# Psychology

## Pythagoras to Present

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# 1 History, Psychology, and Science

If I have seen further, it is by standing on the shoulders of giants. (Isaac Newton, in Ferris 1988, p. 362)

Bernard of Chartres used to say that we are like dwarfs on the shoulders of giants. (John of Salisbury, 1159, in Ferris 1988, p. 41)

Gell-Mann . . . remarked . . . that if he had seen further than others, it is because he was surrounded by dwarfs. (In Ferris 1988, p. 310)

Progress, far from consisting in change, depends on retentiveness. . . . Those who cannot remember the past are condemned to fulfill it. (Santayana 1905)

## The Relevance of History

Pythagoras was one of the most influential people who ever lived, according to an authoritative commentator (Russell 1945), since he strongly influenced Plato, who was perhaps *the* most influential writer of all time. Plato's works strongly shaped the thinking of early Christians, especially St. Augustine, as well as the thought of countless others, including Sigmund Freud. Platonic thinking has so permeated Western thought as to be taken for granted, and a sketch of twentieth-century psychology shows that Plato is strikingly modern, though he died in 347 B.C. Aristotle also lived over two thousand years ago, yet a sympathetic modern interpreter of B. F. Skinner's psychology suggested that Aristotle understood Skinner's doctrines better than did the famed behaviorist himself (Rachlin 1994).

Further, at about the turn of the twentieth century, James Rowland Angell and John Dewey both noted that the new "functionalism" that had developed in America was a return to Aristotle's views, and sixty years later the novelist Ayn Rand described Aristotle as the source of the values that made America great. Aristotle also taught a doctrine that 2,000 years later would be called "self-actualization" by Goldstein, Maslow, Rogers, and others. Even Jean Piaget's conception of the mind of the very young child is precisely Aristotle's, a view very different from that of conventional psychology.

*And Aristotle is only one individual* in the long history of thought that has preceded modern psychology. Plato was even more influential—he greatly influenced Freud, as well as countless others. Both of these Greeks of antiquity are worth knowing, as are many other ancient and not-so-ancient thinkers—not just because we should know the precursors of modern views but because these ideas are frequently *better* than modern ones. That is why history is relevant.

**Presentism: History as Justification for the Present**

Those who dispute that conclusion include those who argue that our predecessors, surely including the ancient Greeks, knew nothing of the science and technology of the twentieth century, which represents the culmination of advances in our knowledge of physics, chemistry, and biology over the centuries. According to this view, the gain in knowledge has progressed continuously, sometimes quickly and sometimes slowly, but change has virtually always meant *improvement*, and the current state of affairs is the best that has ever existed. This seems clear in the natural sciences, where it is absurd to compare current knowledge of particle physics or astronomy with the state of knowledge of the nineteenth century, to say nothing of comparisons with that of the ancient Greeks.

This point of view is *presentism*, and it values history only as an arrow pointing to an ever-better future, so that knowledge of history is helpful only insofar as it shows which way the arrow points. Since current knowledge incorporates all that is of value in the past, it is better to know the present well than to wallow in the scrap heap of outmoded and discarded ideas. Authors who embrace this view often boast that their reference list contains no entries more than ten or twenty years old.

Presentism is compelling when applied to well-developed disciplines that can now point to clear technical advances. Thus, having no access to anything like the Stanford linear accelerator, Descartes was unlikely to progress far in the analysis of subatomic particles, and we may safely ignore his views on that subject. Presentism is still plausible, though less convincing, when applied to the biological sciences, where our conceptions of the nature of life have not greatly changed over the past several thousand years. But what of psychology at the turn of the twenty-first century?

An overview based on a consensus of popular textbook presentations would run pretty much as follows:

1. Psychology is the study of mind and behavior, which are two different things.

2. The mind is almost synonymous with the brain. The mind is composed of faculties, or powers, such as attention, memory, and reason, and these faculties are localized in specific brain centers or distributed in specific neural networks.

3. The senses, such as vision, are directly analogous to input channels —sensory information enters and is "processed." Seeing and hearing are somehow brought about by nerve cells in the brain.

