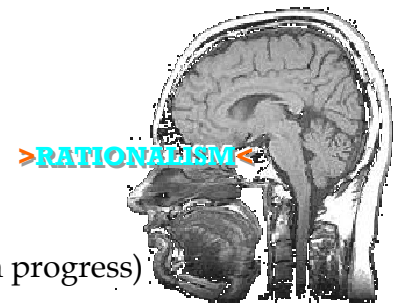


COSMOLOGY without HEADACHES

(Lecture Series)

(compiling, transcribing, researching, editing always in progress)



LECTURE XXXI: The Advent of Modern Psychology: Mind over Matter or Matter over Mind; Are We Controlled or Controlling?

Science or Pseudo-Science of Individual Human Behavior:

With the growth of science and the spread of some version of its method of discovery to every other question of existence and action it was inevitable that it would be turned to the study of human individual behavior. To some degree, indirectly, it already was so used—or abused, as we have seen in the advent of a *science of economy* in the 18th century and the disclosure of an *economic process* as described by Marx; in the birth of *sociology* in pre-Revolutionary France; in the pseudo application of science to the study of *history as a process* by Hegel. All these are, of course, aspects of an exploration of humanity using science-like logic, but as applied only to masses, groups, a culture, a social mind or, as with Kant, a world mind: the transcendental realm of pure reason. All of it has been easy enough to criticize from the elevated perspective to which it, through both failures and successes, has boosted us. But what about applying science to the study of the individual mind: the thought processes of each human being? Perhaps here we could explore, up close, the connection between mind and matter. If we would study scientifically the working of the brain we might actually gain some insight into thought, consciousness, the realm of ideas, etc.—or is the brain, too, just a sensual and material instrument: a machine-like device that will afford us little or no insight into what accounts for consciousness, the mind, or the soul?

How we think: knowledge of the psyche is the study called psychology, rather than how we know anything at all or ‘What is knowledge?’, which is epistemology. Historically, of course, loosely defined—non-scientifically, that is, at least from the perspective of *modern science*—this enterprise, *psychology*, is ancient. We have seen it suggested very early among the Greeks. We have discussed the problem of mind verses matter from time to time in our several lectures and we will review some of that here. But there is no need to go traipsing through the whole history of pre-modern psychology. For those whose interest is piqued by that subject, there are several books available, one of which I highly recommend as an adjunct to our discussion: AN INTELLECTUAL HISTORY OF PSYCHOLOGY by Daniel N. Robinson; Univ. of Wisconsin, Madison, 1995 (3rd edition). Besides introducing and explaining the concept of psychology, Dr. Robinson supplies some plain-spoken insight into Plato and Aristotle, the Romans, the Christians: the thought-evolution of the ages from the perspective of this philosophy-become-science of the mind.

Allow me to quote from Robinson in this regard:

The subject matter of psychology is as old as reflection. Its broad practical aims are as dated as human societies. Human beings, in any period, have not been indifferent to the validity of their knowledge; they have not been unconcerned with the causes of their behavior or that of their prey and predators. Our distant ancestors, no less than we, wrestled with the problems of social organization, child rearing, competition, authority, individual differences, and personal safety. Solving these problems required insights, no matter how untutored, into the psychological dimensions of life.

If we are to follow the convention of treating psychology as a young discipline, we must have in mind something other than its subject matter. We must mean that it is young in the sense that physics was young at the time of Archimedes or in the sense that geometry was “founded” by Euclid and “fathered” by Thales. Sailing vessels were launched long before Archimedes discovered the laws of buoyancy. Pillars of identical circumference were constructed before anyone knew that $C = \pi D$. We do not consider the shipbuilders and stonecutters of antiquity physicists and geometers. Nor were ancient cave dwellers psychologists merely because they rewarded the good conduct of their children. The archives of folk wisdom contain a remarkable collection of achievements, but craft, no matter how perfected, is not science, nor is a litany of successful accidents a discipline. If psychology is young, it is young as a scientific discipline, but it is far from clear that it has attained or should have sought to attain this status. . . .

[*Ibid.*, pp.12-13]

Sense or Nonsense?

As a great reminder, the main dispute among ancient thinkers regarding mind or soul is depicted, as you may recall, by Raphael in his painting *The School of Athens* [1510-1511], wherein Plato and Aristotle appear to be in dispute over whether knowledge comes through the senses from the study of nature (Aristotle indicating that the ‘ground’ of knowledge is sensation) or that nature is known through mental contact with universals or remembrance of the *a priori* realm of ideas (Plato pointing upward to indicate that true knowledge comes from beyond the temporal world). The painting, appearing in the 16th century, counts nearly 2,000 years without a resolution to this debate.

For chemistry and physics and astronomy, even for biology, this was not a problem. In discovering the laws governing matter and motion through mechanical experiments or by witnessing the behavior of elements it makes no difference how we actually do our thinking or just what exactly is mind. For there to be a science of psychology, however, this philosophical/epistemological question must be resolved. In order to establish a proper method for studying the ways of the psyche we need to know (or decide) what is the nature of our subject. Is the mind purely biological (a thing: e.g., simply the brain and its functioning)? Does it somehow result, then, from mere electro-chemical activity and is it thus, ultimately, reducible to physics? Even 21st century biology, however, is still having trouble with that, since the ‘life sciences’, generally, attempt to find laws of the living world despite being unable to precisely define life itself.

Since the psychologist is not given to know what exactly is even the most basic nature of his subject matter (or even what to call it: thought, mind; soul; spirit; will; consciousness; instinct; ego; Aristotle’s or Kant’s summation of categories; the psyche?), is he not compelled to take a leap of faith and make at least this decision: corporeal or incorporeal? Depending on that decision the method of psychology will assume either an ‘empirical’ or a ‘rational’ footing. 17th century Newtonians overwhelmingly (but hardly universally) lent support to the corporeal version: mind as a thinking mechanism, suggesting that psychology should be a study of the brain and/or the nervous system. But the Hobbian view of man as a natural machine, as interpreted and forwarded by Locke, left a lot to be desired, it’s weaknesses being rather quickly disclosed by the insight of Berkeley and Hume.

