

Descartes began with sensation, since that was commonly considered the basis of knowledge of objective reality. He found it wanting. It was already apparent that the senses were deceptive given the evidence of perceptual illusions and the delusions of insanity. Sensory experience may be just a dream or the deceptions of an evil demon (an acceptable idea at that time). After considerable doubting he realized that when he thought, no matter how, or on what, he could not doubt the thinking itself (Pappas, 1998). Thinking was self-evident and, as a corollary, if he was thinking, he existed as a thinker. This led to his famous proclamation of *Cogito, ergo sum* or "I think, therefore I exist." Without going into the details, Descartes reasoned from the certainty of his own existence, and his thinking, that he was innately endowed with ideas that did not come from sensory impressions (nativism). These included mathematical theory and the idea of a perfect being or God. Now, since God is a perfect being, God's perfection would not admit to an imperfection such as His deceiving humans. One was free, therefore, to have confidence in the existence of the external world and in the reliability of one's senses. Locke, in response, would challenge the existence of innate ideas.

7.1 THE EMPIRICISTS

John Locke

According to John Locke (1632–1704), what we know comes from experience; we are not endowed with any innate ideas. The supposed inborn ideas, he claimed, do not exist in children, savages, illiterate people, or idiots (A. Rogers, 1910). To Locke, the mind at birth was a *tabula rasa*, a blank slate, upon which the experiences of the world were written (Brennan, 1982). Nothing in the mind exists that was not first in sensory experience. Whatever knowledge we have only comes from experience. Through sensation one attains immediate knowledge of things, external to the senses, that cause the idea of them (Ayers, 1998). We know of things through their power to produce ideas in us. Such ideas only suggest the existence of things beyond the senses but not their actual nature, their essence, what makes the thing what it is. Our ideas are 'representations' of what has acted upon us. **Representationalism** contends that the sensing mind lacks direct access to objects but understands them through the medium of ideas; ideas represent objects (Flew, 1984).

Locke developed his ideas based on 'corpuscular theory' of the chemist Robert Boyle (1627–1691). To Boyle, the physical world was composed of atoms that possess position in space, motion or rest, size and shape, and without the properties of color, hardness, odor, or sound (Stroud, 1980). Locke accepted that what happens, including perception, is due to the action of physical particles. While that is essentially Galilean, Locke differed from Galileo since primary qualities became ideas produced in us by physical phenomena, mental

representations of the physical particles. 'Primary qualities' became the power of physical particles, when acting upon the senses, to produce in the perceiver ideas that resemble the qualities of physical particles (Flew, 1984). In agreement with Galileo, 'secondary qualities' do not exist in the particles but are the product of primary qualities acting upon sentient beings. They are the power of primary qualities to produce ideas that do not resemble their cause. The qualities of experience do not correspond exactly with object properties. This was demonstrated with the 'paradox of the basins' (mentioned in Chapter 4), wherein the same temperature may be experienced as both hot and cold.

In the end, what we know are our ideas (mental representations) of the world, not the world itself. That, however, raises skepticism about any objective existent. Whether the world is the same as it is experienced did not really concern Locke (Stroud, 1980). He simply supposed that the qualities that are referred to in physical explanations actually exist in those objects. One could be certain that 'simple ideas' (basically individual sensations) are produced by something real beyond oneself; they could not be produced at will or derived from ideas one already possessed (Popkin and Stroll, 1993). They must therefore represent something external to oneself. With respect to secondary qualities, even though they did not resemble their causes, they had to be the result of the power of external things. (This marks the beginning of modern perception theory and the proposition that perception is an interpretation of sensory input rather than direct knowledge of objective reality).

George Berkeley

Bishop George Berkeley (1685–1753) considered the notion of an unperceived existent, some object beyond immediate experience that produces our ideas of things, an unintelligible proposition (Stroud, 1980). If what is known is known through perception, what is known must be of perception. The essence of sensible things is their being perceived. Sensible qualities cannot exist in something unperceived (like physical particles and primary qualities) since that something is just an idea perceived through the senses. Berkeley was referring to all qualities without making a distinction between them as primary or secondary. His point was that all qualities are perceived qualities and, being objects of perception, are 'ideas' that only have existence in being perceived.

Berkeley was not questioning whether ideas of primary qualities resemble objects, but whether any idea can resemble a non-idea, like the unthinking substance called 'matter.' According to Berkeley, "it is evident ... that extension, figure and motion are only ideas existing in the mind, and that an idea can be like nothing but another idea" (Stroud, 1980, p. 153). Berkeley was a thorough-going idealist or **immaterialist**. Whatever qualities exist they depend on mind for their existence.

