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## Epistemology in western thought

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EPISTEMOLOGY IN WESTERN THOUGHT

Richard Harold Higgs

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## INTRODUCTION

This paper begins with a study of the philosophical thought preceding Platonism and Aristotlianism, in order that we might have a clearer understanding of the issues with which these two men dealt. It is essential for us to understand Platonism and Aristotlianism for two reasons: first, it is within the framework of the thought of these two men that succeeding philosophy has largely worked; secondly, if one understands the issues with which these men struggled, he will understand the issues with which modern philosophy deals. Therefore, some space in the paper has been allotted to the thought of these men.

The paper then moves quickly through medieval thought and nominalism to Galileo. From Galileo's thought the paper moves to Descartes, British empiricism, and then to Kant. The emphasis is given here to the conflict between the epistemology of science and the ontology which Galileo, Descartes, and his successors accepted. Their philosophy is seen as an attempt to provide a basis for science's epistemology in a world which was alien to it.

The paper then moves to its conclusion--the explication of the epistemology of science and the ontology which it implies. The basic assumption in this conclusion and in the paper as a whole is the close relationship between epistemology and ontology. By ontology I mean a theory of the nature of reality--those things which we perceive in sense perception and all things related to them. By epistemology I mean the theory of how we know reality.

### Presocratic Development

Western philosophy is said to have begun with the Melisians on the coast of Asia Minor. Ionian thought centered upon the search for an underlying, material principle which would unite the diversity of experience. Out of this search arose the western epistemological problem; for Anaximenes, in his answer to the problem of change of the one to many, commenced the issue of epistemology. The diversity of experience, so he declared, is based on a quantitative change of the one; therefore, a quantitative change of that which is causes a quantitative change in us. Experience is denied in order to solve the problem of change; we know in experience not what is (the one principle, undifferentiated), but the diversity of various things. To solve his ontological problem of change, Anaximenes, then, presented an epistemological answer. In preceding pre-socratic philosophy, this epistemological approach to the ontological problem of the one principle became even more important.

Heraclitus and Parmenides, following Anaximenes, attempted to establish again an underlying principle beneath experience. Both as An aximenes approached the problem in terms of epistemology. Heraclitus asserted that all things flow, that there is only change, and that the one is the process of change; hence, he denies our experience of permanence. Parmenides on the other hand, asserted that nothing changes, that change is an illusion, and that the one is this undivided, unchanging whole that never becomes; hence, he denies our experience of impermanence.

Here perhaps it would be good to analyze more closely some of the underlying assumptions in pre-socratic philosophy. Although the work of these philosophies is obscure and incomplete and their philosophies largely undeveloped, certain trends do stand out clearly. First, their acceptance of a concept (the principle of an underlying material unity) demonstrates their assumption that conception or reason can know what is, rather than can preception. For sense-experience is denied or confirmed as it agrees with their conception of the one material principle. Not only is conception set above preception, but conception is thought to be able to grasp what is, to know reality itself. This point for us to understand is difficult because of our emphasis on sense experience; but it is essential for us to understand this approach if we are to understand Greek philosophy.

Following the lead of the earlier philosophers mentioned above the pluralists, Empedocles and Anaragoras, sought for an understanding of the world. However, they rejected this conception of a material unity; rather, they posited the infinite number of different particularities. Although they modified their conception in terms of the diversity of experience, they did so chiefly because of logical reasons concerning change, not from a desire to be true to sense experience. Picking up this train of thought was the first school of philosophy which actually dealt with the problem of "what and how we know"--the Atomists. However, intervening between the pluralists and the Atomists is an extrememly important movement in philosophy--the Sophists.

Originally, this school was composed of learned men who dispersed their knowledge to students. Then the teachers gradually developed a sophistication of thought that ripped apart the old Greek poly-theism, scoffed at many of the social and ethical mores of the time, and repudiated previous philosophy as an illustration of the inability of man to know. Ethics, values, knowledge--these were all decried by the Sophists. Demonstrative of this movement is Gorgias' three pronged scepticism found in the Sextus. First, nothing exists: "if Being is everlasting, it is boundless; if boundless, it has no position (is nowhere); if without position, it does not exist." "Similarly, Being cannot be created, if it were, it must come from something, either Being (which would have to be created) or Non-being, which is impossible." Secondly if anything exists, it is uncomprehensible: "if the concepts of the mind are not realities, reality cannot be thought. . . ."

"Therefore reality is not the object of thought, and cannot be comprehended by it." Finally, the last point in Gorgias' scepticism is that if anything is comprehensible, it is uncommunicable: "We communicate not things which exist, but only speech; just as that which is seen cannot become that which is heard, so our speech cannot be equated with that which exists, since it is outside of us."

It was against the scepticism that Democritus and of atomism took over the position of the pluralists and developed it against the sophists' scepticism. Reality is composed of an infinite number of Parmenidean wholes--indivisible, undifferentiated, uncreated, indestructable; thus, atomism is a materialism whose

epistemology is mechanistic. Preception and conception is an interplay of the atoms; hence, we know not reality, but the effects of atoms, upon the atoms that compose our senses and mind

Sweet exists by convention, color exists by convention; atoms and void (alone) exist in reality. . . We know nothing accurately in reality, but (only) as it changes according to the bodily conditions, and the constitutuion of those things that flow upon (the body) and impinge upon it.

Therefore, we in conception and preception do not know reality (the atoms and the void in which they move); rather, we know the effects of atoms impinging upon the atoms of <sup>our</sup> senses and of our mind, creating images of the source from where the atoms came. The image I have of this pipe I am smoking is caused by atoms leaving the pipe, striking the atoms of my eye and causing a chain reaction back to my brain where the image of the pipe is produced. Although this position was the source of the modern atomism of Galileo and Descartes and of modern empiricism, let us not think that Democritus had left Greek rationalism:

"there are two sorts of knowledge, one genuine, one bastard (or obscure). To the latter belongs all the following: sight, hearing, smell, taste, touch. The real is separated from this." Thus, sense-preception in Democritus' thought is placed below the genuine knowledge--conception. However as Aristotle noted in de sensu "Democritus and the majority of natural philosophers who discuss preception are guilty of a great absurdity, for they represent all preception by touch." When atomism was revised by Galileo and Descartes, because of the greater emphasis on sense-experience from science, this representation of preception in terms of touch is of extreme importance.

Democritus and the atomists meet the sophist attack by agreeing with them: we know only our own mental states and not reality. However, our mental images are caused mechanistically and thus are somewhat representative of reality. Here, then, is represented one extreme of Greek philosophy--pluralistic atomism. Let us now turn to the other trend of development--Socratic -Platonism.

### Platonism

To understand this second conclusion of Greek philosophy reached in Platonism, one must first look at Socrates. Although Socratic thought cannot be sifted out of its platonic context, certain characteristics of Socratic thought can be ascertained through a study of Socrates' speeches in the Apology and the Socratic technique which runs throughout the dialogues.

First, Socrates definitely asserted the possibility of knowledge, although in searching for knowledge, he destroyed much of the presumed knowledge of his associates. Despite this sophistic analysis of knowledge, throughout the dialogues is displayed a Socrates searching for knowledge. The ten books of the Republic are a quest for a definition of justice. Although the substance of the Republic is probably Platonic, the quest for knowledge is Socratic indeed. Thus, the Socratic technique is one of continual discussion, in which one searches for knowledge. Since Socrates sought knowledge, he must have believed its existence.

Secondly, Socrates also affirmed the existence of values, again in opposition to the Sophists of his day such as Thrasymachos. In Book I of the Republic, Thrasymachos declares, "justice is nothing but the advantage of the stronger." The rest



of Book I consists in an examining and a refuting of the assertion by Socrates in a rather heated discussion with his fellow sophist, Thrasymachos. Even clearer in the Apology is Socrates' belief in the reality of values; for Socrates took death on his conviction of the moral nature of the universe.

No, gentleman, the difficult thing is not to escape death, I think, but to escape wickedness. . . . I fortell, gentlemen, my slayers, that a punishment will come upon you straight after my death, much harder I declare, than execution at your hands is to me; for now you have done this, thinking to shake yourselves free from giving account of your life, but it will turn out for you something very different, as I foretell . . . . this one thing you must take as true--no evil can happen to a good man either living or dead.

Thus spake Socrates to the jury at his trial after receiving a sentence of death. Thus, it is obvious that Socrates affirmed the existence of values and of knowledge. Upon this existential affirmation, Plato built his philosophy.

Plato's epistemology centers around the theory of forms, which he uses to demonstrate how values and knowledge which Socrates affirmed are possible. In brief his theory is this: for each category of things that exist is an archetype, an idea, which is non-spatial or temporal, but has an objective existence of its own. When the human mind knows, it knows the idea and thus can recognize all particulars that exist. Further, each particular is made from its idea; it gains its reality from the absolute reality of the idea. Hence, Plato feels he has demonstrated the possibility of knowledge by these two assertions: knowing a never-changing idea ensures the universality and validity of knowledge; the realness of the particular which is the object of knowledge

is ensured by the absolute reality of the idea from which it was made. To establish an epistemology, implicit in Socratic thought, Plato had to establish the certainty of what is known and the possibility of knowing it. In his theory of forms he does both.

Plato here apparently was aware of the necessary connection between ontology and epistemology--a connection which existed from the first in the earliest western philosophy. Plato rightly felt the need to establish with his epistemology a companion ontology. This insight--that ontology and epistemology are inseparable and inter-dependent--has been largely lost by modern philosophy. One need only look at logical positivism's principle of verifiability to see that in every epistemology is an implicit ontology. It is not coincidence that epistemology and ontology arose together in western thought.

With this brief introduction, let us examine the theory of forms in greater detail. Plato offers evidence of the existence of the ideas in the Phaedo and the Timaeus. In the Phaedo, Socrates points out that people talk of equality. Two sticks are equal in width and length; people say that they are, therefore, equal. Few people would dispute the validity of the concept of equality; but what is it? Socrates points out that equality is not the same as the sticks, but can be conceived in the abstract. Although equality is not the same as the sticks or any other particularities, "you have, nevertheless, conceived and acquired knowledge of equality . . . then we must have knowledge of equality before the time when we first saw equal things." Where did this knowledge of equality come from, since it could have come from experience with

any particular? Socrates indicated that knowledge of equality could only have come from the universal form of equality. Only by first knowing the idea of equality, could we then recognize the two sticks as being equal.

