terms.

The practice that has become common in modern philosophical discourse of contrasting empiricism and rationalism as mutually exclusive

categories obscures the underlying convergence in a common rationalist base that has commonly characterised intellectualist and empiricist epistemologies. Until the 20th century the major versions of empiricism, from Stoicism to positivism in its several variants, have maintained in common with major versions of intellectualism the rationalist view that subjective cognitive authority lies with a self-authenticating rationality of the subject.

I recognise that the rationalism of this period needs to be distinguished from modern rationalism, which characteristically takes the rationality of the subject to be autonomous as well as self-authenticating. I concede, indeed, that the difference is such that a case can be made for restricting the term "rationalism" to the development of the notion of an autonomous, a priori reason that emerged in the 17th century - see Williams (1967:69) and Hart (1966:1-4,23). However, the affinity between this modern rationalism and its precursors such as we are now discussing are such that it seems to me preferable to adopt a definition of rationalism such as I have adopted that recognises this affinity while maintaining the distinction as a distinction of sub-types of a common rationalist type.

Broadly speaking and without attempting an exhaustive analysis of the various versions of rationalism that have occurred in the course of history, three major sub-types of rationalism can be identified. The first sub-type is one in which the fundamental rational principles or laws are external to the subject. Both the Platonic and Aristotelian epistemologies are of this kind. In the case of Plato the fundamental rational principles are identified with the transcendent Ideas apprehended by the subject's rational intellect and in the case of Aristotle they are identified with the Forms of the form-matter composite that are abstracted by the subject's rational intellect. The fundamental order of reality and the structure of cognition are ex-

ternal to the subject who has, nevertheless, privileged access to this order through a self-authenticating rationality.

The second sub-type is one in which fundamental rational principles corresponding to the principles of an original Rationality external to the subject are internalised in the rationality of the subject. In the development of Stoicism there is a tendency in this direction as the notion of human rationality as a fragment of the original divine Rationality lead to the possibility of innate rational principles. The development of Platonic thought in Hellenistic Middle Platonism led, in a somewhat different way, in the same direction with the introduction of the notion of innate ideas corresponding to original Ideas in the mind of God (See Merlan, 1967:53-55).

With modern rationalism - that is, from Descartes onwards - we encounter the third sub-type characterised by human rationality becoming a fully autonomous rationality in which the fundamental rational principles are wholly internalised in the subject as original principles.

Secondly, knowledge is founded in the conceptual replication in human thought of the rational order of reality; a replication that can be articulated precisely in propositional/symbolic form. The rationality of human thought corresponds to a rationality in the reality that is the object of that thought.

On the one hand, truth is identified with propositional/symbolic formulas that have universal applicability. Common sense and practical experience are given different cognitive value in each of the three approaches but there is agreement that knowledge in its highest, and most certain, form is articulated in propositional/symbolic formulas.

On the other hand, knowledge is regarded as the conformity of thought to the rational order of reality. There is no conception of human cognition as imposing an order on nature. Though the notion of

innate ideas laid the foundation for the later development of such a conception, all the major epistemological approaches of the Greek/Hellenistic period assumed that knowledge is the conformity of thought with a universal order of reality that exists independently of human thought; although in the Hellenistic period the notion begins to appear that this order, while existing independently of human thought, is internalised as an a priori principle in human thought.

Thirdly, epistemology is explicitly dependent on metaphysics. Platonic epistemology is dependent on the existence of a metaphysical realm of Ideas; Aristotelian epistemology depends on the existence of universal forms as a metaphysical, intelligible reality, within the world of sensory experiences; Stoic epistemology is dependent on the existence of a pervasive Logos as the metaphysical ordering principle of reality. When later the Ideas were shifted from an independent realm to make them innate to the mind the epistemology remained metaphysically dependent; the original of these innate mental Ideas is the metaphysical postulate of Ideas in the mind of God (Merlan, 1967:54,55; Van Dyk, 1981:48; Copleston, 1985:Vol.I, 446-462).

More is involved than a coincidence of epistemology and metaphysics. There is an epistemological dependence on metaphysics such that if the metaphysical foundation is removed the character of the epistemology is changed fundamentally. Armstrong's separation of Aristotle's epistemological realism from his metaphysical essentialism (Armstrong, 1973:114-123) already discussed illustrates this well. The universals lose the character of metaphysical reality that they have in Aristotle to become nothing but logical constructs of the knowing subject. The result is that knowing ceases to be the process of abstraction penetrating the intelligible inner core of reality that it is in Aristotle to become a logical processing of the data of sensible particulars more akin to Stoic than Aristotelian epistemology.

1.5.6 The Consolidation of the Rationalist Tradition

The long period of socio-political ascendancy, with its concomitant intellectual dominance, of the Christian church in the Western world saw a consolidation of the rationalist position as the unchallenged epistemological orthodoxy.

In establishing its intellectual dominion, backed by the powerful sanctions of a State-Church alliance, Christian thought relied on a synthesis of the rationalism of the Greek/Hellenistic tradition with the dogmas of the Christian faith. Christian theology and the Greek/Hellenistic philosophical tradition were brought into a close alliance of mutual support and defence.

On the one hand, Christian theology and faith gained the status of universal rational certainty that was associated with knowledge in the philosophical tradition; anyone challenging the dogmas of the Christian church could be dismissed as defying the certainties of universal rationality. Any rational person must believe the Christian dogmas.

On the other hand, the rationalist epistemological position was established firmly as the epistemological orthodoxy by its association with the infallible truth of divine revelation embodied in Christian dogma. Any challenge to rationalist epistemology could be rejected as an act of infidelity.

The explicit metaphysical dependence of rationalist epistemology in the Greek/Hellenistic tradition facilitated this consolidating merger with Christian dogma. Because Greek/Hellenistic metaphysics already used explicitly religious language it was possible to recast its formulations in the language of Christian theology with minimal change to the basic structure of the metaphysics. To what extent this meant a reshaping of Christian theology in the image of Greek/Hellenistic metaphysics is another question. The result was a long period of merger, or at least close interdependence, of philosophy and Christian

theology, with a tendency to blur the distinction between them. During this period there was a consolidation of the rationalist tradition of epistemology.

The merger was effected in widely differing ways by different theologian-philosophers, of course, but a rationalist epistemology was common to all. It is important to note that William of Ockham is no exception.

Ockham's metaphysical voluntarism undoubtedly had significant impact on his epistemology. It is directly related to his particular form of empiricism with its rejection of the reality of universals as a reality distinct from individuals (Ockham, 1967: Sentences, I, II, 6). Nevertheless, his epistemology remains firmly within the rationalist tradition; the tradition that forms cognition by a self-authenticating rationality. His voluntarist metaphysics allowed him to separate empirical knowledge from matters of Christian faith without either denying that faith or sacrificing the rationalist character of empirical knowledge.

Knowledge, for Ockham, as for other Christian thinkers of the period, remained a matter for a self-authenticating rationality. At the most primitive level of cognition the intellect intuits objects through the instrumentality of the senses; nothing is required but the object plus the intellect. At the more advanced levels the intellect works abstractively, processing the data that it has gathered by intuition (Ockham, 1967: Sentences, II, 2, 15; Quodlibet, I, Q, IXV).

Ockham's epistemology is an empiricist rationalism. Sensory experience is the sole source of cognitive data while a self-authenticating rationality is the sole authority for identifying and processing this data. The empiricism does not make it any less rationalist.