In proposing that all we know are ideas, Berkeley was in danger of 'solipsism.' What he knew were his own ideas. Certainly he had the capacity to produce ideas but, just as Locke

proposed regarding primary qualities, certain ideas appeared to be outside his control, which suggested an objective reality. Yet since something non-ideational could not produce ideas (remember the excluded middle), what was objective had to be of mind or spirit. The solution was God (Thomson, 1964). Some ideas, which we share with others in common, come to us due to a universal mind within which such ideas are maintained. They thereby continue to exist whether or not any individual currently perceives them. Objective reality exists because it is maintained by God's ongoing perception. Objective reality is not of matter but of mind or spirit (this is known as **objective idealism**—objective because it was external to one and idealism because it was of mind or spirit).

David Hume

David Hume (1711–1776) is a significant figure for the philosophy of science since he formulated one of the major problems that scientists have to deal with—the problem of knowledge by induction. Hume accepted Berkeley's judgment that Locke's primary qualities were known as experienced and that what we know is limited to ideas and impressions (Flew, 1964). He rejected, however, Berkeley's objective reality since sensory experience could not be a basis for knowledge of anything beyond sensation. All one can examine are the experiences and the beliefs one forms on that basis, including beliefs about the supposed objective world. To Hume, the basis of any science was observation and experience, and that demanded examination of the human capacity to know and of what it is possible to have knowledge about.

Locke, Hume believed, had overworked the term 'idea' and replaced it with 'perceptions of the mind' which were of two sorts—primary and secondary or derivative (Hergenhahn and Henley, 2014). 'Impressions,' equivalent to sensations, were primary, resulting from sensory stimulation, and 'ideas' which were the residual images left by impressions. That is all that is presented to mind, not objects or connections to objects. Hume did, at the same time, retain Locke's distinction between 'simple ideas' and 'complex ideas.' Simple ideas were former impressions and complex ideas were amalgams of simple ideas (which need not correspond with complex impressions since mind can rearrange simple ideas). While ideas were open to any recombination, Hume observed that how ideas become associated reveals similarity over individuals, which suggests lawfulness.

Associations were the forces that united mental atoms (ideas) and created compounded ideas. Hume identified three laws of association: 1) the 'law of resemblance'—the tendency of certain thoughts to shift from one event to a similar event; 2) the 'law of contiguity'—the tendency towards recall together events that were experienced together, the one calling up remembrances of the other; 3) the 'law of cause and effect'—the tendency of mind to infer that if, in experience, one event always preceded another, the first event caused the subsequent event. With this third law Hume would introduce a vexatious problem for science and epistemology.

When one examines the different impressions presented to mind, there is nothing to suggest the cause of those impressions, only that they are immediately present. Nor is there anything in the ideas, based upon them, to suggest causality because there is nothing in immediate experience to suggest a necessary connection between them (Baier, 1998). Instead of evidence of causality, what one has is a 'habit of mind' to associate those events that always occur together in experience, in close and regular succession, and to infer a causal relation from it. As Hume (1739–1740/2003) put it, the notion of cause and effect is based on the experience of certain impressions as always being conjoined (separate entities experienced together) and in regular order of succession in past experience. As a result, in thought, the idea of the first evokes the idea of the second. These two are then inferred to be a cause and its effect. Their constant conjunction produces a mental habit that joins them in thought and infers the occurrence of one from the other.

In 'classical conditioning' depicted below, parts 3 and 4 can be used to demonstrate the false assumption of causality based on contiguity, succession, and constant conjunction. Contiguity (nearness in time or space) is represented by the food following closely after the bell has rung. Succession involves the food following the bell. Constant conjunction means that sequence repeats: 1) Bell...Food / 2) Bell...Food / 3) Bell...Food / et cetera. The food reliably follows the bell but there is no necessary (causal) relation between them. The dog, salivating in anticipation, has developed the habitual expectation of food following bell, but bell-ringing does not cause the appearance of the food (the experimenter does).