4. The mind/brain is profitably viewed as a "wonderful computer."

It is almost impossible to entertain the idea that this is the best conception of psychology that has ever existed. In fact, it is not greatly different from Plato's psychology!

There is a lot that is good in Plato, but it's not his psychology, and we can do better if we try. It *is* difficult, because the mind/brain/computer viewpoint is pervasive and actually remolds history, as presentist writers compose new histories by selecting material that contributes to the appearance of an unbroken ascent to the currently popular model. Thus, writers find "anticipations" of modern views in the thought of the ancients, and Aristotle is portrayed as an empiricist/associationist, hardly distinguishable from the simple associationists of the early twentieth century!

## What to Expect in This Book

### A Note on Historiography

During the second half of the twentieth century, many authors pointed out that extant histories of psychology (and other disciplines) were deeply flawed. Just as histories of nations had been strongly slanted to conform to the biases of jingoist authors, histories of psychology were biased. There was great wringing of hands and attempts to right the wrongs that had been done to Wundt, to Fechner, and even to Watson and Skinner. And there was acknowledging of the difficulty in writing history, since the actors were long gone and documentation of their work was scattered or completely unavailable. The reader was to bear in mind that the writing of a history is a creative act, so that the writer's personal history must be taken into account.

One may disagree strongly with that argument! Such subjective factors may be the case in writing political histories, but they are of no concern to us. The fact is that the subjects of our history are indeed long gone, but they left writings that are authentic beyond any doubting, even when we consider writers who lived in ancient Greece. In a later chapter, we will read a brief poem that has been attributed to Plato and, in any event, was translated by Percy Shelly. There is no telling whether that is authentic. We will also read a passage from the *Theaetetus* concerning the nature of our experience and we may rest absolutely assured that Plato wrote it! We may be similarly sure that Aristotle wrote or dictated *De Anima* and *Nichomachean Ethics*. If we read those original sources, assuming fair translation, we can know that we are getting the author's account firsthand. We may interpret it differently than intended by the author, but that is possible with any account, including the one you are reading now.

Had psychologists read Wundt in the original, rather than relying on obviously misleading translation, there would have been no need to correct so many mistaken conclusions regarding his theories. Everything in this book derives from original sources or impeccable secondary sources—but here are my biases.

### The Author's Biases: Guiding Themes

This is a history of *ideas*, more than of people, and we will see that several main themes run through the past 2,500 years. These are as follows:

- ***The nature of mind***—is it different in kind from matter, or are both matter and mind merely aspects of some underlying reality? Perhaps mind is all that exists and matter is illusion. Or perhaps mind is illusory. Each of these views had its defenders and continues to have defenders today.
- ***Statics and dynamics***—is psychology best viewed as a process, as activity? Or may it be better treated as interactions among things? For example, is sensation best seen as the taking in of copies of objects or as an activity we perform?

- ***The nature of knowledge/belief***—what can we know and how do we know it? Is all knowledge and belief the product of sense experience, or are we born with innate knowledge? Perhaps we are born with mental categories that determine how we will construe the world.
- ***What is the self?***—Is the self a stable entity that is born, lives, and dies, or is it a constantly changing thing, so that we are not the same "self" in youth and in old age?
- ***The question of ethics***—what is the best way to lead our lives, and what is the goal of life? Should we seek happiness, or is there a better goal, as the Epicureans and Stoics believed?
- ***The nature of will***—what is free will, and is it only an illusion? How do we account for our voluntary, "willed" acts?

Many other questions will arise, needless to say, but those are the important ones. They are the questions that are important to psychology, as opposed to those of interest only to philosophy or to history. Also important to psychology is the nature of explanation and the definition of science, a topic that we will consider very briefly.

## A Note on Science and Explanation

Early in the twentieth century a group of Austrian philosophers attempted to establish the definitive "philosophy of science," laying out the rules by which science progresses and delineating science from nonscience. Their efforts exerted a great influence during the first half of the century, but by the end of the century, it was widely agreed that their contribution was of questionable value. The philosophers of the "Vienna Circle" had produced *Logical Positivism*, which we should not confuse with the positivism of the nineteenth century.