Is mind simply an accumulation and ordering of sense perceptions (straight-ahead empiricism leading to Pavlovian stimulus-response and to B.F. Skinner's 'radical behaviorism'); or is it a sixth sense, in its own way materialistic: an organizer of perceptions in the same manner as the ear organizes vibrations or the eye organizes light waves; or is it metaphysical, beyond the sensory world entirely, implying a Cartesian dualism or else a strict Platonic idealism or a Kantian transcendentalism—the extreme form holding that mind is the foundation of matter instead of the other way around? And if the incorporeal mind-world *is* the root of reality, or transcends physics, how does it interpenetrate the realm of sensation? What is its connection to the material world? How does 'it', the mind, sense our senses, and how does it, in turn, control our behavior? Does mind *act* upon us; manipulate our bodies, or can all human action be explained simply as mechanistic *re*-action to outside stimuli, suggesting that mind may be illusory: a fake, a chemical reaction synaptically generated by blindly firing neurons, lending credence to the suggestive term, 'theater of the mind'? The attempt to answer such questions as just posed is called epistemology: the inquiry into 'How do we know?' or 'What is knowledge?' This is not yet psychology, but must one not settle on somewhat consistent answers to these questions in order to pursue or construct a science of psychology?

Furthermore, to study the human mind in search of mental laws, psychology must study more than samples, however large, of individual men in their learning capacity, their dreams, their power of memory, their reflexes and auditory and optical functions and the range of ability in spatial relations and language. It must also study history: *mankind*, just as seriously as the particular man is examined in the presence of the psychologist; the whole of human behavior is the subject rather than the immediate action or reaction to stimuli. There are other disciplines now (and sub-disciplines developing even today) to study the particulars that had not yet developed at psychology's infancy. If psychology must depend on the findings of other sciences or branches of science, these other disciplines must first come into being. Does that make psychology a *higher*, more exalted science or a *lower* more impaired science—or, as we shall ultimately come to inquire, is it really a science at all?

Not everyone working in a given discipline, it must be recognized, is overly concerned about its foundation or the veracity of its arch-theories. In fact such concerns are rather rare and psychology could wait no longer for solid answers as to whether it should be empirical or rational in its methods. Finally it had to proceed on assumptions. Hence the battle lines were drawn. Before we move ahead with our description of the struggle between *empiricism* and *rationalism* as applied to the development of a scientific psychology—or failure thereof—we might benefit from a quick review of these two concepts: what they mean and how they differ. In that pursuit, the following extensive quotation is provided courtesy of Professor Robinson, taken from his aforementioned book [AN INTELLECTUAL HISTORY OF PSYCHOLOGY]:

The empirical movement launched by [Francis] Bacon is the scientific movement itself. Empiricism, understood within this movement, is an overarching philosophy that confers epistemological authority on direct experience. It takes the evidence of sense as constituting the primary data of all knowledge. It stipulates that knowledge cannot exist unless this evidence has first been gathered, that all subsequent intellectual process must use this evidence and only this evidence in framing valid propositions about the real world. How does this differ from

rationalism? Rationalism, as received by our own time, is the product of the philosophical systems created by Descartes, Spinoza, and Leibniz. It is no coincidence that two of them, Descartes and Leibniz, were distinguished mathematicians. Descartes founded analytical geometry, and Leibniz invented the calculus independently of Newton. [A reminder might be inserted here that even Spinoza, while not specifically a mathematician, utilized the method of geometry in laying out his philosophy.] The modern rationalist, from the seventeenth century on, has shared with the ancient Pythagoreans, and with the Plato of the “number theory,” a vision of the real world as a system of mathematical, harmonic relationships. Persuaded by proofs of mathematics that certain knowledge exists, the rationalist tends to be aloof toward the imprecise and ephemeral facts of experience. It is only when reason explores the universe that a small set of fundamental and irrefutable principles are clear and that, from these, the more detailed facts and fabric of nature can be deduced rationally. What modern rationalism retains of its Aristotelian origins is the contention that the very act of perception must assume a categorical framework if experience is to be anything other than a buzz of confusion. The mind must be so constituted as to segregate and organize sense data. It must be so equipped as to direct the senses, thus separating their illusory from their real content. One way or another, the rationalist position incorporates the concept of an a priori cognitive capacity. Without it, meaningful experience is not possible. Rationalism takes all settled knowledge to be the result of a rational analysis of the evidence of sense. Such evidence cannot be gathered except by a rationally directing principle. Accordingly, the primary “datum” of which our knowledge is comprised is that innate disposition called “the laws of thought.”

We should also recognize a point of agreement between rationalists and empiricists which survived unimpaired until the advent of behaviorism in the twentieth century. This common feature may best be labeled “mentalism.” The leading architects of empiricism all based their epistemologies upon what seemed to them to be the fixed dispositions of the mind. In other words, their philosophies were explicitly designed to account for the facts of mental life. Although all agreed that the mind is furnished by the senses, they agreed as well that philosophy’s task was to determine how this occurred and what it implied. The empirical tradition, therefore, is in no sense anti-mental, notwithstanding its emphasis on perception. Rationalism, of course, is unabashedly mentalistic. . . .

[*ibid.*, pp.151-152]

Dr. Robinson, then, sees Francis Bacon as “the first significant modern defender of empiricism and empirical science”. Thomas Hobbes, with his man-as-mechanism concept, indicated the route that might be best followed in a study of human behavior, though his personal sensory apparatus is turned toward a political science: an examination of civil society. John Locke, in his *Essay Concerning Human Understanding* [1690], gives us the first modern analysis of thought processing and impels the primary Western version of main-stream psychological *empiricism*, though he himself retains the crutch of rationalism. So, although the problems of how we know anything and/or ‘What do we mean by knowledge?’ (epistemology) have been well explored by the ancients, at least as early as the pre-Socratics and especially as advanced by Socrates, Plato, and

Aristotle, and intensely debated by the scholastics, we find in Locke the beginnings of a modern Western search for answers as to how the mind might work. He seeks a more refined theory of knowledge and a method of attaining it newly suggested by the scientific way—more or less Francis Bacon’s way—of studying the world.

The Empirical Entreaty:

Latching on to the disputed ancient idea of the *tabula rasa* or ‘blank slate’ status of the soul or mind at birth, Locke makes the case—certainly a less than an airtight case, but a significant one—for all knowledge being based on sensation. He does not deny thought *per se*, claiming only that thought, too, is built upon perception. While there is indeed a rational faculty of mind, it is merely reflective in its nature—reflecting only on what is input through the senses. Taking Newton’s cue that the Universe is purely mechanistic, and tweaking Hobbes’ ‘natural law’ view of civil society and his machine-like humans, Locke apparently accepts that there is no further use for the concept of revelation. He could not say that outright, given the political and religious climate at the time, and he would not travel so far as atheism, at least in public argument. Still he sets the stage for increasing skepticism regarding the idea of initial knowledge (e.g., past lives, transmigration of souls, knowledge *a priori*, etc., and even God Himself) and implies a denial of the cleanly separate and willful mind of the pure rationalist and the mentality-only world that would be suggested by Berkeley.