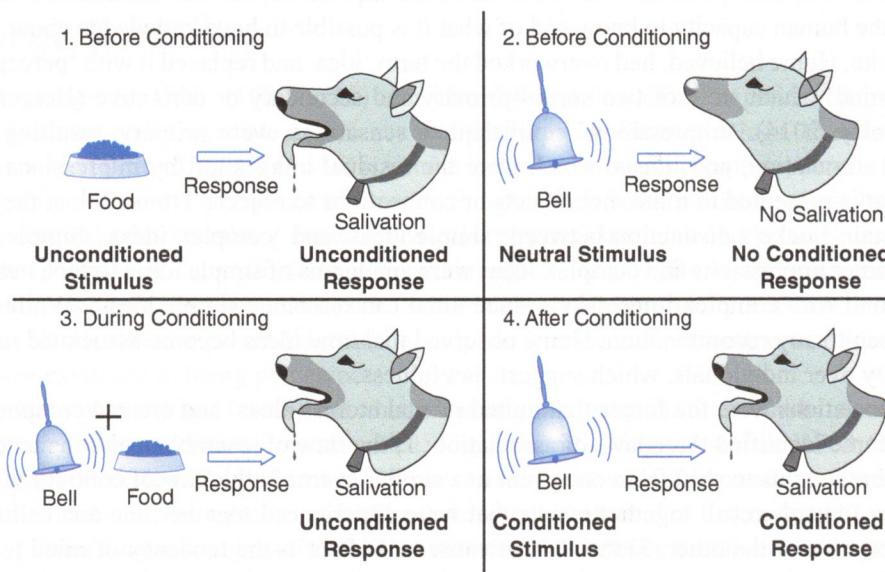


Figure 7.1 Classical conditioning as misinterpreted causality

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Hume's argument (represented in Figure 7.1) is that the idea of 'necessity' is essential to causality but that cannot be derived from observations of immediate experience. All we observe is 'constant conjunction' (appearing together) and 'succession' (one always follows the other). There is nothing in succession and constant conjunction to suggest necessity, but necessity is required for judgments of causality. The inference of causation, due to imagination, is projected to where it will not be found—the world as experienced. Just as causality was a product of imagination, so too were other metaphysical entities like God, matter, and self, since none appeared at the level of impressions (Hergenhahn and Henley, 2014).

A further problem Hume introduced was the **problem of induction** associated with **induction by simple enumeration**. Through inductive logic various instances of a phenomenon are compared and the general proposition, lawful regularities true of them all are identified (Flew, 1964). It is then assumed that this generalization will apply to all unexamined instances. Upon the basis of 'all-known-examples,' assertions are made about 'all' possible cases. The problem is that there is no certainty that contradictory occurrences may not be encountered in the future. Just because every snake I have ever seen has but one head does not mean that every snake has one head. Hume showed there is no basis for certainty and introduced an epistemological problem for science. No matter how many observations of recurrence are made, absolute certainty is unfounded.

WHAT DO YOU THINK?

Given the denial of access to an objective reality, and the removal of causality and order, do you think that science, including psychology, can benefit from Hume or is there something unreasonable with this? Why?

Immanuel Kant and Herman von Helmholtz

Immanuel Kant (1724–1804) took up the problem set forth by Hume's skepticism, his denial of order or causality in experience. He agreed that Hume was correct in concluding that order could not be derived from experience (Flew, 1984). What order is experienced must be derived, therefore, from the operation of the mind since order does exist in phenomenal experience. Kant also accepted that there were no innate ideas. There were, however, innate operations of the mind, organizing conceptual tendencies called 'categories of the mind,' that organized sensory input and provided order to the chaotic sensory impressions. Causation, for instance, did not come from sensory impressions, but it did enter conscious experience. It must therefore be due to mental operations. The object world beyond the senses was inaccessible and unknowable, but it was responsible for sensory experience. The 'thing-in-itself' (the objective realm) was not the world as experienced, as it 'appears-to-us' or as 'phenomena' (Lamprecht, 1955). In this, Kant is a **subjective idealist** (since all one knows is of inner mental experience), phenomenal and solipsistic.

Hermann von Helmholtz (1821–1894) was a famous physiological psychologist who developed the ‘trichromatic theory’ of color perception, the ‘place theory’ of auditory perception. His theory of perception, ‘unconscious inference theory’ (previously discussed in Chapter 4) was his response to Kant and underlies modern perception theory. Whereas Kant is considered a rationalist for his emphasis on reasoning processes (categorical organization) in knowledge, Helmholtz was an empiricist. He found Kant’s position untenable and rejected innate mental categories. He accepted organizing principles, but was intent on establishing an empiricist account of how they were a product of experience.