In the Timæus, Plato's approach is that true knowledge cannot be relative, but must be absolute. If our knowledge is only of particulars which are always changing and becoming, our knowledge would be always changing, hence, relative. Only if our knowledge is based upon an absolute which does not change, can our knowledge be true. Plato offers the ideas--beyond time and space--as such absolutes.

Although this evidence of the ideas is not perhaps conclusive, Plato's verification of knowledge does not rest finally upon the ideas. His final absolute which makes knowledge valid and certain is the principle of the Good. In the last analysis, the possibility of knowledge and the reality, and therefore the certainty, of the object of knowledge (the particulars) rests upon this intuitive flash--the Good. To understand the principle of the Good, let us turn to Plato's myth of the cave found in Book VII of the Republic:

Imagine mankind as dwelling in an underground cave with a long entrance open to the light across the whole width of the cave; in this they have been from childhood, with necks and legs fettered, so they have to stay where they are. They cannot move their heads round because of the fetters, and they can only look forward, but light comes to them from a fire burning behind them higher up at a distance. Between the fire and the prisoners is a road above their level, and along it imagine a low wall has been built, as puppet showmen have screens in front of their people over which they work their puppets.

'I see,' he said.

'See, then, bearers carrying along this wall all sorts of articles which they hold

projecting above the wall, statues of men and other living things, made of stone or wood and all kinds of stuff, some of the bearers speaking and some silent, as you might expect.'

'What a remarkable image,' he said, 'and what remarkable prisoners!'

'Just like ourselves,' I said. 'For, first of all, tell me this: What do you think such people would have seen of themselves and each other except their shadows, which the fire cast on the opposite wall of the cave?'

'I don't see how they could see anything else,' said he, 'if they were compelled to keep their heads unmoving all their lives!'

'Very well, what of the things being carried along? Would not this be the same?'

'Of course it would.'

'Suppose the prisoners were able to talk together, don't you think that when they named the shadows which they say passing they would believe they were naming things?'

'Necessarily.'

'Then if their prison had an echo from the opposite wall, whenever bearers uttered a sound, would they not suppose that the passing shadow must be making the sound? Don't you think so?'

'Indeed I do,' said Glaucon.

'If so,' said I, 'such persons would certainly believe that there were no realities except those shadows.'

'So it must be,' he said.

'Now consider,' said I, 'what their release would be like and their cure from these fetters and their folly; let us imagine whether it might naturally be something like this. One might be released, and compelled suddenly to stand up and turn around, and to work and look towards the firelight; all this would hurt him, and he would be too much dazzled to see distinctly those things whose shadows he had seen before. What do you think he would say, if someone told him that what he saw before was foolery, but now he saw rightly, being a bit nearer reality and turned toward things being a bit more real? . . . Suppose now,' said I, 'that someone should drag him thence by force, up the rough ascent, the steep way up, and never stop until he could drag him out into the light of the sun, would he not be distressed and furious at being dragged; and when he came into the light, the brilliance would fill his eyes and he would not be able to see even one of the things now called real.'

'That he would not,' said he, 'all of a sudden.'

'He would have to become used to it, surely, I think, if he is to see the things above. First, he would most easily look at shadows, after that images of mankind and the rest in water, lastly the things themselves. . . . Last of all, I suppose, the sun; he could look on the sun itself in its own place, and see what it is like, not reflections of it in water or as it appears in some alien setting.'

'Necessarily,' said he.

'Only after this he might reason about it, how this is he who provides reasons and years, and is set over all there is in the visible region, and he is in a manner the cause of all things which they saw.'

Plato goes on to say that the sensual world of becoming and relativity is the prison of the cave. The firelight casting the shadow which we see is the sun. The ascent is the struggle to free ourselves from this prison in order that we rise into the upper world--the world of the mind. The object in the upper world are the ideas; finally, the sun, last to be seen, is the Good. Hence, the highest reality is the Good. The climax of knowledge is the Good.

Before we examine the relationship between the ideas, knowledge, and the Good, let us consider how this principle of the Good is known. Plato in Book VII of the Republic states that "the Good is not itself a state of knowledge, but something transcending far beyond in dignity and power." Hence, while reason can grasp the ideas, the Good, being beyond the ideas is beyond "dialectical" reason, it is known by an intuitive vision. Therefore while the "Exercise of Reason" can know the ideas, it cannot reach the ideas. Rather, Plato speaks in Book VII of "an instrument in the soul" which "must be turned round with the whole soul away

from the world of becoming until it is able to endure the sight of being and the most brilliant light of being." This instrument is, I believe, intuition.

With this understanding of the Good, let us return to Plato's statements concerning knowledge and the Good. He indicates in Book VI of the Republic that the Good is the cause of the ideas being known as well as the cause "of the state of knowledge." As the sun illuminates a particular object and permits it to be known, so the Good illumines the ideas, permitting them to be known. Thus, the Good creates the possibility of knowledge, by somehow enabling the Reason to know them. This then is the Good--the source and cause of knowledge, the absolute standard of truth, the ontological foundation of all else. Let us move on now to the ideas or forms to examine their relationship to knowledge, and how they are known. First, let us examine what Plato has to say in Book VI.

And we speak of beauty by itself and good by itself and so on for each of all those things which we have just put as many; again, moreover, we say that these are related to one single perfect ideal for each, and we put each as a portion of a single essence, and each is really what we name.

For each class of things that exist, a universal form exists. Each particular oak tree partakes of the oakness. Oakness not only gives reality to each particular oak tree, but actually exists independently of all oak trees. So for all things that can be known there is a form, an idea--something mind--like which is ontologically beyond the mind. Thus, as the Good offers an ontological footing to the ideas, so the ideas provide reality

to the world of sense-experience. Each particular is real because of the reality of the idea of which it partakes. Knowledge of each particular is also valid because of its absolute referent, the idea.

In summary, let us look at Plato's metaphor of the divided line found in Book VI. A line is divided into two halves, which are in turn divided into halves. Each fourth of the line represents a level of reality and a level of knowledge. The first fourth of the line represents the lowest level of reality--shadows, reflections, etc. Knowledge gained from this level of reality is gained by conjecture. The second fourth of the line represents the second level of reality--objects, particularities. Knowledge is gained here by belief. This first half of the line is the world of sense experience. The second half of the line represents the world of mind. The third fourth of the line represents intellectual constructs, based upon sense experience. Knowledge is gained from this third level by understanding. Last, the final fourth represents the realm of the ideas; knowledge here is found by the exercise of reason. Here, then, is Plato's epistemology. Before we evaluate it, let us first look at Plato's own criticisms in the Parmenides.

Although Plato succeeded in establishing an epistemological--ontological theory which supported and explicated the Socratic affirmation of values and knowledge, he did not succeed in relating the two worlds of his theory of forms--the visible and the intelligible. Hence, because of this ontological fault, Plato's epistemological theory quakes and crumbles. Let us see the criticism Plato directs

in the Parmenides toward the relationship between these two worlds. The discussion between Socrates and Parmenides here centers around the concept of participation.

Socrates offers the concept of participation as the relationship between an idea and the particular--the latter partaking of the former. However, Parmenides retorts thusly: "Then each thing that partakes receives as its share either the form as a whole or a part of it." If a particular participates in the whole form, then the form would be contained within each particular. Therefore, "a form which is one and the same will be at the same time, as a whole, in a number of things which are separate, and consequently will be separate from itself." In short, a form isolated as a whole in a particular is not the same as a form contained in a second particular of the same category. Hence, instead of one form for each category (say for oakness) a multitude of forms would exist (one for each particular oak tree.)

On the other hand, if a particular partakes in only part of the form, then, the form will be divided, creating something less than the original form that each particular corresponds to. Thus, Parmenides concludes, that since things cannot partake in forms as whole or in part, the concept of participation is inadequate to decide the relationship between the ideas and the particular.

Socrates then replies that "things are made in their (ideas) images and are likenesses; and this participation they (the particulars) have come to have in the Forms is nothing but their



being made in their image." Parmenides answers that if a particular is only like a form, it is not identical with the form. Therefore, a second form must exist for the likeness of the particular to the first form. But, since this likeness must be again only an image of the second form, a third form must exist for this second likeness as well. On and on it goes.

Then, Parmenides draws the discussion toward the crucial point. The forms, he states, are separate from any of the particulars of sense experience: "you or anyone else who asserts that each of them (the forms) has a real being 'just by itself' would admit that no such real being exists in our world." These forms are in "reference" only to each other and not to the particulars of this world which we possess. And the particulars of this world are only in "reference" to each other. Therefore, knowledge in our world can only be knowledge of this world; for anything of this world is separate from the world of forms.

Parmenides states this conclusion again in a different way. The form of knowledge knows all the forms, and the knowledge of man knows the particulars of the sense world. However, since the world of forms and the world of particulars are separate, the knowledge of man (part of the world of particulars) is separate from and thus cannot know the form of knowledge (part of the world of forms). Therefore, because man cannot know the form of knowledge, all forms are unknowable.

The similarity of this criticism to the criticism of Descartes' innate ideas by the empiricists indicates that Plato was indeed keenly aware of the difficulties with the theory of forms.

However, in spite of these difficulties Plato maintained the theory of forms because of his deep convictions of the objective existence of knowledge and values; for knowledge and values to be valid, they must have an ontological footing such as the forms.

For Plato stated in the Parmenides

if . . . a man refuses to admit that forms of things exist or to distinguish a definite Form in every case, he will have nothing on which to fix his thought, so long as he will not allow that each thing has a character which is always the same; and in doing so, he will completely destroy the significance of all discourse. But of that consequence, I think, you are only too well aware.

