Useful

Francis Bacon (1561-1623), influential in the development of the scientific revolution, maintained that only a very particular sort of knowledge is worthy of pursuing. That knowledge is technological knowledge, the knowledge of how something works. Such knowledge is less the knowledge of why something works. The distinction between applied and formal science was made. It is the knowledge that has direct application and utility for man. Born is the doctrine that what is valued and good is that which is useful to man--utilitarianism. And with this knowledge, man is given power over nature; nature will do his bidding. Knowledge is power. Because it is for man, it should be knowledge made public and shared. In 1620, Bacon published his *Novum Organum* that set out his approach to inquiry and knowledge. To acquire this technological knowledge, Bacon was among the first to propose an inductive method based on observation.

Experience

The English philosopher, John Locke (1632-1704), stated, in *Essay concerning Human Understanding*, that the mind is as a "white paper, void of all characters, without ideas," like an "empty cabinet," as yet unfurnished. The mind is *tabula rasa*, a blank slate. The material to furnish the cabinet is the knowledge that comes from experience. For Locke, all knowledge is founded on observation, the senses. And so is founded the empirical method, i.e., "relating to experience." Knowledge is the precise correspondence between what is observed by the human senses and what exists in the natural world.

The world Locke is referring to is the natural world of physics, chemistry, biology, psychology and sociology. It is a world that exists independent of the mind, with its own structures and governed by its own processes, all of which can be discovered through rigorous observation.

The empiricist begins with observations of the natural world. These observations must be controlled, objective, verifiable and replicative. Subjectivity must be kept out. The observations are based on those senses that can be controlled and objective, i.e., sight, sound, smell, touch and taste. An example of an empirical observation would be--the walls of Jericho are 2.7 meters thick, 3.2 meters high and seven hundred meters in circumference.

The empiricist then forms a hypothesis that attempts to account for the observations. The process is called induction, i.e., reasoning from a limited number of observations to a conclusion or hypothesis. For example, the walls of Jericho are built to keep something out and to keep something safely within them.

From the hypothesis, testing begins. Deliberate, systematic experimentation and extensive observation now occur to discover if the hypothesis is indeed correct or needing revision. The hypothesis is tested. The attempt is to verify what was originally observed. Replication is the criteria for verification. At Jericho, the empiricist might observe the types of objects kept within the walls, distinct from those found outside the walls. What is observed are the trappings of a domesticated people within the walls: quantities of stored food stuffs, valuable trade items, finely crafted tools. All valuable objects. Further observation shows that these objects are not to be found among those who lived outside the walls of Jericho. This would lead the empiricist to conclude that the walls are indeed built to keep something out and to keep
something safely within.

If a reasonable verification results, the empiricist then ventures a prediction of what will be discovered under similar natural circumstances. When walls similar to those at Jericho are found, they are likely built to keep something out and to keep something safely within. The strength and legitimacy of the empirical method is its ability to predict what occurs in the natural world.

Dualism

The French philosopher, Rene Descartes (1596-1650), approached knowledge from quite a different stance than did John Locke. For Descartes, man has ultimate knowledge of his own existence because he is a thinking being -- *cogito ergo sum* -- "I think, therefore I am." Thus the foundations of knowledge consist of a set of first, "self-evident" principles, *a priori principles*. The mind is not an empty cabinet but is filled with universal, though not readily known, principles.

Access to these first principles is not based on "the fluctuating testimony of the senses" nor on the "blundering constructions of imagination." Descartes distrusted sensory evidence as much as he avoided undisciplined imagination. The first principles are those based on "the conception which an unclouded and attentive mind gives." It is conception "wholly freed from doubt," principles derived from clear and logical thought. From these first principles, other truths can be deduced by a rigorous application of logical rules and axioms.

Knowledge is not so much what corresponds to experience but what has coherency within and among the principles and their deduced statements. And so the rational method is born. Descartes published his approach to knowledge in 1637, in *Discourse on Method*.

The rationalist begins with a set of assumptions that are hypothetically true. For instance, Jericho is a community settled by people. The walls of Jericho are defensive walls. Defense is an activity for defending something. All of these assumptions need not be verified by observation, need not exist in fact. They need only be hypothetically correct. Implicit from these assumptions, a deduction can now be made logically. The people of Jericho have something to defend. Mathematically-rigorous formulas are applied in order to arrive at the deductions. The strength and legitimacy of the rational method is its ability to objectively think about the natural world and deduce statements of truth about that world.

* * * * *

"Examining attentively what I was, and seeing that I could pretend that I had no body and that there was no world or place that I was in, but that I could not for all that pretend that I did not exist, and that on the contrary, from the very fact that I thought of doubting the truth of other things, it followed very evidently and very certainly that I existed: while on the other hand, if I had only ceased to think, although the rest of what I had ever imagined had been true, I would have had no reason to believe that I existed; I thereby concluded that I was a substance of which the whole essence or nature consists in thinking, and which, in order to exist, needs no place and depends upon no material thing; so that this I, that is to say mind, by which I am what I am, is entirely distinct from the body, and even that is easier to know than the body, and moreover, that even if the body were not, it would not cease to be all that it is." (*Discourse on Method*, 54)
Rene Descartes made another important contribution. Descartes reasoned that if the mind is capable of clear, objective thinking, then it cannot ultimately be reducible to the influences of the material world. "Mind" and "matter" are the basic constituents of the universe. The defining characteristic of "matter" is extension and movement, i.e., the possession of dimension such as time or space. The defining characteristic of "mind" is thought, i.e., the activity of thinking. Regardless of the way "matter" is extended, e.g., straight or curved, it must be extended. Regardless of the way "mind" thinks, e.g., abstracting or imagining, it must think. Each is absolutely different from the other, requiring nothing but itself to exist. Neither has the properties of the other nor is reducible to the other, yet all in the universe is reducible to one or the other, to "mind" or "matter."

Cartesian Dualism affirms that the natural world of matter is independent of the mind, and the mind is independent of the natural world. Objectivity is possible. The world of the "other" and of man himself have become objects, for study.