It was well-established that humans, in their perceptual experiences, are susceptible to illusions. The false experiences that were the basis of the ‘doctrine of specific nerve energies,’ such as a blow to the ear producing a ringing experience, seemed to suggest that whatever is acting upon the sensory receptors need not result in an experience that is consistent with it. Furthermore, the information available at the level of sensory processing was impoverished with respect to the richness of conscious experience. The retina, for instance, is composed of three types of color receptors whose stimulation translates into the full color spectrum of experience. Also, the retina, a two-dimensional structure, could not provide the basis for the perception of three dimensions, specifically depth/distance (Helmholtz, 1867, in Southall, 1925/2000). Perception did not correspond with input at the level of sensory registers.

Just as perception and sensation were inconsistent, the qualities of sensation did not correspond with the qualities of external excitants (Helmholtz, 1869/1971) as the doctrine of specific nerve energies demonstrated. The sensory report was inadequate to give a report of the external world. The percept therefore required mediation from within, internal processing acting on the sensory presentation, like Kant’s categories, which delivered its product to consciousness as the completed percept (Helmholtz, 1867, in Southall, 1925/2000). These mediating mechanisms were acquired through experience. The mind/brain is empty initially, but as a result of accruing sensory impressions, builds up a store of experiences. These serve to symbolize the inaccessible and unknowable objective reality. So, instead of innate categories, one builds up a store of experiences that are drawn upon in processing current sensory input. Our ideas of things, our perceptions, are not the things as they are in the realm beyond the senses, but inferences, made unconsciously, about those things. The impoverished stimulus input is compared with the store of prior experiences, outside of consciousness, and from that a speculation called the percept is produced and appears in consciousness. Upon that basis, one is able to act correctly in the inaccessible world. Correctness of perception is determined by acting and then receiving a new set of sensations that confirmed one’s expectations regarding what sensations should follow from acting in the unknowable world. The store of acquired experiences thus replaced Kant’s categories in analyzing sensory input.

Consistent with Locke, Hume, and Kant, Helmholtz accepted that what is known is not objective reality but ideas about that reality. The world was simply unknowable. With Locke and Kant, he believed in an unknowable world beyond the senses that produced sensations. These would become epistemic problems in later philosophy of science. What Helmholtz

<u>The world of objects</u>		<u>The world as it appears</u>
<i>Galileo</i>	Primary qualities	S
<i>Locke</i>	Objects	E
<i>Berkeley</i>	Objective idea	N
<i>Hume</i>	Objective world (unknowable)	S
<i>Kant</i>	Thing-in-itself (unknowable)	E
<i>Helmholtz</i>	Unknowable objects	S
		Secondary qualities
		Primary/secondary qualities (ideas)
		Secondary qualities
		Perceptions of the mind (impressions, ideas)
		Categories of mind
		Acquired experiences Unconscious inferences

Figure 7.2 Stages in the empiricist debate

advocated, as would later philosophers and psychologists, is known as **indirect realism** (see Box 7.1 for a discussion of indirect realism in experimental research into perception). Figure 7.2 summarizes the trends discussed to this point.

BOX 7.1 INDIRECT/DIRECT REALISM IN PERCEPTION RESEARCH

Traditional perception theory has been based on the experimental demonstration of the inconsistency between perception and objective reality, as perceptual illusions demonstrate. Physiologically, it is concluded that too much processing mediates between object and percept (object → light → retina → optic nerve → occipital lobe → conscious percept) for the percept to reflect the world as it is—see Figure 7.3 below. This leads to an assumption of

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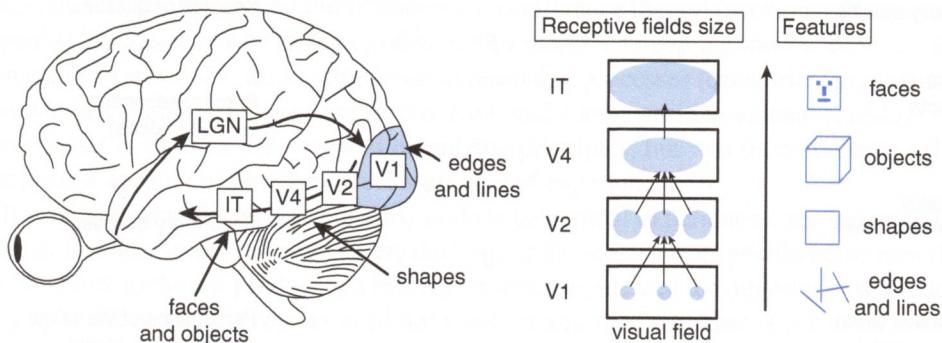


Figure 7.3 Stages in visual processing

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indirect realism, but Wilcox and Katz (1984) contend that there is a contradiction in this—a confusion of two epistemologies since **direct realism** is relied on in proving indirect realism.