Berkeley saw Locke’s materialism as leading straight to radical skepticism, which he could not abide, as skepticism leads to a *belief*, ironically, in the impossibility of knowledge. To avoid the old Cartesian dualism of mind and body, Bishop Berkeley (a believer in mind and God) dispels matter as merely interpretive, yet he tries to preserve ‘things’ as really existing. He maintains that *being* consists of two different sorts. The first is *being through idea* (as things have being through our idea of them) and *being as spirit*. Being through idea is that of an impression having been made on the mind by means of the senses. So, is there not, necessarily, something ‘out there’ that makes such an impression?—something to actually bruise Johnson’s toe? Berkeley admits things “really do exist; this we do not deny, but we deny they can subsist without the minds which perceive them or that they are resemblances of any archetypes existing without the mind; since the very being of a sensation or idea consists in being perceived, and an idea can be like nothing but an idea.” (Incorporeal?) [A *Treatise Concerning the Principles of Human Knowledge* (1710), Treatise #90; Open Court Edition, LaSalle, IL, 1963; found in Robinson, p.171]. In need of something ‘out there’ to generate the ideas, that their data might then be transmitted through sensation, he rebuts skepticism, materialism, and atheism at once by impressing God into the labor force of continual production: placing Omniscient Mind behind what we call the material world. It only takes form by means of perception and only God can affect the eternal and universal perception necessary to give it apparent continuity—or at least the ‘potential for appearance’ which is activated by our senses. (But, have I been misinformed: Isn’t it man who is supposed to serve God?)

The illusory-reality idea is advanced by Hume, who leaves God out of the mix altogether and confirms Berkeley’s concerns as to where Locke’s ideas might lead: finding that we can know pretty much nothing at all with certainty (except perhaps *that* final truth: that we can never quite resolve uncertainty regarding reality). So, while we can certainly *utilize* empiricism (the strict materialism suggested by Newtonian science)

to our technological and practical advantage, we can never gain complete understanding of reality; science cannot provide that answer, nor any actual, underlying truth.

This was exactly the radical skepticism that Berkeley had feared and that Kant felt called upon to curtail; to save both science and religion by taking a much deeper view of rationalism: the transcendental view that holds mind or pure reason as *a priori* and allows for an objective ‘out there’ as well; restores, as it were, a world of material reality totally disconnected from thought (the phenomenal world), even though its true essence, the ‘thing in itself’, remains hidden and forever unknowable. Thus we catch Kant partly agreeing with Hume in leaning back toward Descartes by taking up his initial doubting of the material world, at least as a source of any dependable final truth, as opposed to the logical certainty of the mind (and of God, too) through pure and practical reasoning. Kant considers his thought-world to have been proved beyond doubt by means of the very act of doubting (Descartes’ *cogito ergo sum*) and proceeds to an examination of that mental realm by the same means: pure logic; a sort of mathematics, as it were, without the signs and symbols: a complicated thought-thicket presented as a philosophical system.

As mentioned, epistemology is not itself psychology, but isn’t it necessary to the establishment of a philosophical foundation for such a study? Given a science-oriented, materialist epistemology (though it is, in itself—ah, the irony!—*metaphysical*) we can expect a science oriented psychology to develop (which is also, we should note, *metaphysical*—as is any notion or method or idea). But as we have discovered in our rush through history this double-branched epistemology—material and ethereal; physical and metaphysical—has existed since at least the pre-Socratics. Both branches have grown logically and in complexity; both out of a process of reasoning. The materialist-empiricist-scientist view (of Hobbes & Locke, leading to Benthamite/Mill utilitarianism and St.Simon/Comte sociology) is a scientific-determinist approach to human behavior—I suppose this might boil down to stating ‘only what is measurable is real and only what is pleasurable is good’, as opposed to the idealist-emotionalist-moralist (Rousseau, Kant, even Hegel, mentalist/spiritualist/romantic) trending toward an unsettled overall understanding that allows for soul and idea and spirit. Thus comes consciousness; even free will; ultimately a belief in a partially experimental exploration of mind: a sciencistic groping by physical experiments through a world we can perhaps illuminate only by means of pure reason: that being the *subconscious*, leading to Freud and psychoanalysis.

Which route would psychology take, since both seemed to suggest a foreboding conclusion: that a strictly scientific psychology was impossible?

The *empiricist route*, generally, led toward pragmatism: a practical technology developed through science but which left gross uncertainty about exactly what was being manipulated in nature (‘What is matter?’). If it cannot answer that question how could it illuminate thought and mind, even if mind *is* merely matter?

The *ideological route* led to mere speculation as to how whatever *might* be going on beyond the material world, in whatever way we choose to organize the psyche or break it down, *might* have some relationship to what we consider to be an objective reality existing independently of mind (as with Kant’s dividing of the transcendent realm, or Aristotle’s categories, or any of a multitude of philosophical concepts regarding our way of describing and understanding other-than-material ‘substance’ or non-corporeal ways of being, such as the psyche).

Considering that the overwhelming bent of science through the first half of the 19th century was empirical: that is, leaning heavily toward the objective or positivistic, especially given the considerable pull of the highly respected physiologist Hermann von Helmholtz (first to measure the speed of nerve impulses; inventor of the ophthalmoscope), it is little wonder that there would be a tendency to press psychology into the same mold: to ascribe mental activity to physiology, a more or less biological approach—presuming biology to be purely materialistic. That is to say the basis of mind is matter, so, to study mind, we should study behavior of physical beings and their senses and reflexes; try to discover the mental world by thoroughly examining the sensory faculties that *produce* it.

There were opponents, of course, with strong arguments who saw the world in the opposite manner, believing in principles *a priori* and thus mental ideas preceding and possibly founding the material world—or that the material world is continually created by the ideal world or by God, or even that there is *only an ideal world* and that material is actually an illusion: an organizing of reality by means of our reflective faculty combining the various data presented by our limited means of perception. One can understand why the extremists in either camp held pretty much that a science of psychology was impossible. Either what we want to study (being immaterial: totally mental) is not conducive to discovery by the method of science or (more rare) that there is actually nothing to be discovered at all: that mind or soul or consciousness is a myth, an illusion created by the interaction of the physical senses with the chemistry of the brain.