### Positivism

This is the view that our descriptions and explanations of phenomena must be anchored in sense experience. In its simplest form, it demands that our accounts be "sensible"; we must be able to refer our audience to happenings that are describable in sensory terms. For example, *phlogiston* was a substance proposed by two German chemists, Johann Becher and Georg Stahl, in the eighteenth century to account for what we call combustibility. The problem with phlogiston was that it was supposed to be a substance, but one that had no effects on our senses and was thus undetectable. However, its supposed existence could make sense of many chemical phenomena, as well as rusting, burning, and the like, and research based on the phlogiston theory may have transformed alchemy into chemistry.

Historians of science nonetheless treat the phlogiston theory as an unprofitable diversion and an impediment to the proper chemistry that was introduced by Lavoisier. And phlogiston was surely not a concept compatible with the new positivism. August Comte wrote a six-volume treatise, *Philosophe Positive*,[1] that described a progression in science from theocratic to metaphysical to positive. Theocratic accounts invoke the supernatural, whether fire and rain gods or the Judeo/Christian God, to account for the existence of nature and the course of events. Comte saw metaphysical explanations as an improvement, though still unsatisfactory. They refer to "things beyond the appearances"—Plato's Forms, Kant's noumena, and Descartes's intuitions—which refer to agents that are incomprehensible, since they transcend the senses. The positivists will have none of this, correctly charging that metaphysics is (literally) nonsense.

Comte was only one of a long line of thinkers, from Francis Bacon through Ernst Mach and B. F. Skinner, who made a simple and powerful argument. That is, if we wish to explain something, we must stick with the sensory experiences that define that thing, and if we devise a theory that relies on unobservable, "nonsensical" agents, we are far astray. Ernst Mach, an Austrian physicist and positivist, who is frequently misunderstood, was a modern positivist. He argued against non-sensory constructs such as the atom and the electron, so he was routinely criticized for disallowing things that were commonly accepted. However, if you look into the history of the concept of the electron, you will find that Mach may have had a point. The electron apparently does not exist as a *thing*, and we mislead ourselves if we believe in a subatomic world of tiny solar systems, with nuclei and electrons as sun and planets.

**Objectivity**

This is, of course, the most frequently cited characteristic of science, and it is sad to be charged with failure to be "objective." But what is objectivity? We are told that to be "objective" is to be impartial–unbiased, and we know, as did Aristotle, Francis Bacon, and many others, that we are always biased. The trick is to be properly biased, which must mean to be biased as are other people. Objectivity, as reflected in agreement among observers, has its problems, however. There have been many opinions shared by many people over many centuries that we regard as obvious nonsense. Many still believe in astrology, magic, and learning while asleep, so consensus need have nothing to do with objectivity and the essence of science. Maybe verifiability is the hallmark of science and "objectivity."

**Verifiability**

Edmund Halley had plans to calculate the distance of the planet Venus from the earth by observing its transit time[2] from two widely separated spots on earth. This was a fine idea in 1716, but the opportunity for such observations comes only rarely. In the case of Venus, the next opportunities would be in 1761 and 1769, by which time Halley would be over a hundred years old if he were living at all. All he could do is urge others to do the work.

And what kind of a criterion is verifiability? It specifies that an objective statement concerns an observation that can be repeated by the same observer or by someone else. For example, the action of sulfuric acid on marble is capable of objective description—I may observe it repeatedly or we may observe it. Notice that this way of defining "verifiable" makes clear that it is essentially the same as *intersubjective*, or equivalent to *public knowledge*. Agreement by more than one observer is a simple case of verification and, as we know, verification is not enough!

**Peirce and Popper: Refutability**

Karl Popper (1963) argued persuasively that verification is a poor criterion for "objectivity" or "scientific meaningfulness," using an argument similar to that made by physicist and philosopher Charles Sanders Peirce in 1878. That is, if one were truly to verify something, say the relation between thunder and lightning, one must make enough observations of thunder–lightning to be confident of the relationship. But how large must that sample be?

As Peirce pointed out, there is no large enough number of observations that we can make to assure certainty, given the number of potentially observable instances that have occurred over the millennia, each of which might have provided a counterinstance. This holds for observations and for experiments of whatever kind, and Peirce suggested that conducting an experiment to determine whether some part of nature is orderly or not is equivalent to putting a spoonful of saccharine into the ocean in order to sweeten it.