1.5.7 The Divorce of Epistemology and Metaphysics

The factors that brought an end to the long marriage of philosophy and

Christian theology - a marriage lasting over 1000 years from Augustine to the 16th century - are too complex to be discussed in detail here. Inner tensions that developed in Christian thought, the rise of humanism, Renaissance and Reformation all played a part in bringing to an end the long period of the intellectual dominion of Christian theological/philosophical systems in the Western world.

What is important is that with the ending of this long alliance philosophy was established as a discipline distinct and separate from theology. The dominant position that theology continued to hold for a considerable period as "Queen of the sciences" meant that the philosopher who wanted a position of respect must at least give the appearance of respect for the basic features of the prevailing theological orthodoxy. Steadily, however, even if slowly, the two drifted further apart. Ultimately philosophy became a secular discipline wholly independent of all theology.

This secularisation of philosophy appears to be a peculiarity of the modern Western world. It did not occur in the ancient Greek or Hellenistic ages. During those centuries, as in the long period of Christian dominance, philosophy and theology were inseparable, though the relationship was, of course, different; in the period of Christian dominance theology was dominant over philosophy whereas in the Greek/Hellenistic periods theology was subsumed under philosophy. Nevertheless the idea of a secular philosophy without theology was never seriously considered. Epicurus, perhaps, came closest to it but even he was unable to make the decisive break.

This gradual secularisation of philosophy prepared the way for the divorce of epistemology and metaphysics. The union of theology and philosophy had given metaphysics a special role in philosophy. The union was based on an ontological division of reality into a realm of nature and a realm of supernature (grace) with philosophy authorita-

tive in the realm of nature and theology in the realm of supernature. In this scheme, whatever degree of autonomy might be ascribed to philosophy in the realm of nature, the realm of supernature was the primary realm of ultimate reality that determined the nature of things in the realm of nature. No philosophical understanding of nature could be true, therefore, if it was not in harmony with theology, the science of supernature.

In this situation, metaphysics, regarded as the philosophical discipline dealing with realities beyond nature, had a crucial role as the interface between philosophy and theology. Epistemology, therefore, was expected to take metaphysical specifications of nature and its relation with supernature as fundamental givens.

Ockham's empiricism, though it weakened the epistemological relation between nature and supernature, was no exception as regards the metaphysical dependence of epistemology. Ockham's empiricist epistemology depended on his voluntarist metaphysics.

For Thomas Aquinas the realm of nature was a realm of necessary rational order because it is an actualisation in time of the eternal forms of the Divine Intellect. The metaphysics specifies that true knowledge of nature will be the replication in thought of a fixed rational order.

Ockham did not meet this by declaring the metaphysics irrelevant for knowledge of nature. He could not do so while maintaining, as he certainly wished to do, the inseparability of theology and philosophy. Christian theology demanded that nature be regarded as the creation of a supernatural God with its constitution determined by this creational relationship. Ockham could establish his empiricist epistemology of nature, therefore, only by displacing the Thomist metaphysics with a metaphysical scheme congenial to his empiricist epistemology, yet still attempting to preserve a harmony between the metaphysics and

Christian theology.

The establishment of philosophy as an autonomous discipline entirely independent of theology removed the requirement of a metaphysical foundation for epistemology as a bridge between nature and supernature. It did not make it illegitimate to continue to provide such a foundation but it opened the possibility of an epistemology without such foundations. The autonomy of philosophy implied the autonomy of nature in relation to supernature, opening the possibility of the abolition of supernature; the two realms are, in principle, isolated from each other. It is possible, in principle, to know nature without any reference beyond nature.

That philosophers continued to give metaphysical foundations to their epistemologies was not due to any logical constraint but to the continuing belief in a supernatural - or supra-natural - realm as the ultimate reality that gives shape and meaning to the realm of nature. Only as that belief weakened so that nature came to be seen more and more as self-explanatory could a metaphysical foundation for epistemology beyond nature be abandoned. In this process the contribution of Immanuel Kant, which is essential background for the present study, is an important milestone.

1.5.8 Knowing as Rational Formation

Until Kant it had been generally assumed that knowledge gives a true account of a reality that exists independently of our experiencing it. The differences had revolved around questions about the nature of that reality and the manner of our cognitive access to it.

Kant (1933:283) criticised both the empiricist approach to epistemology - represented by Locke - and the intellectualist approach - represented by Leibniz - as distorting reductionisms. In the one case all concepts are sensualised while in the other case all percepts are intellectualised. In each case it is mistakenly assumed that the

sensualised concepts or the intellectualised percepts, respectively, correspond to a reality independent of the subject - things in themselves.

Kant, who undoubtedly saw himself as the great reconciler bringing together in one coherent system all the conflicting elements in the rationalist tradition of philosophy, insisted that true knowledge could result only from the conjunction of understanding and the senses. In achieving this conjunction he asserted that the known is not any reality that exists independently of the knowing subject but is itself a construction of the subject.

On the one hand, the empiricist is right in asserting that knowledge begins with experience but is wrong in regarding experience as the registration in the mind of data given by the senses. On the other hand, the intellectualist is right in asserting that sensory experience is shaped by a priori concepts of the mind but wrong in regarding these concepts as having any correlate external to the mind. The experience in which knowledge begins is the experience of a world constructed by the subject as the matter supplied by the senses is given form by the a priori concepts of the understanding.

Without the senses there is no experience, only a priori concepts as the empty forms of possible experience. On the other hand, the senses without the a priori concepts of understanding do not furnish experience but only indeterminate - and indeterminable - series of disconnected sensations that provide no basis for knowledge. Whatever reality there may be outside this world of experience - the thing in itself - is unknowable; the knowable is the world of experience that is constructed by the interaction in the subject of understanding and the senses (See especially Kant, 1933:41,42,127,143-162,266-270).

Kant has no intention of abandoning or downgrading metaphysics. In the preface to the second edition of his *CRITIQUE OF PURE REASON* he

tells us (1933:37) that he must reserve the little time left to him for the development of the metaphysics which he clearly regards as the pinnacle of his life's work. However, he isolated epistemology from metaphysics by denying all knowable connection between nature, as the sensible realm of the knowable, and supernature as the supersensible unknowable realm of ultimate realities.

Whatever ultimate, metaphysical realities there may be are epistemologically irrelevant. They have nothing to do with the order of nature, which is the sensible realm of the knowable. That order is given in the immanent categories of the understanding. We need look no further than the immanent structure of human understanding for possibility and necessity in nature (See especially Kant, 1933:147-173).

Metaphysics no longer deals with realities that are the ultimate source of order and meaning in nature. It deals with realities that are wholly beyond nature and so beyond knowing; realities of whose existence there can be no universal certainty but only a personal moral conviction that rests on wholly subjective grounds. "I must not even say, 'It is morally certain that there is a God, etc.' but 'I am morally certain, etc.'" (Kant, 1933:650) See also Kant, 1928:8-14; 1933:467-479, 528.

In the context of the present study Kant is also significant for the way in which he differentiated philosophy from the natural sciences. Only the material sciences yield empirical knowledge. Philosophy as such is not an empirical discipline but is a discipline of pure reason concerned with transcendental critique that identifies the a priori conditions of knowledge together with metaphysics that deals with those rational Ideas of an ultimate reality that, transcending experience, is in itself unknowable.