The ‘father of experimental psychology’—at least the European ‘father’—



Wilhelm Wundt [1832-1920], a professor of physiology who worked for several years as an assistant to Helmholtz, is generally given the credit for establishing the very first laboratory for experimental psychology in Leipzig [1875], with the American ‘father’, **William James** [1842-1910], also a professor of physiology, almost simultaneously establishing a similar facility at Harvard. We will glance first at Wundt to find that, despite the influence of the ubiquitous Helmholtz, he tried not to take sides on the epistemological

issue. Instead he tried to straddle the two camps. He considered that experiments might be devised and conducted that would seek the mind from both directions, empirical and rational. In this he was actually supported by John Locke, who was responsible for opening this can of worms, but who also said:

If we can find out those measures whereby a rational creature, put in that state which man is in this world, may and ought to govern his opinions and actions depending thereon, we need not be troubled that some other things escape our knowledge.

[from *An Essay Concerning Human Understanding*; Henry Regnery Co., Chicago, 1956]

Robinson points out that “Locke is completely neutral on the question of the biological or physical factors that may be responsible for the character of mental states and activities. He avoids all questions regarding the physiological basis of thought”:

I shall not at present meddle with the physical consideration of the mind, or trouble myself to examine wherein its essence consist or by what motions of our spirits, or alterations of our bodies, we come to have any sensation by our organs, or any *ideas* in our understanding; and whether those ideas do, in their formation, any or all of them, depend on matter or not.

[*ibid.*, *Introduction*; *quotes in* Robinson: AN INTELLECTUAL HISTORY OF PSYCHOLOGY; pp.160-161]

As if taking Locke's suggestion, Wundt sidestepped either assumption: empirical or rational; body or mind, so as to get on with the experiments if we're going to have a science. Although Locke thought the mind is furnished only through experience, there was yet a mind to be explored; thus Wundt's lab at Leipzig. Ignoring the question of foundational principles in establishing a method to establish the new science (though he spent much of his life in seeking such principles), Wundt took both what we sense and what we imagine as given, assuming that the process of thought, no matter its manner of being, is worthy of study and is subject to examination; granting that truth may be multifarious and mutable and need not be tied to a first truth—i.e., that though there may not even be a first truth, truth is not thereby altogether nullified. Besides, by shackling ourselves to a particular but essentially indeterminable epistemology we would be stymied by the hopelessness of the task: the discovery of *absolute truth*. That would prevent the discovery of important secondary knowledge about human thought and behavior, knowledge that could possibly lead to a restructuring of society, of politics, of education; the remaking of our world for the benefit of all. But won't this lack of a foundational referent lead to a kind of helter-skelter science? And how will we establish a dependable method of study? The development of modern psychology bears out the validity of this concern. Even today, with no agreement as to foundational, epistemological support, it remains, if anything, more confused than ever.

This 'besides' we mentioned above: a desire expressed to escape from the stifling confines of some prescribed doctrine about the nature of reality and what constitutes knowledge, is essentially what William James understood and further developed out of what he took from his mentor, the founder of *pragmatism*, **Charles Sanford Peirce** [1839-1914]. Peirce's philosophy represents a lifetime of coming to grips with his hero, Kant. It requires a similar sort of tortuous mental spelunking or cave diving, all to no apparent resolution. It does, however, carry its own presumption of philosophical evolution, engendering in the realm of thought the same thing we saw attached to Darwinism: a continual progressive movement but to no predetermined goal; a non-teleological teleology. With Darwin the goal is always (*a*) the present state (whatever stage has already been reached in relation to a dynamic environment) and (*b*) whatever will take place via continuous response to the ever changing environment, such that *fitness is entirely relative to environment*. With pragmatism, truth is what is most relevant to the situation of the truth-seeker. What suits you best; what works is true. Thus *truth is relative to a given situation*—necessarily relative and personal and timely rather than absolute and universal and eternal. Still the idea persists: there may be laws of behavior. After all, Darwin discovered the biological law of natural selection without being required to know what life is or how it began or what a species is or how the particular characteristics resulting in fitness and survival are stored and passed along. So too, Peirce provides an inkling of a kind of 'survival of the fittest' among *ideas* and even of cosmic evolution, since the world consists of *ideas* and *material* and *our ideas of material*.

Having worked under the influence of Helmholtz, that towering colossus of scientific positivism, it should not be surprising that Wundt displayed a distinct leaning toward empiricism even in the very title of his most important work, *Principles of Physiological Psychology* [1874]. In any case, the work was begun, modern experimental psychology was born, and a number of new and important psychologists emerged from the training at Leipzig. But the state of confusion between empiricism and rationalism was not abated. Among the experimental methods that qualified (in the estimation of some worthy minds) as classical science, Wundt also investigated consciousness through introspection: “internal perception” he called it; a kind of ‘objective’ self-examination of emotions, desires, ideas, even while proclaiming there was no spirit or soul. What, then, was the psyche? And if there was no psyche, what would that do for the future of *psychology*?



Well, it sent it hurrying down the positivistic road toward **Ivan Petrovich Pavlov** [1849-1936] and to B.F. Skinner in the 20th century. Pavlov was a strict physiologist and not impressed by the new science of psychology to which, nonetheless, he made important contributions. He is, of course, mostly famous for his discovery of the “conditioned reflex” via experiments on animals, mostly dogs (but also included were human children), whereby he showed that the natural salivary response to food could be induced just as well by an associated artificial stimulus, such as ringing a dinner bell. Once that had been established as part of the feeding procedure, salivation would occur even when the newly associated stimulus was presented without the food. Strongly influenced by Ivan Mikhalyavich Sechenov [1829-1905], another positivist associate of Helmholtz, Pavlov abandoned a life of religious devotion for a career in scientific research. Sechenov was an early neurophysiologist who was instrumental in uncovering the electric nature of brain activity and developed the sub-discipline of electrophysiology. Pavlov carried on in this work and his research went well beyond fooling canines with false hopes of a meal. As a deeply committed physiologist Pavlov, in line with the abominable but then acceptable scientific procedures that had been carried out for at least two centuries (though far from the extreme methods that would soon be used in Germany by the Nazis), did conduct unsavory physical experiments by today’s standards, and on people as well as animals, including electric shock, testing of reflex actions under stress and pain, and even surgical procedures done on children in order to test his hypotheses directly on humans and gather statistical data.

The work of Pavlov, certainly helped along by a Nobel prize in 1904, was popularized in the West mainly through the publications and popularity of American psychologist **John B. Watson** [1878-1958]. Watson is the man chiefly responsible for the radical empiricist stance called *behaviorism*. In 1913 Watson got an article published that has been referred to as the “behaviorist manifesto”. The objectivist attitude of the new behaviorist stance is pretty much laid out in the opening paragraph of his article, entitled *Psychology as the Behaviorist Views It*:

Psychology as the behaviorist views it is a purely objective experimental branch of natural science. Its theoretical goal is the prediction and control of behavior. Introspection forms no essential part of its methods, nor is the scientific value of its data dependent upon the readiness with which they lend themselves to interpretation in terms of consciousness. The behaviorist, in his efforts to get a unitary scheme of animal response, recognizes no dividing line between man and brute. The behavior of man, with all of its refinement and complexity, forms only a part of the behaviorist's total scheme of investigation.