How, asked Wilcox and Katz, can one 'know' that a perceiver's reconstruction of current sensory input is in error or not? In experimental proofs it is the psychologist who judges the discrepancy between the world as it is (experimental stimuli) and the world as perceived (by experimental participant). Wait a minute! In order to make judgments of correctness/incorrectness, the psychologist must have direct access to the world as it is. This assumes direct realism for the psychologist in order to prove the indirect realism of the participant. It is logically absurd to hold one epistemology for psychologists and another for non-psychologists. Both are human perceivers. They either both perceive indirectly or both perceive directly. Being a psychologist does not establish a privileged epistemological position.

Wilcox and Katz proposed a thought experiment: Imagine that the psychologist and the experimental participant switch places. Now the experimenter only has access to sensations and representative knowledge and the former participant has direct knowledge. Obviously, nothing has really changed—changing roles does not alter perceptual processes. Human is human, psychologist or not. Being humans all, we cannot have two epistemologies, one for the psychologists and another for everyone else. Either both are direct realists or both are indirect realists. If judgment favors indirect realism, the psychologist can say nothing because s/he cannot pass beyond sensation to the external world and that leads to solipsism. If one accepts realism, on the other hand, as a basis for knowledge, one can justify reference to the objective world, other people, and accumulated human knowledge. While Wilcox and Katz did not address it, even the argument from stages in brain processing assumes actual access to, and knowledge of, the brain in order to make the case for the inaccessibility of objective reality.

7.2 POSITIVISM

Auguste Comte

Auguste Comte (1798–1857) conducted a historical analysis of the development of the sciences and identified three stages they passed through as they progressed towards what he considered the positive approach (Mazlish, 1967).

- The first, the ‘theological’ stage, was characterized by a projection of human qualities onto nature, and supernatural explanations, as with gods of thunder or sea, reflect the period (anthropomorphism and animism). These were human inventions not based in fact, not observed directly (Acton, 1951).
- During the ‘metaphysical’ stage, gods were replaced by metaphysical, conceptual abstractions, that were not within immediate experience (Mazlish, 1967)—Hume’s issue. Ideas of natural laws, human nature, substances, and so on, prevail in speculative explanation but they are not present in immediate experience.
- The final ‘positive’ stage abandons laws, metaphysical first causes, and absolute knowledge claims. Positive knowledge rests upon observation alone. Observation was not restricted to sensation though. The scientific task was to observe and formulate hypotheses regarding the invariable relations between phenomena, verified in subsequent observations. What conceptions are used have to refer to phenomena only (Acton, 1951).

Positivism rejects metaphysical speculation and focuses on observable, verifiable facts (Abbagnano, 1967). That meant excluding traditional philosophical concerns that were outside empirical investigation—causality and objectivity, idealism and materialism, and religion were dismissed (Naletov, 1984). What was beyond the limits of experience did not accord with positivistic empiricism (Hume’s point). They were speculative, senseless, and non-scientific. In place of speculations Comte emphasized observation, experimentation, description of observations, and generalization based on observation. Unlike Hume, a fact is not in reference to sensations; Comte is aligned more with French ‘common sense realism’ which opposed subjectivism and believed knowledge was of the world (Acton, 1951).

Ernst Mach

Whereas Comte was associated with common-sense realism, the physicist and philosopher Ernst Mach (1838–1916), was aligned with Hume’s empiricism and phenomenism. All one can know of anything is through sense experience; sensations constitute the world, including

oneself and others (Mach, 1890/1897). What we know are sensations: “the world consists only of our sensations” (p. 10). Actually, Mach preferred to speak of ‘elements’ rather than ‘sensations’ because the term sensation carried vestiges of a one-sided theory (presumably the inherent subjectivity of traditional empiricism). Whereas Kant had posited an inaccessible realm beyond the senses, different from phenomenal existence (the ‘thing-in-itself’), Mach considered that notion “monstrous” and “superfluous.” Both outer and inner world are composed of these elements and the purpose of research is to determine the connections between them. Sensations are not produced by bodies; bodies too are complexes of these elements (the body is a ‘concept’ derived from sensations). Bodies are symbols of thought based on particular sensation complexes. According to Mach, physicists are mistaken in considering bodies real, abiding existences, rather than transitory sensations. Matter, too, is just a mental symbol for a complex of elements that are sensuous. All are concepts based on recurring sensation complexes.