All of us, I believe, can appreciate Plato's attempt to establish knowledge and values; however, an underlying assumption of Plato which actually determines the results of his endeavor is the "character which is always the same." Plato felt that the particulars of this world are always changing and therefore could not be the absolute which knowledge demands. Consequently, Plato develops a world of forms as an absolute, entirely separate from this world of change. However, Aristotle, who took over the Platonic system, met the criticism in the Parmenides by refuting this basic assumption of Plato: that no absolute can be found in the particulars which change. Thus, we will see that Aristotle solves the relationship between the Form and the particular by the rejection of this underlying Platonic assumption.

### Aristotlianism

Aristotle sees the difficulty of Platonism as lying in Plato's assumption that anything that changes cannot be the

absolute referent that knowledge demands. In Book IV of the Metaphysics Aristotle states that they "observing that all this indeterminate substance is in motion, . . . supposed that it is impossible to make any time statement about that which is in all ways and entirely changeable." Aristotle rejects this notion by implanting the forms within the changing particular. Thus, when a man knows, he does not only know the world of the particulars as Parmenides indicated; however, since the form is imbedded in the particular, he knows the universal through knowing the particular.

Aristotle, needless to say, changes Plato's ontology to support this position. Therefore, to understand his epistemology, we must first understand his ontology and how it differs from that of Plato. In Book IV of the Metaphysics Aristotle discusses Being as Being. Being as Being he terms substance. That which is substance, Aristotle states in Book V, is "the ultimate subject which cannot be predicated of something else" or "whatever has an individual or separate existence," independent of all else. If any predicates can be given of something, then it is dependent upon these predicates and is not substance. Joe Smith is a man. Joe is not a substance, for he is dependent upon man. Again an apple is red: apples, being dependent upon the color red to be what they are, are not substance either.

Substance, then, exists completely within itself. Its being depends only on itself, not upon anything else. Or as Aristotle says further in Book IV "some things are said 'to be' because they are substances; others because they are made of substances.

Thus, substance is absolute, unchanging; it is primary to all else. Therefore, "knowledge is principally concerned with that which is primary, i. e. that upon which all other things depend."

Note that the definition of substance by Aristotle is quite similar to Plato's definition of the ideas. Also, Aristotle's assertion that knowledge is similar to the reasoning that led Plato to assert the ideas. However, as we shall see the nature of substance differs greatly from that of Plato's ideas.

Exactly what is this concept of substance from which all other modes of being are derived? In The Soul Aristotle breaks substance down into three divisions: form, matter, and a combination of these. For a definition of these three concepts let us turn to Book IX of the Metaphysics. Here Aristotle relates matter to potentiality, form to actuality. Actuality, Aristotle states is "complete reality." If something is actual, every possible aspect of it has been realized. It is as fully realized as it can be. Potentiality, on the other hand, is the possibility "of acting or being acted upon" --in short, realization.

Perhaps a specific example will clarify. An acorn can become an oak tree. This is an example of potentiality. When the acorn has become an oak tree, the oak tree is an example of actuality in relationship to the acorn. Since according to Aristotle in Book IX "form is actuality," the oak tree is also an example of form in relationship to the acorn. Conversely, the acorn is an example of matter. It should be noted that the oak tree represents

potentiality and matter in relations is to firewood, which represents actuality and form in relationship to the oak tree. Therefore, all things that compose reality are a combination of potentiality or matter, and actuality or form, depending upon the relationship that is being considered.

With this understanding of form (actuality), matter (potentiality) and the combination of both, let us examine these three subdivisions in more detail. First, let us consider matter. Aristotle postulates what he calls prime matter in Book IX of the Metaphysics: "if there is some primary stuff, which is not further called the material of some other thing, this is primary matter." Potentiality which is not actualized in any way--this is called prime matter and fits the qualifications of substance. For prime matter cannot be predicated; it is not dependent on anything else, but has a separate existence; and it is the source of all other "modes of being." Therefore, prime matter is one category of substance.

A second category of substance is form (actuality). Aristotle posits pure actuality in terms of the prime Book XII. This prime form is pure thought--thought about thought.

Now thinking in itself is concerned with that which is in itself best, and thinking in the highest sense with that which is in the highest sense best. And thought thinks itself through participation in the object of thought by the act of apprehension and thinking, so that thought and the object of thought are one essence.

Therefore, by form Aristotle means thought. Thought, form, or actuality represent a second category of substance.

The third category of substance (Aristotle calls them simple bodies) are a composite of pure form and pure matter. Form has

actualized matter into one of the particulars which we know. The particular, however, is a unity of both its form and its matter. If either would be taken from the particular, prime matter or pure form would result. Therefore, the form and matter which we know can exist only in relationship to each other. The particulars of reality, however, are integrated with thought, with form. Aristotle states that it is the forms which we know. Conversely, we can know the particulars of this world, because of the form (the thought) which determines the actuality the matter has taken.

However, Aristotle in Book IX of the Metaphysics goes one step further. "Matter exists potentially, because it may attain to the form; but when it exists actually, it is then in the form." Therefore, only because of form can there be matter. Only because form can make matter actual (or actualize potentiality), is there any potentiality at all. "That actuality is prior in formula is evident; for it is because it can be actualized that the potential, in the primary (or substantial) sense is potential." Another way of expressing the point Aristotle makes in Book IX is that matter or potentiality is dependent upon form or actuality to fit its potentiality. Being dependent matter is not as great a substance as is actuality. Actuality must proceed potentiality. Therefore, in the reality of the particulars which we know, form or thought determines the actual expression of matter. Thought is not only part of every particular, but it is an essential component of reality itself. Reality is composed of both matter and form, both potentiality and actuality. Since men know by thought, according partially composed and determined by thought.

This brings us finally to Aristotle's epistemology. In Book III of de Anima Aristotle states that "that part of the soul, then, which we call mind (by mind I mean that part of the soul by which the soul thinks and forms judgments) has no actual existence until it thinks." Therefore, let us not confuse the substance of thought with the abstraction of mind. Mind is the process of thinking. Thinking involves two procedures: one passive, which is perception of the form of particulars we experience. One is active, when one actually thinks thoughts. Thus, man's process of thinking is as all else of reality--potential and actual. It can "become" the particular which we perceive--that is, through sense organs man can recognize the particulars that exist. However, the process of thinking also involves actuality, the thinking of thoughts.

As the actuality in reality preceeds any potentiality in reality, so actuality or thought in the process of thinking preceeds any perception. Not only does this actuality in the mind imply that knowledge is gained by activity, not by passivity (as the empiricists will say), but also that an affinity exists between thinking and reality; for form or thought is an essential component of reality along with matter. This same actuality which determines the form matter takes is present in man when he thinks. This is realism at its best--reality and human thought have an affinity, thus the latter can know and understand the former; however, reality is not thought, but a combination of thought (form) and matter. Both form and matter are real; both are intertwined and interrelated, inter-dependent. Both are a unity. Neither could be without the other.

In summary of Aristotle's position let us review three points: first, a comparison of Aristotlian form to Platonic ideas; secondly, an examination to see if Aristotle's epistemology is congruent with ontology; thirdly, if Aristotle successfully answered the criticism of the theory of forms found in the Parmenides. First, while Plato's ideas are entirely separate from the particulars which are images of them, Aristotle's form is an essential part of each particular. While Plato's ideas exist independently of matter and vice versa, Aristotle's forms exist only in relationship to matter and matter only in relationship to form. Although pure form--pure actuality or thought about thought--does exist, the individual forms such as oakness or manness exist only in particular oak trees and particular men. Both Platonic ideas and Aristotlian forms are what we know; however, the former are known by the exercise of reason without sense perception, while the latter are known by reason (actuality or thought) through sense perception.

Does Aristotle with these modifications in the theory of forms succeed as well in establishing a companion ontology as did his predecessor? Aristotle's ontology, as we have seen, centers around the concept of substance, which in turn narrows down to the prime-mover--pure actuality, pure thought. Since it is this pure actuality that actualizes matter or potentiality, thought lies at the center of reality as an essential constituent. Because man thinks thoughts, he can then understand reality. I believe that Aristotle indeed succeeded in establishing an ontological foundation for his epistemology. Perhaps it should be clarified that pure form is not a form, but form; not a thought,



but thought. From this pure form and pure matter are produced the particulars we know.

Finally, let us consider Aristotle's answer to Parmenides's criticism of the theory of forms. Parmenides's criticism was that forms, which do provide an absolute which make knowledge and values valid, are separate from the forms in the world we know and are thus unknowable. Aristotle intertwined the forms in the particulars of the world we know; therefore, although we know only particulars, through and in the particulars we know universal forms which can serve as absolutes.

In closing on Aristotlianism, let us look once more at the forms. The forms are thoughts. They are universals. However, these universals are similar to the thoughts we have. I hesitate to use the word idea because of its Platonic overtones; but the forms serve as focusing points for men when they know. Therefore, the universality of knowledge gained by Plato's ideas is still preserved by Aristotle's forms.

### Medieval Thought

Medieval thought can be seen as a reworking of the controversy between Plato and the Sophists with a solution being reached in terms of conceptionalism, a somewhat Platonic Aristotlianism. The restaging of this once solved controversy began with a revival of Platonism in the third century A. D. Plotinus took several aspects of Plato's thought--mysticism, viewpoint of knowledge, universals, and a qualified otherworldiness--and developed them into a full-fledged mystical philosophy--Neoplatonism. Because Augustine took Neoplatonism into Christianity, Platonism entered into early medieval thought.

Early medieval thinkers such as John Scotus continued the Neoplatonic emphasis upon the more real world--the world of God. The thoughts of God were the ideas of Plato. Hence, reality laid with the ideas, while the particulars of this world (the lowest level of being) had only a shadow of reality. This position was developed in the middle period into medieval realism. William of Champeaux and Anselm represent this position--that universals are real entities, while the particulars of this world are hardly real at all.

Against this position there arose nominalism--only the particulars of the world are real, while universals are no more than abstractions we use for simplicity in thought. Roscelin represents this position. Of course nominalism with its emphasis upon the individual and the particulars was in opposition to the neoplatonic Christianity with its universal and otherworldly emphasis. Behind nominalism, however, was the beginning of a social revolution which was to end in the Renaissance. Therefore a type of Christianity had to be found to replace neoplatonic Christianity, which would give a place to the individual and the particular.