[http://en.wikipedia.org/wiki/John_B._Watson]

Let's take a moment to consider the claims. First how could there be anything about the psyche that is "purely objective"? And there is no "purely objective" science. All methods of study are value ridden. Furthermore what meaning can there be in the term "theoretical goal", and how can the *practice* of "prediction and control of behavior" be considered *theory*? He then says, concerning psychology, that "introspection forms no essential part of its methods" because, per strict physiology, introspection would be impossible (just another part of the mental illusion) since there is no such thing as mind or an evaluating psyche to be inspected. He admits the science has nothing to do with consciousness—yet he masquerades as a psychologist. He then claims there is no difference between man and brute, so why, in the next sentence, does he speak of studying the behavior of man, if there is nothing other than more or less complex animal behavior? Behaviorism increasingly referred to the subject as 'the organism', the behavior of 'which' was due to the history of 'its' interaction with 'its' environment and conditioned accordingly as the various stimuli resulted in pleasure or pain, thus human behavior is strictly deterministic. On the other hand, if the behavior of man can be *recognized* by the higher level of "its refinement and complexity", it seems there *is* a difference between humans and beasts. And what could that difference be if not psychological in nature and based on the ability of humans to judge situationally: to consciously (and perhaps subconsciously) *evaluate*; to differentiate between good and evil; to know right from wrong behavior? We are "the beast" says Nietzsche, "with red cheeks" because, unlike the beasts, we can be embarrassed by our own behavior.

Biology and physiology were already established as sciences or studies as to how the bodily machine works, including the brain. Psychology is supposed to study precisely what Watson declares is unreal—at least unknowable: the mind, the mental realm, the incorporeal facet of human life. Instead, by strict empiricists, the evaluating faculty that reaches decisions and makes judgments, the very mark of the human, is ignored; cast aside as unreal. In fact, an attempt is made to excise value itself from science in a vain and misguided attempt to copy physics, which was misinterpreted by social scientists and psychologists of the behaviorist persuasion as a value-free enterprise where only facts ruled. The split in social science departments between the theorists and the practitioners of science might not be so much discussed today, but it still remains in the background.

When I was a graduate student in political science the political philosophers were practically ostracized, dismissed as historically irrelevant. An apocryphal story from the University of Chicago had it that Professor Morton Kaplan, a highly respected political scientist and staunch advocate of a 'systems approach' to international relations and group behavior, while he was working in the same educational institution and (perhaps) the same departmental environment as the famous political philosopher Leo Strauss, was

asked why he never attended any of Strauss's lectures. Kaplan supposedly replied to the effect that, while he had great respect for Strauss, he could not afford what being seen there might do to his reputation as an empiricist. It seems it would be tough for him to admit there was anything of *value* to be learned from the 'normative' view. You may hear from time to time something pertaining to the separation of facts and values. Now you will know what that is all about. Behaviorism or empiricism tries to convince itself that it deals *only with facts* and that value, hence *evaluating*, is the scourge of science; philosophy, or what is often called 'normative theory' in social science venues, believes *facts are only made meaningful by evaluation*. Behaviorism, then, must be (in fact) or ought to be (in theory) a separate discipline from psychology—an advancement or a sub-discipline of physiology, perhaps, or an adjunct to biology—because "behaviorist psychology", at least as we heard it explained by Watson, is an oxymoron.

But Mr. Somers, you must be mistaken or ill-informed. There must be more to it. If we, as laymen, can so easily find fault, how is it that behaviorism became so well established among the experts? How did it so successfully infect psychology?

Actually, at the time of publication, few of Watson's peers took his article seriously. Psychology was at that time much more oriented toward Freud's concept of psychoanalysis and the investigation of the subconscious. It was not until the 1950s, as that very article began to show up in introductory psychology text books, that it became a force—well after Watson had been fired from Johns Hopkins University (1920) for having an affair with his assistant, Rosalie Raynor (whom he married a year too late, it seems, in 1921). There were actually accusations that the couple had been engaging in illicit 'sexual research'. By the time his old article was revisited he had already retired from a quite successful career in advertising and marketing, having worked his way up the executive ladder from shoe salesman after being academically ostracized. Despite the unceremonious exit from academia, he had continued to think and write about behaviorism—and somehow to publish his work, including a famous foray into child psychology including (pre-Dr. Spock): a behaviorist-oriented book on child rearing. Here's a sample from his best known book, BEHAVIORISM:

Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select – doctor, lawyer, artist, merchant-chief and, yes, even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors. I am going beyond my facts and I admit it, but so have the advocates of the contrary and they have been doing it for many thousands of years.

[BEHAVIORISM (rev.1930), Univ. of Chicago; p. 82]

Here is a clear promise of social engineering, closely associated with the spread of behaviorist ideas. Man has no definable unchanging nature to be found philosophically. We are completely the product of our environment: soft plastic, ready for molding into whatever shape the experts or authorities prescribe, awaiting only the proper training. Thus a promise of utopia is advanced through behavior modification. Having discovered such knowledge, the burgeoning science of 'behaviorist psychology' positioned itself to save the world through education psychology. Such ideas were, at least in part, what prompted the dire warnings by such as George Orwell in his novel *1984* and Aldous Huxely's *Brave New World*, two books that will be forgotten and go unread at our peril.