In the same vein, Popper argued that *refutability* is the hallmark of scientific statements, since nothing can be truly verified, for the same reasons given by Peirce. But statements can be shown false, given a single counterinstance. I need only one case of an object falling in a vacuum and accelerating faster than thirty-two feet per second, and a "law" is broken. Refutability, not verifiability, is the criterion for objectivity, or the guide to deciding whether statements or questions are meaningful or vain.

**Meaningful Questions** By meaningful questions, Peirce and Popper meant those that we can hope to answer decisively. Such questions must be cast in such form that refutation is possible. We cannot ask, to use an example from Peirce, whether the taking of the communion is really properly interpreted by the Catholic Church or by Protestant denominations: is the taking of the sacraments really the taking of the body and the blood of Christ, or is it symbolic? What experiments could be performed and what observations could be made to settle the issue? None that we can conceive; hence, the question is not meaningful. By the same token, Popper was inspired to adopt the criterion of refutability when he was struck by the apparent *irrefutability* of Freudian theory, compared with the refutability of Einstein's theory of relativity.

Many common questions are meaningless—unanswerable because there are no observations that could allow their refutation. "Are humans basically good or evil?" "Are all things in the process of self-actualization?" *Good* is an undefined—or vaguely defined—attribute, and self-actualization is a name for the fact that things change over time. Could any observations answer either question? What of astrology, an ancient discipline as popular now as it was three thousand years ago? Can an astrological prediction be tested—shown to clearly be wrong? Or are the predictions sufficiently vague that a believer can find confirmation in them?

When believers overzealously seek confirmation of predictions made in chemistry, physics, or biology, the case is different. Consider the almost-daily discovery of cures for cancer and the demonstrations of cold fusion in the late 1980s. In the case of "the cancer cure of the moment" and cold fusion, accepted criteria for testability and falsifiability settle the questions for most researchers. In astrology, such issues can never be settled. That is why astrology is not science—we might wonder whether much of psychology is in a similar state. For an insightful and refreshing discussion of explanation in psychology and in science in general, see Machado and Silva (2007).

## Progress in Science

### Boring and the Zeitgeist

Many accounts for the progress of science emphasize the influence of the times in which advances occur. Thus, Newton attributed his success to his predecessors, such as Galileo and Kepler, who provided the "shoulders of giants" on which he stood. Freud's insights on unconscious motivation were amply supported in Fechner's writings, and his theories of biological drives and energy were held earlier by his teacher, Ernst Brücke, in whose laboratory Freud worked during his student years. Where would Darwin have been if there were not ideas of evolution in the air all around him? His grandfather, Erasmus, as well as Malthus and Wallace, more than paved the way; given the zeitgeist of the early nineteenth century, someone was bound to propose a plausible theory of evolution by midcentury. If not Darwin, someone else would have played the part.

Edwin G. Boring (shown in figure 1.1), whose views (1950) on the history of psychology exerted tremendous influence during the twentieth century, was a prime exponent of the zeitgeist (Hegel's "spirit of the times") interpretation of the progress of science. According to this view, progress is an accretion, the building up of facts and the evolution of theories, so that Newtons, Faradays, Freuds, and Madam Curies are inevitable, given their precedents. This is the point of view taken for granted by the public at large and by the traditional philosophy of science, whose job it is to pass on the "received view." It is the way that all of us are taught to see the progress of science, both in high school courses and in college. And this view has to be at least roughly true, since we have seen progress over the centuries, at least in technology. But did this all happen gradually, as a function of the zeitgeist?

### Kuhn's Revolutions

Kuhn wrote of the moment, in 1947, when, while reading Aristotle, he made his own great insight.

**Figure 1.1**
Boring. Courtesy of the Archives of the History of American Psychology, University of Akron.

Over the last thirty years, "The Structure of Scientific Revolutions" has sold over a million copies, an astonishing number for a work of serious scholarship.

"I'm much fonder of my critics . . . than my fans."