The beginnings of this new philosophical foundation can be seen in conceptualism. Abelard in conceptualism solved the realist--nominalist controversy along lines somewhat similar to Aristotle's revision of Platonism. Universals are not the ideas; but, rather are rather mental products which do have objective validity among the particulars. Thus, although abstractions from particulars, universals do represent universal aspects of particulars.

The conception of universals are formed by abstractions . . . . In relation to abstraction it must be known that matter and form always subsist mixed together, but the reason of mind has this power, that it may now consider matter itself; it may now turn its attention to form alone. (The Glosses of Peter Abelard upon Porphyry)

Although these abstractions do exist in the man's mind, they are ~~also~~ also present in the particulars we experience.

St. Thomas in the thirteenth century, after the rediscovery of Aristotle forged an Aristotelian Christianity to replace the Platonic Christianity. In so ~~doing~~ he took over Aristotle's epistemology and Aristotle's analysis of thinking. The passive intellect receives sense perception. The active intellect abstracts the forms from the particular. These forms are what we do know or recognize in the particulars.

With conceptionalism and Thomism, medieval realism slowly dies away. Actually, however, nominalism gained the day. William of Occam, following the century of Aristotelian victory, again completely rejected the forms in terms of a re-statement of nominalism. Occam felt that the forms did not represent entities, but rather only a collection of individual particulars which we have experienced. Thus universals or forms are symbols of a large number of particular examples, but they themselves do not have any ontological status. Occam did not feel as Plato that the forms were necessary for knowledge--a presupposition of Occam which was taken over by many modern thinkers.

Before closing with medieval thought I would like to comment that the medieval viewpoint of Aristotelianism is through a Platonistic interpretation. For although Thomas did use many

Aristotelian categories to build a synthesis of medieval thought, the result was a somewhat Platonistic Aristotle. The two particular examples which concern us are Thomas's concept of forms and of abstracting by the mind.

Aristotle did not speak of "abstracting" forms from the particular as did the conceptualists from whom Thomas gained the concept; rather, for Aristotle forms can exist only in particulars. Aristotle never was faced as was Abelard and Thomas with the problem of the ontological status of forms or universals in the mind. Universals in the mind lead us back once more to Platonism and medieval realism. Hence, Occam's criticism of Thomism that it had solved nothing concerning the universals is, I believe, justified. For after throwing Platonism out the front door, Thomas brought it in through the back door.

But Thomas made another digression from Aristotle. To Aristotle, thoughts were the source of knowledge, not mind. Mind existed only if there were thoughts. These thoughts did not abstract forms from particulars, but recognized forms (thoughts) in the particular. This development of mind as the seat of knowledge was taken over by modern philosophy.

A more subtle reason exists, however, as to the differences between Aristotle's and Thomas's thought. The question Aristotle answered was ontological--what is the relationship between the world of the particulars and the world of forms that are necessary to know the particulars. The question that Abelard dealt with was "how do we know universals." Both he and Thomas, however, gave an answer concerning the ontological status of universals. As we

shall see, this confusion of answering a question concerning psychology in terms of an answer dealing with ontology will play havoc with much of modern thought. For much difficulty has resulted in modern thought from confusing psychology with ontology.

### Galileo and Science

Between William of Occam and the victory of nominalism and Descartes, the so-called "father of modern philosophy," there is an important development in western thought--the use of science. To understand this new approach which so influenced Descartes and therefore most preceeding philosophy, let us look at the thought of Galileo. For in his thought can be seen the union of the empirical and rational mathematical spirits which compose science.

On one hand was the tradition of such men as Francis Bacon who emphasized observation and experimentation. On the other hand were such men as Kepler and Copernicus who represent the speculative tradition based on a mathematical rationalism. Galileo succeeded in bringing both these traditions together to form "modern" science. For Galileo's assumption was this: the real world is rational in nature; its rationality can be expressed in terms of mathematics; and this rationality can be ascertained from studying particular examples.

The assertion that the universe is rational--that is, that it can be understood by men--is the old Greek affirmation. However, the emphasis on the particular example found in sense perception stand in contrast to the Platonic rationalism of antiquity and to the main stream of medieval thought. This

contribution came from nominalism, which asserted that only the particulars are real. Hence, we shall see that in modern philosophy one of these two aspects of science is always emphasized over the other. For only in Aristotlianism have we found a system which combines rationalism and the particular of sense experience into a unified system. Although Aristotlianism would provide a basis for the new science, the early moderns rejected Aristotle, perhaps because of Thomas' somewhat Platonic interpretation of him.

Galileo believed that the new science dealt with reality. Therefore, the real world is the world of physics--matter. Only quantities of this matter are real; for mathematical science only deals with quantities such as volume, weight, and dimensions. Any qualities such as color, texture, smell, or sound did not actually exist in the real world of matter that the new mathematical science disclosed. The quantities that physics disclosed, Galileo termed primary qualities because they described the real world--matter in motion. The qualities of color, smell, and etc. are called secondary qualities; for these exist not in the real world, but in the perceivers.

How much of this description of the "real" world Galileo took from Atomism is a difficult question. Certainly a large share of it did come from this ancient philosophy. Atomist's reality of atoms moving in the void is similar to Galileo's reality of bodies of matter in motion. Certainly Galileo's distinction of primary and secondary qualities had its roots in the Atomist's thought. Also Galileo's real world was entirely based on the sense of touch as was Democritus's. Therefore, I

think we should recall Aristotle's criticism of this position once more. For latter philosophy was to demonstrate only too clearly this is an arbitrary distinction about the value of certain sense; and thus the distinction between primary and secondary qualities will be exposed as being quite fallacious.

Yet, Galileo's thought is immensely important for the course of modern philosophy; for his description of reality was carried over down into the nineteenth century. Newton was to even further extend this concept of reality into a vast machine of indestructible bodies in motion. However, this conception of reality gave rise to grave philosophical problems; for thought, value, and the world of human experience are alien to this world of matter in motion. The endeavors of preceeding philosophy were largely to attempt to find a place for an epistemology that would support knowledge, values, and the world of experience in terms of the ontology Galileo developed.

Thomas Hobbes sharpens the issues greatly in his thought. The new science reveals a world of matter in motion, a world devoid of the qualities of the ordinary world of human experience. Hence, Hobbes states in Human Nature that:

Whatsoever accidents or qualities our senses make us think there be in the world, they be not there, but are seemings and apparitions only: the things that are in the world without us are those motions by which these seemings are caused. And this is the great deception of sense.

Hobbes clearly shows that in the world of reality, the world of the new science, the world of experience--of colors, values, etc.--have no ontological status, but are deception. For real

being is matter in motion; real being's characteristics are only the quantitative measurements that the new mathematical science formed by Galileo can make. Hence, our world of sense experience, of value, of knowledge is a deception.

Therefore, to understand modern philosophy and modern epistemology, it is essential that we see the importance of Galileo's work--his foundation of mathematical science, his assumption that this new science revealed the real world, and his description of this real world in terms of Atomism--a mechanistic materialism. Finally in Hobbes must be seen the apparently logical result of Galileo's work: a mechanistic universe entirely alien to man's world of qualities, values, and knowledge. For Descartes' thought can only be understood against this context; for his struggle was to relate the world of matter in motion to the world that man experiences.

Before moving on to Descartes, I would like to comment upon the adequacy of a mechanistic materialism as an ontological bases for the new science. We have seen that to describe as the real world a world based largely on the sense of touch, and therefore to discredit the other senses is a fallacy. For as Berkeley will point out touch is a sense. If the other senses do not describe reality, neither does touch; for touch must exist in the perceiver just as much as any other sense experience does. Therefore, no reason exists to believe the sense of touch is less subjective than any other senses. However, a deeper conflict exists between the new science and Atomism. The new science reveals, says Galileo, a world of matter in motion. But the new science involves not only sense experience (in this case the sense of touch), but



also a rational element of speculative mathematics. Yet, in a mechanistic material universe any rationality is completely alien, as alien as are colors, smells, values; or for that matter, therefore, rationality, the very basis of mathematics, is a "deception". Therefore, not only will sense-experience, one essential component of science be discredited as being alien to the real world, but rationality, the second component of science, will also be discredited, when Locke lampoons Descartes' innate ideas. Thus, Galileo's ontology of mechanistic materialism cannot support the new science he formed. The result, as we shall see, is the scepticism of David Hume.

### Descartes

To understand Descartes' contribution to modern philosophy and to epistemology, let us first look at the dilemma which he inherited from Galileo. Like Galileo, Descartes assumed the rationality of the universe, especially in terms of mathematics and the validity of the sense of touch. And like Galileo Descartes accepted and praised the new science formed by the merger of mathematical rationalism and empiricism. Like Galileo Descartes assumed that the new science revealed the "real world"--a world of matter in motion, governed by cause and effect. Unlike Galileo, Descartes realized the problem that existed: how in a mechanistic materialism could there be a place for rationality and sense experience that science demands.

Descartes, therefore, sought to develop a position which would allow for not only rationality and sense experience, but also for values and theology. He believed that he found a solution

in his substantial dualism. Two aspects of reality exist--mind and matter. Descartes describes each in the Aristotlian category of substance. Each one is a substance--independent of each other, unaffected by each. Each substance has its own nature; each is governed by its own laws. Or as Descartes states in the Principles of Philosophy:

By substance we can understand nothing else than a thing which so exists that it needs no other thing to exist. . . . There is always one principle property of a substance which constitutes its nature and essence, and on which all else depends. Thus, extension in length, breadth, and depth constitute the nature of corporeal substance; and thought constitutes the essence of thinking substance.

From this superficial explanation, Descartes substantial dualism seems to solve the dilemma; for the new science indeed describes a real world, while rationality, values, and sense experience have a world in which they are not alien. However, Descartes still has problems. Man knows with mind; but if mind is entirely separated from matter, how does mind ever know anything about matter? Yet, the new science, Descartes felt, did give correct information to the mind about material reality. How could this be?