Promoted by the pragmatism of Wm. James's *PRINCIPLES OF PSYCHOLOGY* and especially by **John Dewey** [1859-1952], who became the leading educational authority (though Dewey distinguished his version by calling it "instrumentalism"), the progressive theme of social psychology rolled like a tidal wave through American teacher colleges or what were called 'normal schools'. The difficulty here is that, if human nature (if such a thing could be granted by empiricism) is malleable, and if society can be psychologically manipulated (given that civil society, according to the social contract theorists, is artificial), *how will the goal of reform be determined and by whom?* Dewey considered himself a democratic socialist so he understood and accepted the natural rights position that sovereignty is ultimately based on the people, a majority of whom, presumably, would make such decisions (a ridiculous expectation). But what about the rights of those who disagree with the goal? What about private education and religious differences? What about the dissenters who might actually have a better idea, or might at least prevent the 'progressives' from making a mistake and ruining the world instead of perfecting it. (Incidentally, in regard to education policies, "Watson was the maternal grandfather of actress Mariette Hartley, who suffered with psychological issues she attributed to her being raised with her grandfather's theories".) [http://en.wikipedia.org/wiki/John_B._Watson]

We will bring up this problem again in a moment: these "psychological issues" that cause some consternation for a strict empiricism in exploring the mind. But before we interrupt our positivist adventure, we ought to consider the tremendous impact of statistics in the modern study of behavior as a means to understanding the psyche. Statistics were used in social studies in a very general way before the 19th century, some of which we have noted in the establishment of actuarial tables and population growth, etc. Statistics were used as facts in the structuring of a behavioral 'reality' and as verification or, less assuredly, as back-up of certain assumptions and social science hypotheses. But, recalling our last discussion session, we have been granted a further step by the statistical work in classical physics undertaken especially by Boltzmann in responding to Lord Kelvin and Ernst Zermelo while they were developing thermodynamics, to whom modern sociology and political science are (if mostly unwittingly) deeply indebted. Now comes probability theory applied to practice as a relatively new scientific tool: a means of data gathering and information processing that might lead us to new heights of knowledge or at least provide a mathematical mystique to veil the fatal weakness in the mechanistic perspective such as to allow the moniker 'science' to be applied now to social studies and psychology.

Basically, statistics would be used to establish new facts otherwise unobtainable, suggesting ideas that would have been overlooked and validating or invalidating assumptions previously established by no more than educated guesswork. Psychiatric patient treatment methods could be evaluated by results over time and compared to alternate methods; behavioral norms could be established by graphing of physiological and mental test results; political attitudes would later be discovered about groups through voting studies and opinion polling. This information is important and has made a big difference in the orientation of modern life. The value of such knowledge in the throes of social science adolescence, however, tended to be overrated: tended in fact, in view of the growing perception that science itself might be based entirely on probability, to establish the behavioral sciences claim to parity with natural science; parity with physics as a path to truth—or, at this juncture, as a path to a 'practical' understanding of reality.

It seems to have been forgotten by social scientists that the probability avenue in physics had been opened, in the first place, by the pursuit of the arguments over what might be implied by the several laws of thermodynamics—in a sense: gas statistics raised to the level of philosophy. It is not clear how thermodynamics applies at all to social science, and there's the rub. In fact, jumping a bit ahead of ourselves, it is not at all clear, today, that the laws of thermodynamics govern even physics after Einstein and Bohr and the advent of quantum mechanics. This is not to say that statistical findings are necessarily bogus or misleading—though they can be both—but to contend that facts (statistical or otherwise), by themselves, are not enough to establish any reality beyond their own existence. They are neither meaningful as isolated events nor do they constitute anything like absolute truth. Even in the purely practical realm, facts (however indisputable) are only accumulating data. They must be organized by theory to be meaningful and then require evaluation from the perspective of a goal to be useful. The end cannot be determined by a mere collection of data, no matter how mountainous, nor can the data by itself indicate the root of its own being: the deep-lying foundation of its existence; the 'why' of a particular fact; the design behind the details?

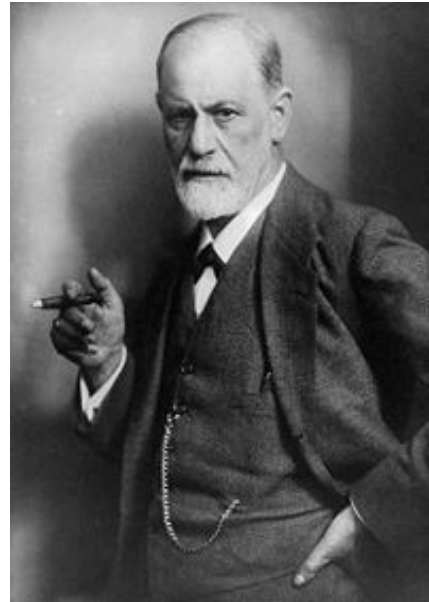
With this in mind, within the psychology and world-picture *a la* Charles Peirce as interpreted and promoted by William James, the route to truth was shortened by changing the very definition of truth to 'whatever works', a higher truth being whatever works better. Is this not residue of Machiavelli in his reducing of political philosophy, by which it is apparently impossible to come to undisputed conclusions, to the study of man's actual behavior, which might be measured in various ways—a significant extension of such measurement to be supplied by statistics (voting studies, consumer trends, religious affiliations, opinion polls, etc.)? By this means, it is intended, we might one day measure and track and finally map human behavior such as to ultimately display the sum and once supposed spirit of mankind graphically, which is to say mathematically.

So we have a *theory* (that truth is relative and environmentally modified, and that we can discover it or its process by studying human behavior), and we have a *goal* (to grasp what is true today and predict what might be true tomorrow). Is that a reasonable goal; a sufficient goal? Does that qualify as a scientific theory? Does this view leave the nature of man so fluid, so ethereal, that it cannot be contained in any theory of behavior?

The Rationalist Response:

The behaviorism of J.B. Weber gets even worse by the middle of the 20th century with the "radical behaviorism" of B.F. Skinner, to which we may return after we have had our dose of quantum mechanics and relativity theory. Here we will step back once more into the late 19th century to take an all too quick excursion along the rationalist route to psychology. Actually the counter-arguments on the rationalist side have been mostly exposed in the criticism we have been citing of empiricism. Furthermore, as is the case with most science disciplines, philosophical underpinnings are not constantly reviewed in day to day practice. Most psychologists thought they were indeed studying the mind as something different from purely physiological activity and electro-chemical interactions but that the only way open for such a study was through careful examination of the mechanism. Or at least they saw no 'scientific' means of studying what was immaterial and thought that some clues as to the mind's nature might be uncovered by testing only the body and observing and recording the resulting behavior.

One particularly insightful neurologist, **Sigmund Freud** [1856-1939], was not content with this idea. He and several of those in his circle of influence came to believe the mind could be studied on its own terms. He was especially affected early in his career by the famous public hypnosis experiments of Jean-Martin Charcot in Paris in the 1880s. In fact it appears he named his second child after this great early neurologist, though he would later reject hypnosis himself as a useful treatment for 'neurosis'. Neurosis is actually a mechanist's term for mental illness. The theoretical goal of neurology is to discover how the nervous system creates or controls the mind and how the mind (presuming there is one) reacts upon the nervous system resulting in behavior (normal or not) of the organism, with special emphasis on how to fix any observed oddities thus called neuroses. Neurologists, then, were understood to be *mind*-doctors. Psychiatrists, most of them having been neurologists, much like their leader in training and profession, as if in a conspiracy with Dr. Freud, seem to have stolen that role from their former neurology colleagues, who are now generally reduced to *brain*-doctors.