Kant follows clearly in the rationalist tradition, which, since the Hellenistic period, had ascribed to human rationality an innate struc-

ture in accordance with which knowledge is organised. However, prior to Kant this innate structure of thought had been regarded as reflecting the structure of reality that exists independently of thought. Kant decisively severed all connection between the structure of thought and any independent reality. It is thought that gives structure to experiential reality in accordance with its own innate structure that has no reference beyond itself

The Kantian answer to the question of the fit between knowledge claims and the experiential universe, therefore, is that knowledge claims must pass two fundamental tests: they must conform to the order of rational thought and they must have a content supplied from the senses. A claim to knowledge that has no sensory reference is false; it may be thought but it is not knowledge. Equally a claim to knowledge that does not correspond to the rational order of the innate structure of thought is false; it may be sensation but it is not knowledge. In neither case does the knowledge claim answer satisfactorily to experience since experience is the conjunction of sensation and the a priori structure of thought.

The Kantian epistemology finds intersubjective universality in the a priori character of human thought; the universal a priori structure of the mind furnishes the universal and necessary structure of knowledge. The inductive procedure by which Hume tried to establish an intersubjective universality could yield no more than generalisations with assumed universality leading to the scepticism to which it led Hume. It is the a priori structure of human rationality that alone gives a true universality to knowledge (See Kant, 1933:44,127,128).

Finally, Kant makes the knowing subject central to his epistemology. From the formation of the experience in which knowledge is initially given to its most complex formulations the subject is the authoritative constructor of knowledge. The rational subject is autonomous in

the most absolute sense. Previously human rationality was regarded as answering, in its cognitive activity, to a rational order beyond itself. With Kant it answers to nothing but itself.

1.5.9 The Renewal of Empiricism

With the scepticism of Hume, and the rise of Kantian intellectualism, empiricism seemed to have become lost in a dead-end. Yet within less than a century of the appearance of Hume's "Treatise of Human Nature" there was a renewal of empiricism as a major philosophical force.

Whatever the appeal in Kant's idealism, it is a major obstacle to its general acceptance that it requires the total rejection of common sense realism. By common sense realism I mean the common sense view that our sensory experiences give us access to a real world of objects external to ourselves in a direct relationship such that our sensory experiences give us at least some reliable information about that world. While many of us will be ready to listen to argument to the effect that this common sense view needs to be modified few of us are ready to accept that it should be rejected as totally false. Yet this is just what Kantian epistemology requires of us.

It is not surprising, then, that the 19th century saw a renewal of empiricism in the form of positivism, a development inseparable from the name of Auguste Comte. The Comtean philosophy is by no means characterised by a total disjunction with the Kantian. There are important disjunctions but there is also important continuity.

In particular there is continuity in the view that empirical knowledge is scientific knowledge, that science is self-accrediting and that epistemology as the theory of this self-accrediting science is independent of metaphysics. In the latter respect, indeed, Comte (1975:Vol.1,20-41) went further than Kant by assigning metaphysics a transitional function in human intellectual development that is discarded by those who attain intellectual maturity. Kant isolated meta-

physics from knowledge but continued to give it an important place in his philosophy; Comte abolished metaphysics as something that, like alchemy and astrology, had outlived its usefulness and henceforth could only be a hindrance to human progress.

The decisive beginning of this age of maturing in human history, when men made the decisive turn away from metaphysics toward the positive knowledge of science, Comte (1975:Vol.1,27,39) associates with three main figures, Bacon, Galileo and Descartes. The inclusion of Descartes is interesting in view of the empirical character of Comte's positivism since not only was Descartes not an empiricist but he developed a philosophy with a decidedly metaphysical character. The affinity no doubt lies in Descartes' emphasis on science together with his strong mathematical orientation; for Comte "mathematical analysis is the true rational foundation of the entire system of our positive knowledge. It constitutes the first and most perfect of all the fundamental sciences" (Comte,1975:Vol.I, 76).

Comte's vision was grand and comprehensive. The sciences understood as the purest source of knowledge, independent of both theological and metaphysical considerations, would not only provide the only possible universal truth with regard to every area of human experience but would provide the basis for a restructuring of society, including education, that would effectively end the revolutionary crisis that "is distressing the civilised nations" (Comte,1975:Vol.I,38,39). This could be achieved, however, only if the sciences were co-ordinated by a general science which, initially at least, was to be the role of positive philosophy (Comte,1975:Vol.I,33).

It would take us too far beyond the present purpose to explore in any detail the extent to which the socio-political circumstances of the time influenced both the development of Comte's philosophy and the ready reception that it received in European thought. Certain it is

that he developed and published his ideas in the period of socio-political turmoil in Europe that followed the French Revolution.

It is also beyond question that the major intellectual forces behind that Revolution, in which Voltaire and Rousseau are key figures, had placed a low value on science, pinning their hopes rather on a human freedom that transcends science. It would not be surprising in this situation if disillusionment with the experience of this revolutionary movement generated a powerful movement toward science as the answer to the problems of mankind. Freedom having brought horror and instability, science might be expected to bring the desired peace and harmony.

However this may be, Comte's positivism represented not only the decisive naturalisation of philosophy, and, indeed, of the whole of human life, but also a decisive endorsement of science as both the one authentic knowledge and the one authentic source of norms for human action. In this last respect Comte stands in sharp contrast to Kant who maintained that normative direction for human action comes from practical reason that transcends the cognitive domain of science. After the long centuries during which Western thought had been dominated by the nature/supernature duality, Comte reduced all human experience to the realm of nature enabling him to postulate the natural sciences, together with human and social sciences modelled on them, as the comprehensive key to both knowledge and practice.

Comte's positivism did not achieve the lasting world conquest that his historical determinism led him to predict so confidently and his view of science appears naive today. Nevertheless he must stand with Kant as one of the two most decisive influences in the shaping not only of modern philosophy but also of much popular thought.

More specifically in relation to the present study Comte re-established the empiricist position that knowledge is given through the observation of the senses processed by the rational subject. Follo-

wing in the rationalist tradition, the rational processing is crucial to Comte's empiricism. The senses provide raw data which must be rationally processed by the subject in order to yield knowledge.

Comte continues in this tradition but now it is the scientific method that constitutes this rational processing. The scientific method renounces all search for absolute notions, inner causes of phenomena and answers to ultimate cosmological questions. It restricts itself to the observed facts in order to discover, by the combined use of reasoning and observation, their effective laws. These laws are not ultimate causes but simply the invariable relations between phenomena as experienced (Comte, 1975: Vol. I, 21, 22).

Though Comte often uses the term "phenomena" (phenomènes) he does so without any suggestion of the Kantian distinction of phenomena and noumena. On the other hand, he certainly does not think of the phenomena as giving access to knowledge of the things in themselves. The idea of the thing in itself is one of the illusory ideas of metaphysics that has no place in positive philosophy and science. For Kant the thing in itself is an ultimate reality of which we can have an idea but not knowledge. For Comte it is nothing but a metaphysical illusion. Positive knowledge simply accepts the phenomena as given since to ask anything about them other than this givenness can only lead back into the illusions of metaphysics.

The rational scientific method is also important in determining what counts as cognitive data. Not everything that we observe with the senses qualifies as cognitive data. Only the facts that result from the systematic observations of science qualify as cognitive data. The heart of the Comtean epistemology is a scientific methodology that ensures the universal truth value of scientific data that alone qualify as facts constituting cognitive data. According to Comte all scientific knowledge is founded in mathematical analysis and is devel-

oped in the empirical sciences by the experimental method. This experimental method consists in removing objects from their natural circumstances to place them in artificial conditions that are instituted for the express purpose of facilitating the examination of the phenomena from a specified point of view (Comte, 1975:Vol.I,447). In other words it is observation within a carefully controlled environment.

Comte's positivism, therefore, in distinction from the empiricism of Stoicism, is a scientific empiricism. Only sensible data secured by the specified scientific method constitutes cognitive data.