Kuhn even tried to take back the word "paradigm," suggesting instead "exemplar." (All four quotations are from Gladwell 1996, p. 32)

Thomas Kuhn, with a Ph.D. in physics, published an unlikely best seller, *The Structure of Scientific Revolutions* (1962), for a series of monographs called the International Encyclopedia of Unified Science. Philosophers had made science, the most exciting of disciplines, dull and plodding—the zeitgeist raises enthusiasm in few. Kuhn showed that the progress of science is not the slow accretion of accomplishments by one generation that lays a foundation for the next. Instead, it is a series of "intellectually violent revolutions," separated by peaceful interludes. The fact that he specifically excluded psychology and other social sciences need not concern us—his book stirred sociology and psychology as much as it did the natural sciences, where it clearly applied.

The influential little book proposed that science was a social enterprise characterized by *revolution*, not evolution. Far from an orderly accumulation of facts that add to a universally shared view of reality, Kuhn argued that science shows revolutionary struggles, leading to fundamental changes in the way that whole sciences are construed. Later viewpoints are not necessarily more "scientific" than earlier ones, and there is nothing essentially unscientific about Aristotelian dynamics, phlogistic chemistry, or the thermodynamics of caloric. These worldviews were simply replaced by other worldviews, following a sequence that probably has more to do with the *sociology of science* than with "science versus pseudoscience."

Kuhn examined the circumstances surrounding some of the acknowledged "turning points" in the history of science, those associated with Copernicus, Newton, Lavoisier, and Einstein. In each of these cases, the scientific community eventually rejected a set of time-honored beliefs and adopted a new set. A marked discontinuity in thinking occurred in each case—*revolution*—rather than a gradual evolution in thinking as findings "accumulated."

Kuhn used the term *paradigm* to refer to a set of beliefs shared by virtually all workers in a scientific field. Newton's mechanics serves as a familiar example—a paradigm that treats space, time, and mass as absolutes and that successfully accounts for an amazing variety of phenomena, ranging from the motion of a projectile to the falling of leaves to the orbiting of planets. This paradigm, that treats the universe as dead, purposeless matter obeying universal mechanical laws, replaced the mechanics of Aristotle, which envisioned the universe as filled with purpose and composed of "essential natures." With Newton's triumph, we no longer saw plants as "trying" to grow and stones as falling due to their "jubilance" in returning to earth.

A paradigm includes all the beliefs that are taught to professionals in a field, and no one ignorant of the paradigm can be taken seriously as a scientist. Newtonian physics, Darwinian evolution, and the astronomy of Copernicus were all paradigms, as were their predecessors, the physics of Aristotle and the chemistry of the phlogiston theory. But, as Kuhn described paradigms, it is clear that there have been none in psychology, since no general framework of interpretation has been universally accepted. While philosophers of Newton's time might question the fundamental status of time, no physicists did, and, while some question the details of evolutionary theory, no biologist questions the theory in general aspects. No such state of affairs has existed in psychology.

**The History of Paradigms** Given a paradigm, *normal science* never involves real discoveries; rather, research is concentrated on *puzzle solving*, or showing how more and more phenomena of interest can be explained within the framework of the paradigm. The scientists of the Enlightenment of the eighteenth and nineteenth centuries were not trying to discover new phenomena—they were trying to fit all phenomena into the mechanical space/mass/time framework that Newton had used to explain the motion of bodies. Does the fall of a stone exemplify the same laws shown in the flight of an arrow or of a comet? Are the bodies of animals *and* of humans merely complicated clockwork mechanisms? All efforts aimed to show that the laws at hand could encompass all reality.

The normal science paradigm chugs on for years or for centuries, with ordinary puzzle solving sometimes bothered by *anomalies*, or findings that seem foreign to the paradigm. In physics, the finding that heavier objects do not fall faster in a vacuum was a difficult anomaly for Aristotelian physicists.[3] When anomalies become numerous enough or serious enough, the paradigm is modified to deal with them. This blurs the paradigm, of course, and, in the classic example, the geocentric theory of Ptolemy[4] endured for over a thousand years because Ptolemy had modified it so much with added eccentrics and epicycles. It thus accounted for otherwise anomalous observations of heavenly bodies, but everyone knew that it was so bizarre that it could represent no conceivable reality.