The subject-matter of all the sciences was the same to Mach. Where they differed was in terms of which set of sensations, and relations between sensations, they attended to. When our gaze shifts from the sensations that one science focuses on to those of a different science, nothing has actually changed, they all form a whole. When dealing with color as a physical object, a light source, one is within the field of physics and when dealing with it in terms of the retina and optic nerve it is physiology and psychology. Mach conceives of the sciences as unified, given sensation is the common object of study. The world of sense belongs to both the physical and psychical domains; there is only one kind of element. Due to this common subject matter Mach, and others, would posit a unity of the sciences.

The aim of every science is to describe its observations in terms of sensations. What we call laws are merely descriptions of the relations between sensations. Laws summarize past experiences; they mentally represent the sensuous facts in general, and support prediction of future experiences. Descriptions are what constitutes explanation in science and explanation does not invoke metaphysical concepts like causes. There is no need of unknown, unknowable processes behind the interdependence of sensations (Mach, 1905/1976). An isolate ego (self, mind) is a provisional fiction, as much as the isolated object, given that both are different aspects of element complexes. They are objects of experience that enter consciousness and are identical in that they are element complexes. By restricting oneself to the description of the functional relations that existed between sensations, there would be no need to introduce unnecessary metaphysical notions like causes (Winston, 2001). The goal of science is to seek the most economical description of the largest number of observations rather than explanations based on unobservables (Robinson, 2000a).

Within psychology Edward B. Titchener (1867–1927) and Edwin Boring (1886–1968) were supporters of Mach’s philosophy of science (Winston, 2001). Titchener accepted that description was the aim of science (Danziger, 1979). He had adopted a form of positivism in basing his subject matter on the direct experience of what is given to consciousness.



To Tolman (1992), John Watson, the arch-behaviorist, in emphasizing a science based solely on what was observable, was emphasizing immediate experience too, and in that he was a phenomenalist and **presentationist** like Titchener (and Mach). **Burrhus F. Skinner** (1904–1990) wrote that his “debt was to the empiricism of Mach” (1987, p. 208). Having read Mach’s *Science of mechanics*, he (1979) began to deal with the reflex in Machian terms. Skinner (1953/1965), rejected the terms ‘cause’ and ‘effect’ and replaced them with changes in independent and dependent variables; what were cause-effect relations became functional relations (akin to Mach seeking functional relations between sensations). Skinner, however, replaced Mach’s sensations with ‘stimulus,’ ‘response,’ and ‘reinforcing stimulus’ but, after that, their philosophy of science was basically the same (Kitchener, 1996).

7.3 LOGICAL POSITIVISM

Positivism has been influential in biological and physical science but, by the 20th century, scientific findings, such as Einstein’s ‘relativity theory,’ were challenging the approach (Hilgard, 1987). The assertion that science must be restricted to observables constrained scientific work. It was becoming clear that a number of theoretical concepts, unobservables, were essential (Hergenhahn and Henley, 2014). In physics and chemistry, concepts like gravity, valence, electromagnetic fields, atoms, and electrons could not be bypassed. Such unobservables were crucial to their explanations of what they observed and had to be retained, while still avoiding unverifiable metaphysics. A group of philosophers, called the ‘Vienna Circle,’ proposed **logical positivism** as a solution. Theoretical terms (referring to unobservables) would be accepted if they could be connected to observations, but empirical observation was the ultimate authority.

Precursors

Henri Poincaré (1854–1912), a mathematician, considered himself an empiricist who disallowed reference to an objective reality, only sensory impressions (Alexander, 1964). Lacking access to what lies beyond, mathematics and geometrical principles were not derived from experience but they should be given privileged status, like Kantian categories, independent of experience. This is known as **conventionalism**, the positing of certain truths from the start (like mathematics or logic). Rather than proven, these truths were a matter of agreement among adherents—by convention. Theories based on conventions were not meant to yield ‘truths;’ they served as aids in coping with empirical data as given (Hung, 1997). That certain statements could be asserted, simply upon the basis of convention, was accepted by logical positivists.