In the end knowledge, for Comte, is nothing but the results of the combination of mathematical analysis with observations obtained within the controlled experimental environment (Comte, 1975:Vol.I,76-78,446-449). All knowledge is, in the end, a matter of unquestionable factuality, and scientific theories are nothing but so many large-scale logical facts (*autant de grands faits logiques*) (Comte, 1975:Vol.I,33).

It is important for the present study to note that Comte anchored his empiricist epistemology in an historical determinism. That the human intellect should move from a primitive theological perception to a mature positive knowledge by means of a transitional metaphysical stage is a matter of universal historical necessity. The progress does not proceed at a uniform rate in all areas of experience but always and everywhere it follows an inevitable and necessary order (Comte, 1975:Vol.I,27).

This universal historical necessity in the intellectual progress of the race is replicated in the intellectual development of the individual. All knowledge is given in observation but, on the other hand, we can know nothing unless we have a theory by means of which we read our observations. Theories, then, cannot be the product of theory-free observations since all rational observation depends on a pre-existent theory. The most primitive theories in terms of which we make our most

primitive observations, both individually and as a race, are spontaneous theological conceptions. Without these we could know nothing. Yet, by an inexorable historical necessity we move from these primitive theological theories through the transitional stage of metaphysical theories to the ultimate intellectual maturity in which all our theories are positive (scientific) theories of pure factuality (Comte, 1975:Vol.I,21-25).

Although Comte renounced all search for transcendent realities beyond nature, in the Platonic tradition, and all search for inner realities within nature, in the Aristotelian and Stoic traditions, he rejected, as decisively as any, the reality of the common sense world of everyday sensory observation. The real world behind the world of commonsense observation is a world ordered by invariant laws that are identified by the mathematical/experimental method of science. He denied the existence of any cosmic order accessible to human thought by which scientific knowledge can be unified. He held that each class of events has its own specific laws that are united in scientific knowledge only by the common method that establishes them and their common tendency toward the one essential destiny in subordination to the same general evolution (Comte,1975:Vol.II,772).

In Comte's positivism, then, knowledge fits the reality of the experiential universe by identifying invariant relationships between the phenomena of that universe - mathematically founded laws yielded by the scientific method - that underly the world of common sense experience. The appropriate testing of knowledge claims is by mathematical analysis supported by experimental observation.

Intersubjective universality is secured by a determinism that rigorously excludes the knowing subject from any formative role in cognition. The subject does no more than register knowledge; whatever deficiencies and flaws there are in human knowledge are due to the

disturbance of non-cognitive, subjective factors that distort the registration. In the positive knowledge of science these distortions are filtered out by the systematic exclusion from cognition of all factors other than the controlled observations of the experimental method ensuring an intersubjective concurrence in observation and mathematical analysis that has the character of universal necessity. Progress to this pure state of positive knowledge is assured by historical necessity.

Finally, whereas Kant founded the objectivity of knowledge in the universal structure of thought in a subject that actively forms knowledge, Comte endeavoured to secure it by reducing the cognitive activity of the subject to the registration of facts in accordance with a universal determining necessity.

1.5.10 Epistemology as Logical Analysis of Language

Without doubt the dominant form of philosophy in the Anglo-Saxon world during the first half of the twentieth century has been that somewhat diverse, yet clearly identifiable, movement best described as analytical philosophy. The practice sometimes followed of calling this kind of philosophy "Logical Positivism" or "Logical Empiricism" is unsatisfactory because, as A.J. Ayer (1959:3) points out, it blurs a distinction within analytical philosophy which the philosophers concerned generally regard as significant.

Stumpf (1971:437) describes the common factor that unifies all analytical philosophers, from Russell and Moore to Ayer, Wittgenstein and Ryle, as "their agreement concerning the central task of philosophy. The task of philosophy, they say, is to clarify the meaning of language". Wittgenstein (1958:47) states this thesis clearly when he asserts that philosophical problems "are, of course, not empirical problems; they are solved rather by looking into the workings of our language ... Philosophy is a battle against the bewitchment of our

intelligence by means of language".

Analytical philosophy does not appear to have developed as a direct continuation of Comtean positivism. It seems to have developed first in Britain as a reaction to an often obscure neo-Hegelian metaphysics in an attempt to bring philosophy down to earth (Stumpf,1971:437). And, although Ayer (1959:4) includes Comte among those whom the Vienna Circle - the original Logical Positivists of analytical philosophy - regarded as their main precursors there are few references to Comte in their writings. Hume, whom Comte largely ignored, figures much more prominently in the writings of analytical philosophers than does Comte.

Nevertheless there is a clear affinity between analytical philosophy and Comte's positivism. There seems little doubt that analytical philosophy grew out of a philosophical environment that, whether directly or indirectly, had been significantly shaped by Comtean positivism. There is the same empiricist assumption that all knowledge originates in sensory experience, there is a similar mistrust of metaphysics, and there is the same confidence in inductive procedures.

The degree of this affinity varies but is clearest in the case of Logical Positivism. Since this is the version of analytical philosophy that is most significant as background to the present study the following discussion will concentrate on it.

While Logical Positivism was developed by the Vienna Circle who saw themselves as developing a Viennese tradition (Ayer,1959:4) its links with Anglo-Saxon analytical philosophy are undeniable. In the first place, in its development it received significant stimulus from British analytical philosophy and particularly the Cambridge school. Russell and Wittgenstein were especially influential. Bergmann (1967:1,2) argues that Logical Positivism is the result of interaction between the Cambridge School of Analysis and the Vienna Circle. In the

second place, the work of the Vienna Circle was fed back into the English-speaking world where it found its most congenial philosophical climate and where it had its strongest influence; an influence that was for a time overwhelming in the philosophy of science.

Through Ernest Mach, who was something of a founding father, or rather grandfather, of the Circle, the Vienna Circle appears to have had more direct links with positivism than did early British analytical philosophy (Hanfling, 1981:6). Certainly the affinity with Comtean positivism is pronounced in the writings of the members of the Circle.

There is the same emphatic rejection of metaphysics. Carnap (1959) not only argues forcefully that all metaphysical statements are meaningless but uses a very Comtean-like scheme to explain the prevalence of metaphysics in the history of human thought. He suggests that we may regard metaphysics as a "substitute for theology on the level of systematic, conceptual thinking" replacing the transcendent sources of knowledge of theology "by natural, yet supposedly trans-empirical sources of knowledge".

Along with this there is the typical positivist respect for the scientific method as the sole source of truth. It is undoubtedly this feature of Logical Positivism that made it so attractive to analytical philosophers of science. Philosophy and science belong together, with philosophy clarifying the meaning of scientific statements and science establishing their truth. Philosophy is an activity distinct from science but there is no domain of philosophical truth, no set of philosophical statements, distinct from the truths and statements of science; "the philosophical activity of giving meaning is ... the Alpha and Omega of all scientific knowledge" (Schlick, 1959:56,57).

Neurath (1959:283), perhaps even more strongly, argues that the philosophical task of the clarification of the meaning of concepts is inseparable from the scientific method. The full title of the Vienna

Circle which Neurath gives in this essay itself speaks volumes - the "Vienna Circle for the Dissemination of the Scientific World Outlook (Weltauffassung)".

Carnap's footnote (1959:80) in his essay on the elimination of metaphysics provides a concise statement of the position of Logical Positivism in relation to Comtean positivism in these two respects. He explains that he uses the term "metaphysics" in the usual European sense to mean "the field of alleged knowledge of the essence of things which transcends the realm of empirically founded, inductive science" but that "it does not include endeavours towards a synthesis and generalisation of the results of the various sciences". This closely parallels Comte's statements both about what he is rejecting when he rejects metaphysics and the synthesis that he expects his new positive philosophy to achieve (Comte, 1975: Vol. I, 21-41).