Though Freud would abandon hypnosis as a treatment it was strongly suggestive of something about the mind that seemed to reach beyond a purely mechanistic theory of neural interactions; something that led him to theorize about the *subconscious*. He was hardly the first to discover the unconscious mind but was influenced in that direction mainly by Franz Brentano, who had considered the 'existence' of the subconscious in his *PSYCHOLOGY FROM AN EMPIRICAL STANDPOINT* [1874]. Freud also admitted being heavily affected by the work of Nietzsche.

Generally, Freud theorized about the organization of the human mind and how that is conditioned by, and in turn affects, human behavior. The connection to neurology (materialism) is not so much severed as practically ignored in the treatment of psychological problems. Empiricism remains relevant, of course, but only with the understanding that human behavior is conditioned through environmental input, especially experiences of childhood that are stored in the subconscious and secretly affect behavioral output and even health. Therapy, thus, ought to be aimed not at the body but directly at the unconscious mind. The technique was suggested by **Josef Breuer** [1842-1925], who collaborated with Freud in writing *STUDIES OF HYSTERIA* [1895]. Freud was especially affected by the famous case of Anna O. It was this patient of Breuer (real name: Bertha Pappenheim) who gave the technique the name "talking cure", later to be known as *psychoanalysis*.

The treatment is a two way street: The *recognition* of hidden thoughts and feelings on the part of the patient by being encouraged to talk about them with the analyst, and the *projection* of such thoughts and feelings along with any associated anger and loathing onto the doctor (*transference*). The idea is to draw 'repressed' ideas or memories from the subconscious into consciousness so they might be resolved or let go through open discussion with the therapist—expunged, as it were.

Based upon Breuer's work, Freud developed what he called his 'pressure technique', which seemed to indicate to him, over time, that most (if not all) of his patients had been childhood victims of sexual abuse. Later he came to disbelieve many of their stories but considered that what were at first understood as memories (though admitting that they may have been suggested or planted by the therapist) were built upon the patients' culturally unacceptable desires, particularly Oedipal fantasies (the name based on the Latin form of the name of the protagonist in the ancient Greek tragedy, *Oedipus Rex* by Sophocles). Thus sexuality, especially pre-adolescent development of sexual concepts, specifically the taboo incestuous desire to make love with one's mother combined with the resulting and equally taboo wish to kill one's rival, the father, became for Freud the most important underlying factor in repression and neurotic behavior in adults. He expected that would prove to be the key to curing all forms of neurosis.

The more interesting question here is, since hysteria was the condition that brought about psychoanalysis, and since hysteria was believed to be strictly a female condition, how does that jibe with the Oedipus complex, which must be, by definition, restricted to males—and only heterosexual males (or could it be the cause of homosexuality considered as a type of neurosis)? And what about the children of single parents where the infant does not know the father, nor anything at all of fatherhood?

To proceed, at least somewhat scientifically and in a way that could be understood and discussed not only between therapists and clients but between psychiatrists in the interest of research, Freud needed a model of the mind that would include the subconscious. After several beginnings that fell short of expectations, he developed the famous triple structure of *id*, *ego*, and *superego*. Here's how that goes:

The id is like an infant, totally involved in the moment and demanding immediate gratification.

The superego is like the super-parent or the pope or imam: the moral overseer that demands that the established code be followed regardless of situation or consequences. You might think of it in terms of a conscience.

The ego is like a negotiator between the two, in light of the external world situation, such that behavioral decisions are made with consideration of both extremes but not completely impractical: a synthesis attempted, as it were, of opposite tendencies; perhaps only a pragmatic compromise.

Here we have the attempt to form a model of the mind, to make a 'thing' of it; something to visualize, thus to discuss and to test. Along with this, naturally, came descriptions of mental activities: tension, pressure, conflicting forces called 'drives' such as *libido* or *Eros* (the life drive) and *Thanatos* (the death drive). These are discussed in his book *BEYOND THE PLEASURE PRINCIPLE* [1920] where they are hardly distinguishable from the idea of energy in the science of physics. In a lesser work, called *Project for a Scientific Psychology*, he speaks in terms of a tendency for the mind try to reduce the tension between these forces, if not to zero (as in 'absolute zero is impossible'), at least toward a minimum (as in 'equilibrium'). Has he not managed by this means to introduce the principles of thermodynamics into the incorporeal realm of pure reason? By a persistent and relatively consistent rationale he built a phantom mind-machine which could be examined by a phantom science that shared its basic principles with classical physics. In fact some feel his greatest achievement was the development of *psychodynamics* in collaboration with Jung, Adler, and Melanie Klein.

As so many other elements in Freudian psychology, this was not entirely his own invention, but that of Ernst Wilhelm von Brücke [1819-1892], a teacher of Freud in Berlin and a colleague of none other than Helmholtz. Classical physics, it seems, was so ingrained in the positivism of the age that it was no miracle how these ideas were propagated so quickly and thoroughly among the seekers of a mind-science.

So while many folks today might consider that the actual ‘structure’ of the mind was *discovered* by Dr. Freud, it is merely another mental *invention*, a *visualization*: a means of reducing the psyche to scientific, mechanistic concepts: matter and motion and forces, thus making it available to examination; making it possible to, seemingly, advance the study of mental processing. Yet as every beginning physics student knows, force is equal to the product of mass and acceleration ($M \times A = F$), and since the psyche includes neither mass nor movement—nor even space—Freud’s model would seem misleading and not only useless but possibly dangerous in the hands of an alpha-type therapist who strongly resembles Boris Karloff entrusted with some poor psychotic’s innermost thoughts and something like exposure of the patient’s naked subconscious.

Despite all this, or perhaps *because* of the seemingly unlimited possibilities opened by the new treatment method, a number of eminent physicians in Vienna saw value in this prospect and fell under Freud’s spell. They formed a social club that met once a week at his residence; a kind of psycho-*salon* with lectures and the reading of papers and discussions interspersed with and cakes and coffee and cigars consumed in vast quantities; a serious exchange of thought about this new method of mental treatment that would develop into the Vienna Psychoanalytic Society. As its originator, Freud not only organized the society but forcefully imposed his ideas and himself upon it. Such overbearing dominance could only lead to eventual dissent, forcing any new ideas—the heretical offspring of this blossoming Freudian ‘psychophysics’—to take root elsewhere.