To overcome this difficulty, Descartes develops his theory of ideas. To be sure, since mind is only in "reference" to mind, it can only know the contents of mind. Thus, since the contents of mind are ideas, a mind can only know the ideas it contains. However, Descartes maintained that the ideas we have represent the substance of matter. These ideas represent sense experience and are called adventitious ideas. In contrast to these adventitious

ideas stand the innate ideas, which represent universals and certain truth. Here in the innate ideas lies the greatest knowledge; for here lies the basis of mathematics and rationality. The innate ideas actually are similar to Plato's ideas, except innate ideas exist in the substance of mind. However, they also serve as the absolute referents for knowledge.

By this theory Descartes hoped to establish the rationality and sense experience science demands. But Descartes gave a greater emphasis to the former than the latter. Innate ideas are clear, ~~sic~~<sup>and</sup> intuitively certain, while adventitious ideas are hazy, ambiguous, uncertain. Thus, Descartes's position in the final result is similar to Platonism. ~~He~~ should have studied the Parmenides; many similar criticisms were made of his thought as were made by Parmenides of the theory of ideas. Locke would soon lampoon the innate ideas, destroying the basis for rationalism in Descartes's system. Berkeley would soon point out that we actually have no knowledge of matter, but only of ideas; therefore, we have no right to say it exists. Finally Hume was to point out that we ~~no~~ have knowledge of mind, but rather only ideas; therefore, we have no right to say mind exists. But we shall examine these criticisms in greater detail later.

What is the source of difficulty? The source is that the ontology of mechanistic materialism is in direct opposition to the ontological basis demanded by the epistemology of the new science. Descartes's difficulties resulted in trying to relate this ontology gained from Galileo (mechanistic materialism) to the epistemology of the new science (rational realism).

To be sure Descartes postulated a substance which was rationally constructed and in which values, thought, and sense experience have meaning. But this is the substance of mind. The substance which the new science describes in terms of rationality (mathematics) and of sense experience (touch) is still as alien to either as it was with Hobbes. For the substance of matter is only matter in motion; hence, rationality and thought are still meaningless here. Preceding philosophy inherited this difficulty of Cartesian philosophy; actually, it has been brought down to the present day.

The fact that science does work with its assumptions of the rational nature of the sensory world is one of the strongest pieces of evidence against mechanistic materialism. For to work sciences' assumptions about reality must be valid; these assumptions as we have seen conflict with mechanistic materialism.

### Early Empiricism

On the continent was growing a school of philosophy which emphasized rational truth, the innate ideas, and mathematics. This tradition of Spinoza and Leibniz followed in the footsteps of Descartes. However, on the British Isles there had arisen another philosophical tradition through the works of Francis Bacon and Thomas Hobbes. Bacon had emphasized observation as a means to truth. Hobbes had declared that all knowledge is a result of sensation and that these sensations are the only source of knowledge. Only because we can name these sensations can we think; for thinking is simply a manipulation of names. Further, Hobbes said that our thoughts follow in a sequence as do our sensations. Therefore, we tend to associate the thoughts and the sensations.

British philosophy, then, had developed two different characteristics. One was an extreme nominalism. Only the world gained in sense-experience is real. Only particulars have ontological status; hence universals, or innate ideas for that matter, are meaningless. Our only source of knowledge is experience of particulars. Secondly, British philosophy approached philosophy in terms of psychology. This approach is valid, if one realizes the difference between psychology and philosophy. However as with Abelard and with St. Thomas preceding British philosophers made ontological assertions on the basis of psychological investigation. Therefore, it is against this context that John Locke, George Berkeley, and David Hume were to attack Cartesianism.

Immersed in this empirical tradition, Locke rejected Descartes' innate ideas. However, he accepted Descartes' two substances; he accepted Descartes theory that mind knows its ideas. Descartes had claimed that there exists certain ideas in every man's mind from birth. These ideas are intuitively certain. Thus, these innate ideas provide an absolute universal basis for truth.

Locke asserts that all ideas come from experience (sensation). The mind, Locke felt, does not possess any "innate" ideas before we have experience; but after experience writes on the blank sheet of mind, mind can form from these simple ideas more complex ones. Our mind, then, is at first a blank tablet on which sensation creates ideas. Therefore, because all ideas come from sensation or from the combination of ideas which originally came from sensation, Locke concludes that talk of inborn ideas is foolishness.

Thus, knowledge for Locke is of ideas, either simple or complex, which had their origin in sense experience. As Locke

stated in An Essay Concerning Human Understanding:

Since mind, in all its thought and reasonings hath no other immediate objects but its own ideas which it alone can or does contemplate, it is evident that our knowledge is only conversant about them. Knowledge then seems to me to be nothing but perception of the connection of and agreement, or disagreement and repugnancy of any of our ideas.

Thus Locke undercut the source of rationality in Descartes's position --the innate ideas. As Hume would show, no longer was there any basis of rationality in the Cartesian philosophy. Locke, however, attempted to construct a basis for rationality in terms of sensation; but having no ontological basis, this attempt failed.

Although Locke was critical of Descartes's innate ideas, he accepted Descartes's substantial dualism and Descartes's theory of knowing--knowledge by ideas, which represent bodies in motion. Locke's disputes with Descartes were not about the ideas being the objects of knowing, but rather about the origin and nature of these ideas.

George Berkeley took over Locke's modified form of Cartesianism, but added another criticism, the criticism of Descartes's theory of a material substance. Both Descartes and Locke had accepted the concept of substance. Both assumed that two kinds of being exist --mind and matter. However, in rejecting Descartes's innate ideas, Locke created a problem; for it was in terms of the innate ideas that Descartes had deduced the existence of a material substance. His reasoning was this: because I can doubt that I exist, I must exist; thus I know I exist. To know I exist, I must have a mind. But my mind is finite; thus, there must be an infinite mind, God, from which my finite mind came. To be God, this infinite mind

must be perfect. Since this infinite mind is perfect, it would not deceive me by giving me ideas of a material world which did not exist. Hence, a material substance must exist.

The first idea contained in this reasoning is what Descartes called an innate idea; for "I think; therefore I am" is intuitively certain he felt. But Locke could not use innate ideas, after rejecting them, to demonstrate the existence of a material substance. Hence, Locke declared that the primary qualities of weight, motion, volume, dimensions show to us the material world and thus are evidence of its existence. However, all other sense experience of the material world are secondary qualities, representing not the material world, but our ideas.

Berkeley, however, was quick to point out the fallacy in this position. In the Principles of Human Knowledge Berkeley rightly concludes:

They who assert that figure, motion and the rest of the primary or original qualities do exist without the mind, in unthinking substance, do at the same time acknowledge that colours, sounds, heat, cold, and suchlike secondary qualities, do not; which they tell us are sensations, existing in the mind alone . . . . But I desire anyone to reflect, and try whether he can, by any abstraction of thought, conceive the extension and motion of a body without all the other sensible qualities . . . . In short, extension, figure, and motion, abstract from all other qualities, are inconceivable. Where, therefore, the other sensible qualities are, there must be also, to wit, in the mind and nowhere else.

Berkeley rightly observes that the primary qualities are as much sense experience as are the secondary qualities. Therefore, since man knows only his own ideas, man knows only his ideas in primary qualities just as much as secondary; for no real difference

exists between them. All that we experience as existing are ideas; since experience is the only source of knowledge, (innate ideas having been rejected) we have no knowledge of a material substance. Berkeley, then, extends the result of this conclusion. If we have no knowledge of a material substance, which we apparently do not, we have no basis for claiming that it exists.

Berkeley's criticism of Locke's modified form of Cartesianism is quite justified; however, Descartes used innate ideas not only to support the existence of a material substance but also the substance of the mind. Therefore, when Locke discredited the innate ideas, he destroyed not only the basis of the material substance, but also the basis of the substance of mind as well. David Hume, the Scottish sceptic, finally concluded the criticism Locke began.

Descartes support of the substance of mind was this: I doubt; therefore, I think, I think; therefore, I am. To think a mind must exist; hence, there must be a substance of mind.<sup>3</sup> Descartes claimed that these ideas were innate--that is, that this certainty is obvious, intuitive. However, Hume and Berkeley accepted Locke's rejection of the innate ideas, although he too accepted that we know only ideas. Hume simply carried Berkeley's criticism of a material substance over to the substance of mind.

According to Locke, the only knowledge we have is from sensations, which create ideas. We, then, only know our ideas. Hume accepted this and declared these ideas are simply copies of the impressions we have experienced. But we receive no impression of a substance of mind. All that we are impressed by are



particulars. Hence, all we know are a series of ideas about particular impressions. Since we receive no impressions of mind, we have no right to speak of a substance of mind. All that we know are impressions and ideas. Thus, Hume ends in complete scepticism--no mind, no matter.

Most of us would accept this criticism of Descartes's innate ideas. To speak of ideas which are inborn in every individual and which are intuitively certain seems like foolishness to us. However, the problem goes deeper than the innate ideas. It penetrates to the roots of Cartesianism; for the whole philosophical endeavor of Descartes had been to reconcile the epistemology demanded by the new science with an incompatible ontology--mechanistic materialism. As we have seen, an ontology and epistemology grow out of each other and are dependent upon each other. The philosophy of David Hume represents the futility of Descartes's attempts.

It is difficult not to wonder why these philosophers did not realize where the problem laid. But each seemed to accept what his predecessors developed and to criticize this inherited philosophy without re-analyzing Cartesianism to find the difficulty. But before moving on to Kant and his solution to the scepticism of Hume, let us study more closely this philosophy of Hume, not only to more adequately understand Kant's thought, but to understand the nineteenth and twentieth century empiricism.

### Hume--the "Founder" of Modern Philosophy

David Hume is credited with the founding of the variety of empiricism of the nineteenth and twentieth centuries. Therefore, to

understand the origins of this later empiricism, let us review the earlier empirical tradition, which preceeded Hume and then Hume's work itself.