Kuhn proposed that the final stage is that of *crisis*, where the paradigm is defended by the old generation of scientists, if only because it is in that paradigm that their reputation and prestige are invested. Younger scientists lack that baggage and so join their senior dissenters who have brought about the crisis. All of this finally leads to the dissolution of the paradigm and its replacement by a new one. Aristotelian physics would never have left unless Newton's paradigm had been there to replace it.

**Do Revolutions Really Occur?** Kuhn saw science as a social enterprise that advances through the violent overthrow of one paradigm by another. Russell Hanson (1958/1965) proposed a similar theory but emphasized the way that people conceive things, so that the change from Aristotelian to Galilean physics is a "Gestalt shift," or a new perspective on the world.[5] Hence, his view was revolutionary, like Kuhn's, but occurring at the level of individual scientists. Others, like the philosopher Laudan, combined the evolutionary and the revolutionary accounts, really no trick, showing that great individuals were more important than Boring allowed and softening the disruptive influence of revolutions in science.[6] But thank heaven for Thomas Kuhn, whether he exaggerated his case or not. Finally there was something *interesting* in the philosophy of science!

**Is Science Possible?**

An unintended effect of Kuhn's book was its appeal to cranks, who would publish manuscripts that the authors felt were "paradigmatic," while "the postmodernists used his book to suggest what he never believed: that his scientific paradigms were as faddish and ephemeral as trends in art" (Gladwell 1996, p. 32).

Kuhn had emphasized social/cultural influences on science, providing a welcome revision of the logical positivist "introductory chapter" model. However, in the late twentieth century, the social/cultural aspects of science were stressed to an extreme degree by humanists who might be called "postmodernists." They argue that science is wholly a social enterprise, as are art and literature, and that there is no such thing as objective truth.

This is a position that is difficult for many people to understand, let alone accept. In particular, chemists, physicists, and other physical scientists may have more difficulty in comprehending it than do their colleagues in the humanities. One writer tried to help by translating postmodern thought into words that are understandable to scientists. A biological anthropologist and anatomist named Cartmill (see figure 1.2) offered this simplified description:

> First, objective reality is a myth. There is no "other" out there to be objectified. All others are part of the self. All so-called realities are subjective, and all of them are constructs. The ones that find widespread acceptance are consensual arrangements, party platforms, socially hammered out to satisfy a variety of pragmatic and political aims. Facts are arranged and negotiated, not discovered. Second, since different reality constructs are incommensurate with each other and potentially infinite in number, observation and experiment can never force us to choose one to the exclusion of all others. It follows from this that

**Figure 1.2**
Cartmill. Personal collection.

> any claim to know something about a real world is at bottom a power grab, a bid to eliminate cultural and political diversity by dictating the terms and content of everybody's discourses. Therefore, scientists' claims to knowledge are really political claims, dressed up as detached objectivity. (Cartmill 1991)

Cartmill went on to discuss the views of Jean Baudrillard, "France's leading philosopher of post-modernism," who accuses the science of biochemistry and molecular genetics of promoting a social and political program, in that DNA's power of control promotes a neo-capitalist cybernetic social order.

Such an astounding proposal is actually only the extreme of very reasonable views, and they are held by advocates who are unaware that less extreme contextualist views have been held by many others, such as Wundt, Meade, Kantor, and Skinner. Those authors were not advocating the abandonment of science; they promoted merely a change from the primitive mechanical science of the Enlightenment. This seems to have been realized by Cartmill, who was not totally opposed to all forms of this view.

He proposed that scientists deal with postmodern critics by emphasizing technology. We may never be able to answer questions like "Do we really understand thermodynamics, and how can we be sure?" But what of the question, "Do we really know how to make automobiles, or are we just kidding ourselves?" The answer here is that we *do* know, and the ancient Greeks did not. This supposes that advances in technology must correspond in some way to advances in understanding of reality, a case that is not necessarily easy to make. Perhaps a wiser method for dealing with the recent crop of "pop" critics of science is Cartmill's proposal that all students (and postmodernists) dissect a human body, "which is one of the great transforming experiences."