Yet Logical Positivism differs from Comtean positivism in at least two important respects. Firstly, it does not take over Comte's historical determinism. Perhaps this retained too much of a metaphysical flavour to suit the tastes of the Circle. Secondly, it took a different view of the nature of the scientific method and of the relation between philosophy and science, a view suggested by its qualification as "Logical" Positivism.

Comte had seen the scientific method as a combination of mathematical analysis and experimental observation. Logical Positivism did not reject these components but added to them the "logical analysis of the statements and concepts of empirical science" as an essential ingredient that supplies "both the foundation and the apex of the edifice of science" (Carnap, 1959a: 133; Schlick, 1959: 57). In this respect it could be regarded as enlarging and refining rather than displacing Comte's conception of the scientific method.

In Logical Positivism the role of Queen of the Sciences, that had

once been assigned to theology, is taken over by philosophy (Schlick,1959:56). It can fulfil this role without being any threat to the sciences because, although not itself a science it has adopted "a new, scientific method of philosophising" (Carnap,1959a:133). Philosophy is restricted to narrower limits than ever before; it is now nothing but the logical analysis of language. On the other hand the dependence of science on philosophy for the clarification of its concepts, a clarification essential to its progress and, indeed, its very existence, gives philosophy unsurpassed authority in the cognitive domain (Schlick,1959:57-58).

The cornerstone of Logical Positivism was its verification principle that the meaning of a proposition is its method of verification - where verification means empirical verification. It is on the basis of this principle that metaphysical statements were held to be cognitively meaningless; they could not be verified within the specified understanding of verification. Logical Positivists experienced difficulty in arriving at an adequate formulation of the method of verification but, as Ayer (1959:14) observes "the employment of the principle did not wait upon its proper formulation; its general purpose was held to be sufficiently clear". In the process of its use philosophy was swept clear not only of more obvious metaphysical questions but "of most of the perennial problems of philosophy".

An important consequence was the reduction of epistemology to a logical methodology or, as Carnap (1959a:133) put it, applied logic. All empirical considerations are, in principle, excluded; epistemology is concerned only with the logical conditions of empirical science.

The method of verification is Logical Positivism's prescribed test for a fit between knowledge claims and the experiential universe. The universal validity of the logic of that method is the guarantee of intersubjective universality. In these respects it is a characteris-

tically modern form of rationalism.

Yet, it retains the fundamental approach to the role of the knowing subject that has characterised empiricist epistemologies since the Stoics. The subject registers and processes sensory data in accordance with a universal rationality. In contrast to Kantian epistemology the subject has no formative role but processes data according to the rules of a universal rationality. The way in which this universal rationality is seen differs significantly from earlier varieties of empiricism but the role of the subject remains substantially the same.

1.5.11 The Development of a Constructivist Epistemology

Although philosophers in the English-speaking world have tended to act as though the analytical method is the only respectable way to philosophise in the twentieth century, it had little impact outside the English-speaking world and, to a lesser extent, Scandinavia (Ayer, 1959:7). Although the Vienna Circle has an important place in the development of the analytical tradition it was, in itself, an isolated and short-lived enclave in continental Europe whose main impact was felt in the English-speaking world.

At the same time that the analytical method was developing as epistemological orthodoxy in English-speaking philosophy, a quite different approach was being developed in French-speaking philosophy. The beginnings of this development can be traced to the distinguished French mathematician/philosopher, A.A. Cournot (1801-77), a contemporary of Comte. It came to its full development in the work of Léon Brunschvicg who was a major formative influence in the intellectual development of Jean Piaget.

Deschoux (1964:222) lists Brunschvicg, with Bergson and Blondel, as one of the three figures dominating 20th century French thought until the Second World War. Brunschvicg developed an epistemology that, following Kant, regarded knowledge, and the experience in which know-

ledge originates, as the construction of the subject. At the same time the epistemology he developed differs from Kant in too many fundamental respects to be classified as either Kantian or neo-Kantian. Deschoux (1964:210) describes him as both more "critical" than Kant and more "positive" than Comte.

In relation to Kant Brunschvicg rejected the notion of a fixed a priori structure of thought. He regarded this feature of Kantian philosophy as an aberration in the authentic tradition of intellectualism represented by Leibnitz and especially Spinoza. He saw himself as resuming this authentic tradition after the Kantian and neo-Kantian deviation (Brunschvicg, 1951-8:Vol.3, 86, 87).

For Brunschvicg human thought has no a priori structure but creates its own structures in interaction with the natural world. It structures all human experience, not according to any predetermined structure but according to structures that it constructs as it goes in interaction with nature. Totally rejecting all static views of reason and of nature he regarded reason and nature as two moments of the same activity; reason and experience are not two distinct, fixed categories but each is simply the extension of the other, two interdependent faces of a single growth ("deux faces solidaire d'une croissance unique") (Brunschvicg, 1951-8:Vol.2, 65, 66; Vol.3, 71, 72).

Action, or rather interaction, is the key to Brunschvicg's intellectualist epistemology. There is neither nature in itself nor mind in itself but only the two in interaction (Brunschvicg, 1951-8:Vol.2, 65, 66). This is illustrated clearly in his view of the origin of the concept of number which, he argues, is neither to be found in a logical concept nor in an a priori form but in an act of thought in which experience and reason, both understood as activities, concur. The "act of relation precedes the function of the concept" (Brunschvicg, 1951-8:Vol.3, 85, 100, 101, 121).

He also rejected the Kantian noumenal realm of things in themselves. For us only the knowable exists. "Beyond this there is nothing; a thing that was beyond knowledge would be by definition the inaccessible, the indeterminable, which is to say that it is, for us, equivalent to the nothing" (Brunschvicg, 1951-8:Vol.2,68). Given that, for Brunschvicg the world of the knowable is the world of science, the affinity with positivism is apparent. The unknowable Kantian Idea transcending experience is metaphysical nonsense. The world of experience accessible to science is for us the only world there is (Brunschvicg, 1964:2).

Where Kant made room for a rationally ordered science and a creative human freedom by specifying separate realms peculiar to each Brunschvicg brought them together in one realm governed, even created, by a constructive rationality. In the Brunschvicgian world there are neither eternal truths of reason nor invariant laws of nature. In that sense we are wholly free. On the other hand, this free rationality in creating its own norms to which all experience and knowledge conform acts according to a universal law of unity internal to all thought. In this sense we live in a rationally ordered world the universal ordering principle of which is internal to the intellect of the knowing subject (Brunschvicg, 1964:235-237; Deschoux, 1964:212-214).

Emerging science is not enclosed as Comte, and before him Kant, wished, in the forms of science as already established. The constitution of these forms reveals a primitive dynamism the force of which continues in the synthetic generation of more and more complicated notions (Brunschvicg, 1981:567).

This conception of a dynamically ordering rationality led Brunschvicg to adopt what came to be known as the historico-critical method as the key method of epistemological investigation. A rationality such as Brunschvicg proposed could only reveal itself in history as the

field of ongoing interaction of reason and nature. The philosopher, then, must "make history his laboratory" since rationality cannot be known in any other way than by its activity in history (Deschoux, 1964: 214). Any attempt at atemporal definition will be futile.