From the time of William of Occam, extreme nominalism grew as a philosophical force in England. Francis Bacon had furthered this emphasis on the particular found in sense experience. Thomas Hobbes had scoffed at universals or forms declaring them to be only names. Thus, Hobbes concluded that all we know are sensations, gained from sense-experience and from which we gain ideas. Both these men stand in this extreme nominalistic tradition, started in England at the time of Occam and Roger Bacon.

After Descartes had attempted to reconcile the new science and Atomism, Locke gave a new twist to this growing nominalistic tradition--an emphasis on psychology, on the origin of ideas and knowledge. His conclusions were that knowledge and ideas originate from sense experience, from sensations of the particular. In good nominalistic tradition, he declared innate ideas or forms were non-existent. This is empiricism--an emphasis on sense experience, a limiting of knowledge to sense experience, an emphasis on ideas as the objects of knowledge, and a disdaining of any metaphysical endeavor. Berkeley succinctly stated the spirit of empiricism in his Principles of Human Knowledge:

No sooner do we depart from sense and instinct to follow . . . reason. . . but . . . we are insensibly drawn into uncouth paradoxes, difficulties, and inconsistencies, which multiply and grow upon us as we advance in speculation; till at length, having wandered, through many intricate mazes, we find ourselves just where we were, or which is worse, sit down in forlorn scepticism.

However, we must not overlook that Cartesianism plays an essential role in forming earlier empiricism. For Locke accepted Descartes's separation of the knower and the known, of subject and object. He accepted Descartes's theory of the idea as the bridge between the knower and the known. And he related the idea to his nominalistic emphasis on sense experience by saying that sensations give rise to all ideas. All we ever know is our ideas.

Actually, if one strips this Lockian combination of Cartesianism and nominalism of the concept of substance, he has the essential core of Hume's thought, the origin of later empiricism. Hume, as Locke and Berkeley, felt that one should first study the powers and nature of the mind in order to see the possible realm of human knowledge. As his predecessors, Hume assumed that all knowledge comes from sense experience; therefore, any talk of innate ideas or metaphysical assertions was foolish speculation. Men should only claim knowledge of what they can know. Hume, accepting the modified form of Cartesianism, said that men know only impressions and ideas. The difference between these two "perceptions of mind" is the strength of their impact upon us. Impressions are direct and strong; ideas are weak and faint. Thus, impressions are our more lively perceptions, while ideas are the less lively parts of our experience.

How do these ideas arise in our experience? Hume states in his An Inquiry Concerning the Human Understanding: "This creative power of the mind amount to no more than . . . compounding, transposing, augmenting or diminishing the materials afforded to us by the senses and experience." Ideas are mere copies of impressions;

therefore to find out the validity of an idea, we must look for the impression from which it originated. Further, Hume concludes that each impression is distinct, unrelated to the impression or the idea which preceeds or follows it. Rather, we associate ideas together.

Since we associate ideas, our "ideas" of contingency or necessary in the outer world are fallacious. For what impression is the source of this idea? No such impression exists. Rather, this idea is a generalization which is based upon other ideas. Since impressions or sense experience can be the only source of valid ideas, this idea of causality and necessity cannot be accepted. The material world, God, the self--all these fall into the same category. They are all abstractions from ideas and thus cannot be related to any particular impression. And as we have seen, nominalism only allows knowledge to come from sense experience. Therefore, causality, God, self, world are all metaphysical speculation and beyond human knowledge.

This brief summary of part of Hume's thought should represent the spirit and approach of empiricism. Therefore, in closing, let us summarize once more the origins of empiricism and each sources' specific contribution. First, there is nominalism with its assertion that all men know are particulars and that their particulars are only known through sense experience. Secondly, there is the psychological approach of Locke--we must first find out what the mind can know and how it does know this. His conclusions were in the tradition of nominalism: the mind is limited to knowing particulars and it knows these particulars only through sense experience. The result of this approach was that a proposition

is only true if it can be related to a particular sense experience (the twentieth century principle of verifiability found in logical positivism).

The third and last source of empiricism is Cartesianism. Descartes's thought gave two contributions: one was the theory that we can only know ideas, never the world around us; secondly that the particulars found in impressions and sense experience are entirely separate from universals. Thus, the empiricists concluded that because we can know only particulars of sense experience, we can never know universals. These three sources merged into the empiricism of Hume. Men can know only their own ideas, never reality in itself. Men's knowledge is limited to sense-experience; therefore, only if any idea has a referent in sense experience, can it be accepted as valid knowledge. All other ideas are abstruse metaphysics.

Criticism of this tradition shall be following the analysis of logical positivism later in the paper. However, two points need to be made here. One is that the empiricism is the result of Descartes's attempt to reconcile a conflict between science and a mechanistic materialism. The empiricists took the nominalist emphasis on the particular of sense experience and criticized Cartesianism in light of it. The result was a philosophy, which, while including science's emphasis on the particular and upon sense experience, actually ended by undercutting science itself. This situation becomes ever more complex when the later empiricists attempt to build their empirical system on science.

This complexity arises from the fact that empiricism is based partially on Cartesianism; Cartesianism is in turn based upon a

conflicting epistemology (that of science) and ontology (mechanistic materialism). Empiricism's criticism of innate ideas undercut the basis of science in Cartesianism; therefore, as Hume declared, causality or the material world, essential elements of the philosophy of science, have no basis in empiricism. The result is that a deep antagonism exists between empiricism and science.

In the force of Hume's sceptical empiricism, one has three alternatives, if he wants to construct a meaningful philosophy. One is to accept Cartesianism and empiricism. Another is to accept Cartesianism and attempt to re-work it into an acceptable philosophy in light of empiricism's criticisms. The third alternative is to reject Cartesianism and empiricism and to re-analyze the dilemma that Galileo presented to Descartes. The first approach is represented by logical positivism and the linguistic analysts. The second approach will be an approach represented by Kant. The third approach is based on Aristotelianism, with a rejection of one horn of Galileo's dilemma--mechanistic materialism. Let us first consider the second approach--that of Kant and the idealists.

### Immanuel Kant

After having read Hume, Kant was faced with a dilemma: on one hand he wished to affirm mathematics and science as did his rationalistic predecessors; on the other hand, he was aware that empirical criticism in Hume's thought undercut the validity of science, mathematics, and rationality as a whole. All we know according to Hume are a series of discrete sensations and ideas.

Descartes's approach was accepted by Kant: we know ideas, not the world of matter in itself. However, he rejected Locke's

interpretation of mind as a "blank tablet" upon which experience creates ideas, which either do or do not correspond to the "real" world out there. To Kant, the mind is active, not passive. The mind has certain forms upon which it organizes experience. Thus, the mind is structural; and it approaches the experience it perceives in terms of this structure. Let us examine this structure.

All knowledge starts with experience Kant claims as did the nominalists. However, the mind contains "pure forms of sensibility" by which it orders sensation. These forms are space and time, which are intuitive and a priori--that is, these forms exist in the mind before we have an experience. Thus, Kant agreed with Hume that we experience discrete, unrelated sensations. But our mind has these forms of space and time to order sensations. Thus, space and time are universal and necessary within human experience. Let us take a specific example.

This table upon which I am writing presents a discrete sensation as it impinges upon me. My mind relates this sensation to the sensation of the floor and puts the table on the floor. My mind relates the sensation of the wall to that of the floor and the table, placing the wall behind the table at the edge of the floor. Now then, each individual who looked into this room would see a table on the floor with a wall behind it. Each mind would order these sensations in terms of space; therefore, a universality would exist among individual experiences of this room. The same approach applies to time as well.

Thus, Kant declares our mind orders experience in terms of space and time. Further, Kant asserts there are categories of

understanding, by which the mind interprets the now ordered experience it receives. These two categories are substance and causality. The mind imparts a "thing in itself," which underlies the sensations it receives. To fully grasp this point, we must remember that Kant accepted the Cartesian tradition that to know is to know contents of our mind. Berkeley demonstrated that no basis exists upon which to assert a material world; for all we experience are our own ideas. Kant meets this difficulty by asserting that the mind a priori (before experience) gives to its sensations a material substance. Thus, each mind understands each sensation which has been ordered in terms of space and order by the category of substance.

Also the mind understands all of its experience in terms of causality. It understands experience in terms of cause and effect. Although causality as substance cannot be established from sensations, the mind uses these categories as it uses the forms of sensibility. Thus, Kant feels that the mind makes its own world and that a universality exists in the way individual minds make their worlds. This universality is ensured by the "transcendental apperception" which is common to all minds and which departs to these minds a common structure.

In analyzing Kant's thought, one must conclude that he succeeded in his effort. The innate ideas were the source of rationality, order, and universality in the Cartesian system. As the ideas of Plato gave reality to the world of experience, to knowledge, and to values, the innate ideas, which reason intuitively grasped as true, were the foundation from which all other aspects of Cartesianism were deduced. When British nominalism



discredited the innate ideas, but accepted the rest of his system, it was only a matter of time until someone demonstrated the chaotic result. Hume with his scepticism did just this as he reduced experience to unrelated sensations and as he denied causality, substance and much more.

Kant did establish order once more within the Cartesian framework. But he sacrificed much to meet empirical criticism. To be sure there is a universality in human experience in terms of experience's structure. No longer is experience a disordered chaotic mass of sensations as Hume stated. Kant did solve this problem by asserting that although space, time, substance, and causality cannot be demonstrated from sensations, every mind orders sensation in terms of these forms and categories. However, in so re-establishing order in experience and knowledge, which in Cartesianism rested upon the now repudiated innate ideas, Kant sacrificed objectivity entirely. For Kant admits that we cannot ascertain whether space, time, substance, and causality do exist beyond our mind. We must, therefore, posit such a world which the forms and categories imply because of practical concerns. Thus, while knowledge is universal and ordered it is completely subjective--that is, knowledge reflects the structuring of mind, not the structure of an objective reality beyond mind.