Alfred Adler [1870-1937], who had been named president of the Society and was perhaps its most powerful intellect was the first to depart. He found he could not abide the single-minded focus on sexuality as the basis of problematic behavior. He considered pure aggression, a kind of ‘will to power’ (Nietzsche was still heavy on all their minds), to be the primal force in shaping one’s mental outlook, and also identified the ‘inferiority complex’ as a major problem in neurosis. After some heated debates with Freud he left the group to devise his own version of psychiatry called ‘individual psychology’ and to found his own society.

Famous Swiss psychologist, **Carl Gustav Jung** [1875-1961], with some of his own followers, visited Freud’s group in 1907. He joined the movement until, finding no room for his own conceptual development within the Freudian galaxy, he, too, stepped away from the guru to follow a new course through anthropology and the occult to his theory of archetypes: universal symbols supposedly present in the ‘collective unconscious’ leading to a social psychology. It was Jung who gave us the concepts of *introvert* and *extrovert* in his book *PSYCHOLOGICAL TYPES* [1921]. Jung was an odd and interesting thinker who followed his own unique course through the intellectual thicket: a greatly talented human being who divulged many valuable insights in his various writings. We cannot stop, here, to examine his thought, much of it sidetracked now, but you may find it worthwhile to look into his work as you sample more of the intellectual world and develop your own perspective.



Another fascinating character emerging from the Freudian genre was Wilhelm Reich [1897-1957] who took Freud's obsession with sex to unexpected lengths, proclaiming that it was the sexual orgasm that directly connected us with a universal force called *orgone*—possibly a hint here of Bergson's vital force. Reich, however, got a bit further out: actually building carefully designed orgone boxes, which he and his clients would enter to bathe in this all-pervading life-energy. Eventually ordered destroyed by the US Food and Drug Administration (just as they would destroy ineffective drugs or dangerous food additives—though I'm told some were secretly spared the government axe and are still in use), these carefully engineered boxes would supposedly immerse the occupant in the ethereal cosmic force or, somehow, direct it through them—possibly a hint here to Woody Allen for his inclusion of the 'orgasmatron' in the comedy movie, *Sleeper*. (Or did that device appear in *All You Ever Wanted To Know About Sex (But Were Afraid To Ask?)*) We might mention here that it has not gone entirely unnoticed that a good many psychiatrists are themselves likely neurotic, and that some of their best work has been accomplished as 'clients' of asylums.

There were several others who broke away from Freud's group, which, of course, had its outside critics from the very beginning, but it continued to grow in numbers and importance. Freud continued to be the icon of psychoanalysis, as he remains today. Though the methods of its practice have evolved beyond his own; though he has been subjected to withering feminist attacks; though his theoretical positions were undermined by science philosopher Karl Popper as unfalsifiable and therefore unscientific; and although striking advances in modern neuroscience have stolen the spotlight and the bulk of research funds from psychoanalysis (not to mention there was never recorded a single permanent cure among Freud's psychoanalytic clients), even so there are always a few in the field who entertain a back-to-Freud attitude. But even if psychoanalysis is dead as a science, his intellectual influence beyond psychiatry may have been even more powerful. Latter day social-psychologist and humanistic philosopher Erich Fromm [1900-1980], despite his considerable criticism of Freud, saw him in the company of Marx and Einstein, as one of the "architects of the modern age" [*In* Erich Fromm; *BEYOND THE CHAINS OF ILLUSION: My Encounter with Marx & Freud*; London, Sphere Books, 1980, p.11]. He has been seen by some modern philosophers as "the most significant progenitor of the shift from an objectifying, empiricist understanding of the human realm to one stressing subjectivity and interpretation" [*from* Paul Robinson; *FREUD AND HIS CRITICS*; Berkeley, University of California Press, 1993; pp.182-183]. While on the other hand, Nobel laureate immunologist, Peter Medawar, has said psychoanalysis is the "most stupendous intellectual confidence trick of the twentieth century" [*in* José Brunner; *FREUD AND THE POLITICS OF PSYCHOANALYSIS*; Transaction Publishers, 2001]. It has also been said to be "perhaps the most complex and successful pseudoscience in history" [Richard Webster; *WHY FREUD WAS WRONG: Sin, Science and Psychoanalysis*; London, The Orwell Press, 2005; p.12], and that "step by step, we are learning that Freud has been the most overrated figure in the entire history of science and medicine—one who wrought immense harm through the propagation of false etiologies, mistaken diagnoses, and fruitless lines of inquiry" [F. Crews (1995); *The Memory Wars*; New York: [THE NEW YORK REVIEW OF BOOKS](http://www.nybooks.com); p.298]. Who's right? As always, you are left to decide. [*All quotes in this paragraph from* http://en.wikipedia.org/wiki/Sigmund_Freud -- visit this article for a list of Freud's own works and several books about Sigmund Freud and his ideas]

So, what has been determined? Here are some questions that ought to be seriously entertained: Should we seek truth in regard to mind in pure thought through the study of such imaginative, ethereal, psychoanalytical dreamlands?—or in sheer behavior through the exploration of the ever-growing fact-dunes in the desert of statistical dataland? Will the answers to the human problem be found in the mind or in matter? Will the scientific method help us at all with the problem of consciousness and subconsciousness or will it be more likely to lead us astray? Is an experimental science of behavior really of any value; is it satisfactory perhaps to some limited purpose; or is it insufficient even pragmatically? How can we best use science in this regard? Are we stretching it beyond its capability? Is it useful at all in exploring the purely mental realm: the idea world? In short: Does psychology really qualify as a science, or is it the great pretender?

The debate goes on furiously inside and outside of psychology—probably always will. So we must leave these arguments unresolved and disengage from psychology so that we might, in our next session, re-engage the physical cosmos through the examination of early 20th century astronomy’s “Great Debate”.

HANDOUT:

Excerpts from AllPsych ONLINE: The Virtual Psychology Classroom;
Psychology 101, ch. 3 & 4; by Dr. Christopher L. Heffner, 2001
[see <http://allpsych.com/psychology101>]

AND

All of chapter six, “From the New Astronomy to Henrietta Leavitt” in
MODERN THEORIES OF THE UNIVERSE: From Herschel to Hubble by Michael J. Crowe;
Dover, NY, 1994;
(incl. excerpts from Alfred Wallace Russell’s paper “Man’s Place in the Universe”;
from a work of Agnes Mary Clerke [THE SYSTEM OF THE STARS];
and from Henrietta Leavitt’s important paper for the *Harvard College Observatory Circular*
[#173; Mar.3, 1912]: “Periods of 25 variable Stars in the small Magellanic Cloud” concerning the
use of certain star-types called *cepheid variables*), pp.195-232;

PLUS

Crowe’s handy chronology of events from chapter seven of the same book, pp.233-243;