While superficially this stress on history suggests the influence of Comte, on closer examination there are marked differences. Comte's historical determinism is closely linked to the empiricism that is basic to his positivism. In positive science the subject registers information about the object world as it is in its positive factuality because the subject possesses a rational framework that reflects the positive rationality of the object world. An historical necessity determines the progress from the primitive condition in which the world is perceived through a distorting framework to the state of all-embracing positive science which is the definitive human condition. Epistemology must be based on the study of positive science, as definitive knowledge, not on the study of history which does no more than provide positive evidence for the definitive character of positive science.

For Brunshvicg, on the other hand, there is no ultimately definitive human condition. History leads to no definitive state. What is definitive of the human condition, and of knowledge, is the activity of the rational intellect in interaction with nature. That activity is not being led by any historical necessity, as in Comte, to a definitive state, but is itself continually defining both history and itself in an indefinite process of development (Brunshvicg, 1951-8: Vol. 2, 67; Deschoux, 1964: 210, 214). Epistemology, therefore, cannot be based on the study of positive science in its present actuality since this is not definitive but only the immediately present definition that the defining rational intellect gives to knowledge. Epistemology can only be based on the study of intellectual history in which the

rationality that defines knowledge actively reveals itself.

Brunschvicg faults both Kant and Comte for having attempted to prescribe a definitive form or method of science. Philosophy, he argues, cannot enclose science within its systems since all philosophical systems are tied to the progress of science (Brunschvicg, 1981: 302-304).

For Brunschvicg as for Comte history is significant for epistemology but they take fundamentally opposing positions on the nature of history's epistemological significance. This opposition is directly related to the empiricist and intellectualist positions that they respectively adopted. In spite of the strong emphasis on historical studies, "historicism" is not appropriate as a description of Brunschvicg's epistemology. More appropriate is the classification "intellectualism" that he himself liked to use to describe his position. It is the rational intellect as ordering activity acting according to a universal law internal to itself that determines all things in human experience, including history.

Yet, although he wishes to avoid the Kantian deviation and maintain the "pure" intellectualism of Leibnitz and Spinoza, his intellectualism is decidedly influenced by the Kantian revolution. Even more decisively than Kant, if possible, he places the actively constructing, autonomous subject at the very heart of his epistemology.

This leads him to an intellectualist rationalism with a universal dynamic principle of constructive unity internal to the intellect as self-authenticating, autonomous authority. The autonomous rational authority is neither a Kantian a priori conceptual structure nor a Comtean a priori method, but is a dynamic principle of constructive activity. This ensures an inter-subjective unity of rationality that unites all rational minds at any given time and place. Though there is no supra-temporal rationality allowing us to define a rational order

once for all, individual knowing subjects are united by a universal law of action internal to thought that universally directs the constructive activity of cognition (Brunschvicg, 1964:236-238; Deschoux, 1964:212).

This underlines the importance of historico-critical studies in Brunschvicg's epistemology. While we may hope to identify the Kantian a priori structure of understanding equally well at any historical moment and will expect to identify positivism's a priori method only when historical development has reached the positive stage, the nature of Brunschvicg's rational directing principle can be uncovered only from studying intellectual activity throughout history.

There is a more decisive link between Comte and Brunschvicg in Brunschvicg's emphasis on science as positive knowledge whose truth is assured by its rational method of mathematical analysis applied to systematic, experimental observation (Deschoux, 1964:216.) However, whereas Comte's empiricism made mathematics a tool for the analysis of "facts", in the intellectualism of Brunschvicg mathematics is constitutive of knowledge. "The consideration of mathematics is fundamental to knowledge of the mind as it is to the natural sciences, and for the same reason: the free and fruitful action of thought dates from the time that mathematics furnishes man with the true norm of truth" (Brunschvicg, 1981:577). It is by mathematical analysis that nature is revealed to the mind and, at the same time, the mind's own intellectual capacity is revealed. (Brunschvicg, 1951-8:Vol.2, 65, 66).

This provides the demarcation criterion of science. Science is continuous with practical experience in that both are governed by the interaction of mind and nature that continually constructs experience. What distinguishes science is the use of systematic tests, a mathematical procedure of verification (*une règle de vérification*), that enables us to test systematically the results of this activity (Brun-

schvicg, 1951-8: Vol. 3, 71, 72, 86, 99, 100).

At first glance it is tempting to draw a parallel between this conception and the verification principle of Logical Positivism. On closer examination it becomes evident that the two conceptions are very different. In accordance with the empiricist character of Logical Positivism its verification principle held that the truth of an empirical statement is established by an appropriate logical connection between the statement and sensory observation; sensory observation is the ultimate locus of truth against which empirical propositions are to be tested. This gave to the verification an underlying dependence on inductive logic that became the focal point of Popper's attacks.

For Brunschvicg, on the other hand, the locus of truth is the activity of the rational intellect, with a strong emphasis on its mathematical character, in its interaction with nature. Verification, for him therefore, is the use of systematic tests that thought prescribes for itself as a check on its own activity. It does not establish the truth of statements by their logical relation with observations of a reality independent of thought; it prescribes inter-subjective rational tests that ensure the intersubjective universality of knowledge, tests that are never mere observations since they arise from the universal temporal intersubjectivity of rationality itself. There is no trace of reliance on inductive logic in Brunschvicg's verification; it is a deductive procedure for the systematic rational checking of the activity of rationality, an "internal audit" of rationality.

To ask whether such tests are logical or empirical - as the philosopher nurtured in the 20th century English-speaking philosophical world will be apt to do - is to ask a meaningless question for Brunschvicg. In the very nature of things they must be at once logical and empirical. There is no logic except in empirical interaction with nature and there is no experience of nature apart from the logical ordering of

reason.

It is also worth noting, especially in relation to Popper's falsificationism, that Brunshvicg gives considerable emphasis to the detection of errors as the purpose of verification. Brunshvicg's verification is certainly not Popperian falsificationism under a different, and misleading name, but neither is it the verificationism of Logical Positivism.

In brief, the epistemology developed by Brunshvicg and which had significant impact on the French-speaking world in the first half of this century, founds the intersubjective universality of knowledge in the rationality of human thought as a constructive rationality governed by a universal dynamic law internal to thought.

The fit between knowledge and experience is assured because the same intersubjective rationality that yields knowledge is also formative of the experiential universe. The tests for this are the systematic methods of verification that this rationality prescribes for itself.

In sharp contrast to the passivity of the knowing subject of Logical Positivism, and, indeed, of analytical philosophy in general, Brunshvicg's knowing subject is the epistemological key since knowledge is the construction of this subject acting wholly by a law internal to itself. With Brunshvicg the knowing subject has absolute autonomy.

1.6 PIAGET, POPPER AND POLANYI - CONVERGENCE AND A NEW DIVERGENCE

In Brunshvicgian intellectualism on the one hand and analytical philosophy on the other we have the two sharply divergent epistemological traditions that make it difficult for philosophers in the English-speaking world to understand - or even take seriously - Piagetian epistemology.

Brunshvicg, who was almost certainly the most important single influence in the formation of Piaget's basic epistemological position, represents a twentieth century development of the intellectualist

stream in rationalist epistemology. This stream is characterised throughout its history by the view that empirical knowledge originates in the intellectual apprehension of an intelligible reality that is normative for the empirical.

From Plato to Brunschvicg there was a steady and significant shift both in the location of this intelligible reality and in its character. Plato had identified the intelligible reality with an eternal realm of Ideas that transcends human thought. In its Hellenistic development the intelligible reality became identified with innate ideas in thought itself correlate with ideas in the divine intellect. With Kant it became an innate, self-contained rational structure of thought. With Brunschvicg the intelligible reality becomes wholly a construction of the subject functioning in accordance with a universal constructive principle internal to thought. Intelligible reality is neither transcendent reality nor innate reality but the product of the activity of the intellect governed by an innate law of action.