Kantianism represents a plausible reworking of Cartesianism in light of the criticisms of British empiricism. If one accepts the ontology that Galileo presented to Descartes, Kantianism represents a position in which science still has meaning. However, if one accepts mechanistic materialism, he should not whimper when he finds

in Kantianism that he does not know as objective world. For after all if one assumes an objective world which is entirely alien to thought and rationality, he has no right to complain that he cannot know this world with thoughts based on rational constructs such as space, time, or causality. For thoughts based on rational constructs can represent only that which includes rationality and thought as an essential component of itself. But this point shall be further explicated later.

#### "The Whole is the Real"--Absolute Idealism

Philosophy following Kant took two roads, each almost directly opposed to the other. Idealism flourished, although Kant had declared that metaphysics was an area in which no knowledge could be gained. Hegel and his successors built great metaphysical systems based on the concept of an absolute mind which creates and structures the world around us, as Kant's human mind creates and structures its own world. The concept of absolute mind perhaps grew directly out of the "transcendental aperception" which Kant asserted gave universality in knowing. For each mind partook of this transcendental aperception and thus fained the structures by which it ordered its experience.

Yet, a deeper connection exists between the idealists and Kant. Kant had identified the knower and the known. He had united the object and the subject by making the object entirely subjective. Although for the most part, the absolute idealists believed in an objective world, it was a world based upon mind, dependent upon mind, and meaningless without mind. The world of

stands in absolute idealism about on the same level as Plato. It is a secondary reality; for it is fragmented and partial. Mind, on the other hand, can grasp the whole of things; it can relate each to everything else. Therefore, mind is of greater reality than matter; for the more universal is the more real.

Thus, idealism with its emphasis upon the whole as the real ignored sense experience. In the spirit of the seventeenth century rationalists following Descartes, logical necessity determines reality and reason can grasp such logical necessity and thus know the whole. However, because sense experience deals only with the particulars, fragments of the whole, it is not an important medium of knowledge.

However, the school of absolute idealism is on the wane today. The philosophy of Hegel, Bradley, and Royce is not in vogue today. Rather, the other road that philosophy followed after Kant is today the most traveled--the road of positivism.

### Logical Positivism

To describe the origins of this movement in contemporary philosophy is not easy to do. Certainly one source is the positivism of Comte. Science, Comte asserted, is the final stage in man's intellectual development; religion was the first stage, while philosophy was the second. However, now science should entirely replace philosophy and religion in western civilization. Science is now the only acceptable medium of gaining truth. The "knowledge" philosophy and religion can present is only opinion, while science can give "facts."

A second source of this movement is Kant's thought concerning the limits of human knowledge--that is, that we can have no knowledge of metaphysical issues. A metaphysical issue, so the positivists were to say, was one which had no referent in sense experience. Beneath this assumption lies the nominalist assumption that all knowledge is derived from sense experience. Metaphysics debates issues such as ontology or God, which are beyond sense experience and thus human knowledge. Therefore, metaphysics is meaningless and men should not involve themselves with these issues that can never be settled. Since science deals with only sense experience (Oh! What a fallacy this is), it is the only acceptable vehicle of knowledge. Thus, the logical positivists combine Comte's positivism with British nominalistic empiricism. Added to this position is Kant's censure of metaphysical endeavor.

The cornerstone of modern logical positivism as found in A. J. Ayer's Language, Truth and Logic is the principle of verifiability. To be meaningful a proposition must have a referent in sense experience that can be affirmed or denied. If such a referent cannot be pointed out, the proposition is meaningless. Thus, the logical positivists hope to exclude propositions such as God or values from human consideration to avoid endless, senseless controversy. As Ayer states in Language, Truth and Logic

all propositions which have factual content are empirical hypotheses . . . . and this means that every empirical hypothesis must be relevant to some actual, or possible, experience so that a statement which is not relevant to any experience is not an empirical hypothesis, and actually has no factual content.

However, the fallacy of logical positivism as developed at Vienna by Rudolph Carnap and then in England by others including Bertrand Russell is this: no empirical referent exists for the principle of verifiability. Therefore, since each proposition must have a referent in sense experience, the proposition which asserts this to be true is itself a meaningless proposition. The principle of verifiability does not have an empirical referent, which it demands of all meaningful propositions. And to have a meaningless proposition as the criterion of meaning is an abused position.

However, this fallacy in logical positivism is a natural result of the empirical tradition it has inherited. Hume clearly demonstrated that without metaphysics, sense experience is a chaotic, disordered world. After the innate ideas were repudiated, Cartesianism fell apart. Kant only reordered it by making metaphysical assertions about the structure of the mind; however, he felt these a priori assertions of the forms and categories could be allowed.

The logical positivists missed this crucial point that empiricism to be meaningful involves metaphysics, that any position involves metaphysics to be meaningful. They felt that a position that refers only to sense experience is devoid of assumptions which go beyond sensory experience. However, their principle of verifiability is a metaphysical assertion. No, if the positivists want to avoid the chaotic, meaningless world of Hume (which actually discredits science), they are involved in metaphysics. As Kant saw and did, the positivists too must and do make metaphysical

assertions to avoid Hume's scepticism. While they ruthlessly apply empirical scepticism to religion, values, and philosophy, they hold back from doing so to science and to their own position.

### The Third Alternative--Realism

The position of modern philosophy to most people is somewhat absurd. A philosophy which disqualifies larger areas of human experience--religion, art, etc.--from meaningful discussion by a principle which even undercuts the philosophy as well--this makes little sense. Yet, to claim that the structures of knowledge such as time, space, causality are only devices of mind to order experience and may not exist in the objective world--this also makes little sense. Yet, this is the dilemma we face, if we accept the Cartesian framework. Either we end in absurd scepticism (that is if we carry the empirical criticisms to their logical result as Hume did) or we claim that mind creates its own world. A third alternative does exist; for if we re-analyze Descartes's starting point, we can find a new possibility.

Descartes accepted an ontology from Galileo of mechanistic materialism. He also accepted the epistemology of science. As seen in the work of Hobbes and in the result of empirical criticism, no place exists in such an ontology for science's epistemology<sup>which</sup> has reference only to mind, not to bodies in motion. However, through our study of Plato and Aristotle, we have seen that epistemology and ontology are quite closely related. Each grows out of the other. A certain ontology implies a certain epistemology. A certain epistemology implies a definite ontology. These two aspects of a philosophy must be harmonious, if the philosophy is to be valid.

Let us take a specific example. Plato's theory of forms as an epistemology implies a certain ontology. If knowledge is of the unchanging, we must know that which does not change. Thus, the forms we know must have a certain ontological status, a certain being, if Plato's epistemology is to stand. Although Plato relates his epistemology to an ontology which supports it, he fails to satisfy the converse--an epistemology which supports the ontology. For in the Parmenides, Plato demonstrated the ambiguous relationship of form to the particular and that because form and particular are unrelated, forms are unknowable. Further, Aristotle solved the epistemological difficulty by a change in ontology--the concrete form, the universal in the particular.

Thus, a close relationship exists between epistemology and ontology. The dilemma facing modern philosophy results directly from the fact that Galileo and Descartes attempted to combine into a philosophy an epistemology and an ontology which did not grow out of each other, but rather were in direct conflict with each other. Of course, Descartes had to pose a dualism, for the epistemology of science and the ontology of mechanistic materialism refer to two entirely different worlds. Of course, empiricism ripped Cartesianism asunder; for Descartes's ontology and epistemology are in direct conflict, let alone not supporting each other.

Let us, however, attempt to discover what ontology the epistemology of science implies. To do this we first must explicate science's epistemology. Descartes and modern philosophy asserted that knowledge begins in objectivity. Knowledge begins

with a "cogito ergo sum" from which all the rest of knowledge comes. Before becoming involved we must find objective "evidence" for so doing. Science in opposition to this approach asserts that knowledge begins in involvement. To acquire knowledge, one must first experiment. He, must, in short become involved with his environment. Although this approach is different in terms of experimentation, science's approach to knowledge gained from perception is the approach most everyone assumes.

For example: if one wants to know if the water on the stove is now boiling, he does not remain in his armchair, wondering what knowledge he has of the water boiling. Rather he strides into the kitchen and over to the stove. He becomes involved in his environment. As he burns his mouth on the tea he has just made, he believes he is perceiving not ideas, but real objects, distinct from him. As one lives day by day, as he eats his meals, reads his paper, and brushes his teeth--he believes he knows objects in environment, not representations or ideas. His experience in perception is one of encounter. He encounters objects in his environment, becoming aware of them as he does so.

Thus, everyone of us assumes a realism in terms of perception as we live our day to day lives. We are quite certain we encounter and become aware of our environment itself, not a representation of it. This is realism--that objects exist distinct from us, which we can directly know through sense perception. If we have no reason to doubt this position which we accept in ordinary life, why should we doubt it. Descartes because of a substantial dualism did doubt it. But as we shall see, science



actually rejects this dualism. Further, science actually uses the everyday approach to perception.

Science views man as an involved organism. Descartes and preceding philosophy viewed man as objective mind. To the latter perception is awareness of ideas. To the former perception is an encounter of an organism with its environment. To the latter perception is only passive. To the former perception is active. An organism to perceive its environment must be involved with it; it must act. As it acts, the organism encounters and becomes aware of its environment. Being aware of, perceiving and encountering one's environment is the same.

An objection might be raised here concerning the reality of the environment we perceive. This objection could be in two forms: one in terms of subjective idealism; the other in terms of nuclear physics. Let us consider the latter first. Our environment, nuclear physics tells us, is made up of moving atoms, not the objects we perceive such as trees, cars, or houses. The table upon which I am writing is actually innumerable atoms, moving and swirling through space. The world of atoms--this is what the world really is. These particles compose our environment; therefore, our environment is not as it seems.

Both pictures of our environment--that which physics shows and that which we perceive ordinarily--are equally as valid. To state that our sensory organs are limited to only one part of reality is a valid assertion. To declare, however, that this part of reality which our senses perceive is not real because other parts of reality exist which we cannot perceive without special

instruments--such as assertion is absurd. For knowledge of the other parts of reality--atoms and sub-atomic worlds, sound waves too low or high in frequency for our ears, or electromagnetic waves with a frequency too high or low for our eyes--all come from perception. Let us not make the mistake that Galileo and Locke made. Either every part of reality we perceive is equally as real or all we perceive can<sup>not</sup> be trusted.