In the case of analytical philosophy we have the 20th century development of the empiricist stream that goes back to Stoicism. Again it is not Stoic but the major headwaters are to be found in the Stoic conception that knowledge is the conformity of thought to the world of sensory experience, a conformity that can be achieved only by the rational processing of sensory data. In analytical philosophy this crucial rational processing centres on the logical analysis of language, with a scientific emphasis in the case of Logical Positivism.

The third major epistemological approach of Greek/Hellenistic philosophy, the abstractive intellectualism of Aristotle, dropped out of the philosophical mainstream after the Reformation. Aristotle is still referred to with great respect and the name "Aristotelian" is used to describe a particular position such as Armstrong's Realism discussed earlier. However, it is an eclectic use of Aristotle in

which the distinctive heart of Aristotelian epistemology, the abstraction of the intelligible as the inner core of the sensible, is discarded. There is a disjunction of intelligible and sensible. Intelligibles become mental entities wholly internal to thought that are either a priori categories of thought or the products of thought.

In the heyday of Medieval Scholasticism Thomas Aquinas had been able to sustain an Aristotelian-type epistemology on the basis of an ontology of a material world of nature determined and pervaded by a supernatural intelligibility. Matter as such is indeterminate. It participates in determinate reality only through the activating presence of intelligible forms that are replicas of exemplar forms in the divine intellect. Knowing the material world, therefore, is a matter of abstracting these intelligible forms from the form-matter composites. (Some of the key passages of the *Summa Theologiae* in which Aquinas develops this are 5.3, 8.1, 14.8, 11, 15.1, 3, 44.2, 3, 45.1, 3, 75.4, 76.5, 79.3-8, 84.6, 85.1.)

The naturalisation of epistemology that began in the Renaissance period eroded the supernatural basis essential to this scheme. With Kant that basis is decisively abolished as the naturalisation process in epistemology is completed. As Brunschvicg observes (1981:566), the terms of the philosophical problem are changed so that "it is no longer God face to face with the universe but the human mind; it is no longer a matter of ascertaining a plan of transcendent creation but the conditions of scientific knowledge". The human mind takes the place that had belonged to the supernatural. The debate henceforth was not to be about the relation between supernatural and natural realms but between mental and physical realms.

In this situation the empiricist stream of epistemology was easy to maintain; knowledge results from the mind's rational processing of sensory impressions of the physical world. Equally readily, intellect-

ualist epistemologies of a "mentalist" type could be maintained; the qualification "mentalist" meaning that the immediate cognitive objects are mental categories with knowledge of the physical world originating with the mind. In the physicalist version of the empiricist stream the mental is reduced to the physical; in the more extreme versions of mentalist intellectualism the physical is epistemologically reduced to the mental.

With both the animistic conceptions of the Greek/Hellenistic world and the supernaturalistic conception of Christian scholasticism out of favour the abstractive intellectualism of Aristotle is left without a plausible basis. If the two categories with which we must work are the mental and the physical there is no room for an intelligible reality external to the mind without reintroducing an unacceptable supernaturalism, and hence no apparent basis for abstractive intellectualism. However, it becomes again a significant category when we come later to the detailed analysis of Piagetian epistemology.

If we adopt a Brunschvagian intellectualism then epistemology will necessarily focus on the rational activity of the knowing subject in which logical and empirical considerations are inseparably entwined; an inevitable consequence is that epistemology must be concerned with "psychological" questions concerning the nature of the thinking activity of the subject. Its primary concern cannot be knowledge as a product but must be knowing as a constructive activity. This, of course, is precisely the direction that Piaget took in developing his epistemology.

To the philosopher nurtured in the tradition of analytical philosophy this seems to result in a kind of bastardised hybrid in which the logical and empirical are hopelessly confused; hence Hamlyn's charge (1971:19,23) that Piaget is guilty of "a degree of incoherence" if not simply "a muddle" in his epistemology.

Such judgments beg the question. They assume the universal normativity of the philosophical conceptions of analytical philosophy which, on any view, represent only one segment of the philosophical world of thought. Piagetian epistemology is by no means immune from criticism but a charge of incoherent and muddled thinking such as Hamlyn makes is not justified. In terms of the Brunschvicgian intellectualism on which Piaget's work is in large measure founded it is not at all incoherent or muddled. On the contrary, viewed from that perspective Piaget (Piaget & Garcia, 1983:293) can argue, with good reason, that the epistemological endeavours arising from analytical philosophy, because they confine themselves to logical methodology, ignoring the activity of the subject, fail to address the real epistemological problems.

Of course, this is no more satisfactory than Hamlyn's charge about Piaget's incoherence. For philosophers in the analytical tradition the problems of logical methodology are the only epistemological questions. Constructive interaction between Piagetian epistemology and the mainstream of Anglo-Saxon philosophical epistemology will always be limited unless discussion can be shifted from these immediate epistemological differences to the underlying divergence in the philosophical traditions within which the epistemologies have been developed.

The divergence in the conception of epistemology discussed above undoubtedly separates Popper from Piaget. Educated in Vienna in the heyday of the Vienna Circle and then developing his academic career in the English-speaking world it is not surprising that he regards epistemology as logical methodology. The influence of Logical Positivism remains indelibly stamped on his work. At the same time he has moved away from this tradition in important respects in the direction of an intellectualism that leads to interesting convergences with Piaget.

First there is his view, central to his whole epistemology, that

scientific theories are conjectures, or guesses, of human subjects that are nothing but "our own inventions...our own self-made instruments of thought". The notion that observation is theory laden, is not, in itself, alien to the positivist tradition of course. It was basic to Comte's position. However, in the positivist tradition observation acts as a control on theories compelling a reshaping of theories to fit the facts of observation. Scientific theories, being based on systematic observations, are in accord with the facts. In making them nothing but self-made instruments of thought Popper breaks decisively with that tradition. He himself acknowledges that, in this respect, he is in agreement with the idealist (Popper,1972:117). He has replaced the classical empiricist notion of the subject as registering and processing sensory data with the notion of the subject as an active constructor of knowledge in the tradition of modern intellectualism exemplified by Kant.

Then there is his view of metaphysics to which, like Kant, he denies all cognitive value but which, unlike analytical philosophy and positivism in general and Logical Positivism in particular, he considers to be meaningful. He even argues that metaphysics may be a fruitful stimulus to scientific research programs providing a background to his own epistemology (Popper,1983:81,176,177,189-216).

Finally there is the World 3 hypothesis, with its strikingly Platonic overtones, on which Popper's view of objectivity rests. Unlike the Platonic Ideas Popper's World 3, of course, is not an eternal realm prior to all thought; it is a World generated by human thought. Yet, like the Platonic Ideas, it transcends all individual, and even all collective, thought, having an autonomy enabling it to generate ideas that no one has thought (Popper,1979:106-150). Popper's World 3 is a decidedly intellectualist conception.

Popper's epistemology is a determined attempt to save epistemologi-

cal rationalism from the crisis to which it has been brought in the English-speaking world by analytical philosophy, and particularly by the influence of Logical Positivism in the philosophy of science (see Popper, 1983:177). In the process, while retaining positivism's reduction of epistemology to scientific methodology, he makes a major shift away from the empiricism of positivism toward an intellectualist approach. Although he seems to think that he has simply fallen back to an Enlightenment position (Popper, 1983:177) his emphasis on the constructive role of the subject in cognition, is unmistakably post-Kantian in character.

Piaget and Popper represent major attempts to sustain a contemporary epistemology in the rationalist tradition. Their divergent backgrounds in Brunschvicgian intellectualism and the empiricism of analytical philosophy with its positivist background respectively results in significant divergence between their epistemologies. Yet each has created a distinctive epistemology that is not simply a reproduction of the philosophical background but carries the unmistakable marks of his own originality and, in the case of Popper, has brought a shift toward an intellectualism that converges in some respects at least with the intellectualist tradition in which Piaget worked.

In shifting the locus of rational authority to the rational judgment of the subject Popper may appear to have moved into irrationalism. This will be almost an inevitable conclusion if we limit rationalism to the two alternatives of a priori structure of thought as rational content or a priori method. However, as we have seen, Brunschvicg already opens up the third possibility of a self-authenticating, autonomous rationality governed neither by a priori content nor by a priori method but by a universal principle of acting. It is my contention, which will be developed further later in this study, that Popper's position is a rationalism of this type but with the important

qualification that the universal governing principle of Popperian rationality is a critical and not a constructive principle.

Michael Polanyi, on the other hand, is representative of the irrationalist trend that has arisen in English-speaking epistemology out of the crisis in rationalism. It should be stressed again that irrationalism is not an abandonment of rationality. This is something that the average irrationalist would not concede. What he is abandoning is not rationality but the notion of a self-authenticating rationality. Rationality, he argues, is necessarily founded in an extra-rational component of human experience as self-authenticating cognitive principle.

Polanyi is not the only important figure in this irrationalist movement nor necessarily the most important. And he is "representative" only in the broadest sense that he represents the movement to irrationalism within which a variety of other positions can be found.

He has been chosen as a comparative reference for the purpose of this study because, not only was he in the vanguard of the irrationalist movement in epistemology in the English speaking world but, unlike some other prominent figures in that movement, he has not concentrated his attention on issues specific to philosophy of science but has developed a broadly-based irrationalist epistemology though one that places a high value on science. Since this study is a study in epistemology understood in its broadest sense and not in philosophy of science per se Polanyi provides an eminently suitable comparative reference from within the irrationalist movement of English speaking epistemology.

Here also there is a shift of emphasis to the constructive activity of the knowing subject. In this respect the rationalism of Piaget and Popper converges with Polanyi's irrationalism. But beyond this there is an irreconcilable divergence concerning the locus of epistemic

authority in the subject. For Piaget and Popper, as rationalists, it is located in a self-authenticating rationality, in the first case as a constructive rationality and in the second as a critical rationality. For Polanyi, as an irrationalist, it is located in the extra-rational in which rationality is founded.

An important question to be considered before we conclude will be whether Piaget and/or Popper can save rationalist epistemology or whether some form of irrationalism must prevail. Or whether perhaps there is yet another alternative.

1.7 SUMMARY

This study aims to examine the epistemological contributions of Jean Piaget, with special reference to the role of the knowing subject, to compare this contribution with contemporary contributions in the English-speaking world, particularly those of Karl Popper and Michael Polanyi, and finally to evaluate these contributions critically while developing an alternative theory of knowledge.

In order to achieve these aims common problems have been identified that underly divergent problem formulations. This is of special importance because of the wide divergence between 20th century epistemological developments in the English-speaking world and the French-speaking tradition within which Piaget developed his theory.

The question of the role of the knowing subject in cognition is itself one such common underlying problem. The widely divergent formulations of epistemological problems in Piaget's epistemology, on the one hand, and his contemporaries in the English-speaking world, leading to different views on the nature of epistemology itself, is due, in a very large measure, to different approaches to this common problem.

Two subsidiary common problems are closely related to *this* central problem. The first is the problem of acceptable tests for a fit bet-

ween knowledge claims and the experiential universe; the second is the problem of the intersubjective universality of knowledge.

This study will be addressed, therefore, primarily to the problem of the role of the knowing subject in cognition together with the above two problems as subsidiary to this central problem. In addition, the development of epistemological discussion both in Piagetian epistemology and in contemporary philosophy in the English-speaking world raises two further problems that become significant for the present study: the problem of the relation, if any, between epistemology and metaphysics and the problem of the cognitive status of science.

An examination of the historical background has identified some typical answers, or approaches, to key epistemological problems that provide a framework for the comparative evaluation of contemporary epistemologies.

The Western philosophical tradition until the 20th century has been dominated by rationalist answers to epistemological questions. "Rationalist", in this context, embraces those views that, in one form or another, locate subjective authority in a universal, self-authenticating rationality. In its modern development, since Descartes, rationalism has been characterised by the ascription of autonomy, as well as universality and self-authentication, to this rational authority.

In this modern development three further sub-types of rationalism have been identified. One, represented by Kant, identifies autonomous rational authority with a universal a priori conceptual structure of thought. The second, represented by Comte, identifies the universal ordering principle of cognition with an a priori method accredited by autonomous rational authority. The third, represented by Brunshvicg and largely confined to the French-speaking world, identifies the universal ordering principle with with an a priori (innate) dynamic principle that governs the structuring activity of the subject's

thought; as a dynamic governing principle the a priori principle of Brunshvicg can be identified neither with a a priori conceptual content nor with an a priori method, but governs rationally the generation of both content and method by the subject's thought.

The 20th century has seen a decline in the influence of rationalist solutions with, on the one hand, a tendency, as illustrated in Popper's theory, to an attenuation of rationalist claims and, on the other hand, the rising influence of various types of irrationalism, as illustrated by Polanyi; understanding by "irrationalism" those views that locate the seat of cognitive authority in an extra-rational function of the knowing subject.

In this situation an important issue is the evaluation both of contemporary attempts to save rationalism, of which Piaget's epistemology is an important example, and of the possibilities offered by the rising tide of irrationalist alternatives.

A further important distinction arising from the historical survey is that between intellectualist and empiricist solutions to epistemological problems. It is a distinction that cuts across the rationalist/empiricist distinction. "Intellectualism" is used to distinguish those theories that take the primary cognitive objects to be intelligible objects of one kind or another while "empiricism" is used to distinguish theories that take primary cognitive objects to be empirical, or sensible, data. Intellectualism does not necessarily imply the exclusion of sensory experience from a role in cognition any more than empiricism rules out the cognitive use of the intellect; the distinction concerns what is taken to be the primary cognitive data.

Within intellectualism four sub-types have been noted. First there is a transcending intellectualism, associated with Plato, in which the subject apprehends intelligible objects by transcending the world of sensory experience. Then there is an abstractive intellectualism,

associated with Aristotle, in which the subject abstracts the intelligible objects from the sensible. Thirdly, there is an a priori intellectualism, represented by Kant, in which the intelligible data are given a priori in the subject's thought. Finally there is the constructivist intellectualism exemplified by Brunshvicg in which the intelligible data are wholly constructed by the subject's thought. Both the last two have a characteristically modern mentalist stamp.

Within empiricism note has been taken of only two sub-types. One is a sensationalist empiricism, associated with Stoicism, in which simple impressions resulting immediately from sensation constitute the cognitive data. The other, which we encounter in Comte and again in Logical Positivism, is a scientific empiricism in which only the sensible data obtained in accordance with a specified scientific method constitute cognitive data.

As with the rationalism/irrationalism distinction so in the case of the intellectualism/empiricism distinction no attempt has been made at an exhaustive analysis of sub-types. This is particularly true with respect to empiricism. Because each of the three 20th century epistemological contributions that provide the main focus of this study have an intellectualist character more attention has been paid to the development of the intellectualist tradition than the empiricist. In considering the empiricist tradition special attention has been paid to those forms of empiricism with which these three have interacted - or perhaps to which they have reacted - which have been predominantly of a scientific type.