The second objection which could be made toward this form of realism is that of subjective idealism. The subjective idealist would point out that we have no knowledge of things unless we are perceiving them. Therefore, we have no evidence that they exist outside of our perception, and thus have no right to claim that they do. If I left this table and went into another room, this table would not exist, since no one would perceive it. In order to exist, a thing must be perceived.

The issue here is do we have evidence that does our environment and the objects which compose it exist outside of our perception. Of course if no one perceives the Washington Monument in Washington, D. C., we cannot demonstrate that it continues to exist. But to say that it does not exist is absurd. Objects we perceive seem to have a continuity of existence which is not dependent upon our perceiving them. When I return to the room in which the table stands, I am quite certain that the table has existed there, although no one perceived it. Although an argument can be devised against objects existing outside of our perception, the weight of experience lies with the continuity of the existence of objects outside of our perceiving them.

One last issue must be dealt with before closing on the viewpoint of perception that the epistemology of science holds. This issue is error in perception. If a man as he acts within his environment encounters and perceives directly the objects of his environment, how could he have a mistaken perception. How can we have an erroneous perception, if we perceive the object itself? For it would appear that if we make an error in our perception, we have not really known the object as it is. Further, what is this mistaken perception? If it has no object, which it presents, isn't it something like an idea--something existing only in us. These two objections must be answered if this form of realism developed so far is to stand.

Actually, error only presents a problem to realism, if man's perceiving is viewed as a total process. For if objects impinge on our mind, an error means that we do not perceive the object. This would refute realism. However, the form of realism which this paper develops presents perception as an active process. Man must become involved with his environment before he can perceive it. He must act to encounter the objects he perceives--thus, error can be ascribed to his lack of attentiveness in his encounter with the object. In realism where objects impinge their likeness on man's experience, error would indeed present a problem. For if one errors, objects must not faithfully impinge their images upon man's mind and thus man does not know the object. However, in realism when perception is an active process, error can be attributed to man's activity, not to his not knowing the object. If a man is not sufficiently attentive in his encounter with an object, he will err in perception of it.

If one is sufficiently attentive in his encounter with his environment, he will not err. For perception is direct, immediate. It consists of one's becoming aware of an object in his environment. If one is attentive, he can rightly perceive the object. If perception is mediate, indirect, then error means the object of our environment did not create a true image or idea of itself in us. If so, then how can we say we perceive the object. But "direct" realism does not have this problem.

In summary, then, science holds a viewpoint of perception which is the common ordinary approach to perception. To perceive we must be involved with our environment. We must act and encounter it. Upon encountering it, we become aware of it. We are immediately, directly aware of it. We do not perceive it through ideas or sense-datum. We perceive the objects themselves. Also we have begun to see the ontology, the theory of reality, that science's epistemology implies. Our environment is objectively real; it exists beyond our perception of it. It has "being", which is not contingent upon our knowing it. This theory of being is "direct realism." Let us turn to the second half of science's epistemology--understanding--to see in more detail what this direct realism is.

Experimentation, however, is only one part of science's theory of knowing. Not only must we experiment with our environment, but we analyze our findings to find the underlying principles involved. Let us take a specific example. Suppose a chemist wants to understand the reaction of elemental sulphur with permanganate ion in acidic solution. The first thing he would do is to prepare an acidic solution and then put elemental sulphur and permanganate into the solution. After heating gently, suppose the chemist

added barium and found the barium sulfate precipitated. Upon farther analysis of the solution, he found that the manganous ion was present in solution.

After finding out these things, the chemist would then attempt to understand what has happened. It is evident the permanganate ion oxidized sulphur to sulfate and in so doing was reduced to the manganous ion. Thus, the chemist is brought to oxidation-reduction reactions and with barium sulfate to solubility. If he understands both of these, he then understands what has happened in the acidic solution, which contained elemental sulphur and permanganate ion.

Thus, only when the scientist understands the principles involved in that which he is studying, does science claim it "knows" about the situation. Understanding is objective, as opposed to perception which is involvement with one's environment. As to the process of understanding, I leave this again to psychology. But I would like to make two points. One is that this understanding takes place in the neuro-pathways in our cerebrum. Secondly, the electrical impulses that move along these neuro-pathways are the thought we have. We do not understand in a substance called mind, which is non-physical in nature. Mind at most can be only an abstraction, describing the process of thinking. Now these electrical impulses in our cerebrum produce the thoughts we experience is unknown. Yet, thought has a physical structure and is a physical process.

The point of importance to this paper is how can our thoughts understand our environment. How can our reasoning know the principles by which we and our environment operate. In understanding

science develops rational constructs based upon findings in experimentation. These rational constructs such as oxidation-reduction or evolution are genuine explanations of how reality does work. How is this possible? The only answer is that reality is itself rational, that reality is constructed in terms of rationality, which man in his rational thought can understand. If reality is alien to rationality, such as if it is a mechanistic materialism, then rationality could pertain<sup>only</sup> to man's understanding, not to reality. Only if rationality is an essential part of reality, can the rationality science uses to understand reality actually pertain to reality.

Then, what ontology or theory of reality does science's epistemology imply? We have seen in its approach to perception that science implies an objective, direct realism. Further, science in its approach to understanding implies an objective realism in which rationality is an essential part. Thus, reality is composed of physical structures to be sure, but the physical structures are not of the nature of Galileo's "bodies in motion." Rather rationality is an essential constituent of these structures and for the processes in nature which they produce. It is hard to escape our conditioning on this point; for we view reality as inert, material substances devoid of any qualities that we attribute to thought.

To facilitate an understanding of the ontology which science's epistemology implies, I have avoided using the terms mind and matter. Mind implies a part of reality which is not related to a physical structure. Matter implies structures or objects which can never be related to thought. The ontology science implies is one in which

all things are related in physical structures or objects, but one in which these same structures are related to thought and rationality.

Physical structures produce thought. Thought can understand the physical structures which produced it. Evolution has produced an organism which can think and understand evolution. Who can deny that thought and rationality are not related to the physical structures of our environment. Both of these are intertwined, inter-dependent, inter-related. The nature of thought is such that it is related to physical structures. The nature of the physical structures of our environment is such that it can produce thought and be ordered and patterned on the basis of rationality and thought.

This ontology that the epistemology of science implies is quite close to Aristotlianism with the form in the particular, ordering and structuring potentiality. In Aristotlianism thought is an essential component of reality. We can understand particulars because they have been structured by thought or form. Aristotlianism also asserts that all we can know are particulars; but in the study of particulars we can go beyond the particular. The scientist studies the particulars to find principles beyond the particular by which he can understand the particular. In short, one carries out the implications of his findings to their logical conclusion.

So in this scientific spirit, let us carry our conclusions in this paper to their logical result. The first step is to decide whether science's epistemology does lead one to know reality. Anyone who thinks of the products of scientific research from airplanes to cars to drugs can have little doubt that science does work. Science does appear to understand the way reality is composed and the way it functions. If then science's epistemology does lead

me to know reality, the ontology that this epistemology implies must be the correct theory of reality. Since science's epistemology involves rationality and the perceiving of physical structures, then reality must be physical structures composed on the basis of rationality or thought. In short, science's epistemology is an objective, rational realism. If one part of a philosophy is valid, so must be its logical consequent. As we have seen, an epistemology or ontology always implies a specific ontology or epistemology.

Thus, because science's epistemology understands reality in terms of rational constructs and theories, science implies that reality is rational, that thought plays an essential part in reality. From this conclusion two results can be drawn. The first is that the world that the humanities implies is the same as that which science implies. Art, literature, music, religion--all these deal with thought; and science implies that thought is an essential component of reality--it is the "form" of physical structures. Thus, far from discrediting the world of humanities, science declares reality to be dynamic, not static, to be *rational*, not invariable, to have produced thought and to be structured by thought, not to be alien to thought. In short, science provides a philosophical foundation for the humanities.

The second result of science's ontology deals with how reality is structured by thought and thus contains thought. Science implies that an affinity exists between the rational constructs by which we understand reality and the way that reality is structured. This could only be, if thought preceded the structuring



of reality and structured reality in terms of the rational constructs of thought. Or to put it in another way, if the process of cosmic evolution is so structured to have produced thought which can understand this evolution, thought must have preceded this evolution and structured it. This thought before reality is God. Thus, the workability of science implies God. Because of the reality science implies by its being able to understand reality, this reality in turn implies pure thought--God. To be sure other arguments can be developed to explain the emergence of thought in reality by evolution and the structuring of reality in terms of thought. But the preponderance of evidence for this argument makes such other rather thin.

Then in closing, my argument here with the positivist or the Kantian is not over the issues of what we know, but rather over the issue of what the nature of what we know is. I, too, assert our knowledge is of particulars found in perception. But these particulars are such in nature that we can know that which is beyond them. They are concrete in their "physicality," but universal in terms of the thought which structures them. They are, indeed, concrete universals. For what a particular consists of is both its physical quantity and the thought construct upon which it is structured. The one gives a particular concreteness; the other gives it universality.

## BIBLIOGRAPHY

Aiken, Henry D., THE AGE OF IDEOLOGY, New York, The New American Library of World Literature, Inc., 1956.

Berlin, Sir Isaiah, THE AGE OF ENLIGHTENMENT, New York, The New American Library of World Literature, Inc, 1956.

Hampshire, Stuart, THE AGE OF REASON, New York, The New American Library of World Literature, Inc, 1956.

Jones, W. T., A HISTORY OF WESTERN PHILOSOPHY, New York, Harcourt, Brace, and World Inc., 1952, vol. I and II.

Kaufmann, Walter, PHILOSOPHIC CLASSICS, Englewood Cliffs, New Jersey, Prentice Hall, 1961.

Randall, John H., ARISTOTLE, New York, Columbia University Press, 1962.

Santillana, Giorgio de, THE AGE OF ADVENTURE, New York, The New American Library of World Literature, Inc., 1956.