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# Behaviorism and Naturalism*

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**Abstract**
Behaviorism as a school of psychology was founded by John B. Watson, and grew into the neobehaviorisms of the 1920s, 30s and 40s. Philosophers were involved from the start, prefiguring the movement and endeavoring to define or redefine its tenets. Behaviorism expressed the naturalistic bent in American thought, which opposed the then prevailing philosophical idealism and was inspired by developments in natural science itself, especially biology. This naturalism was not materialistic; it viewed mind as a part of nature from a Darwinian and functionalist perspective. Although Watson adopted a strict materialism, other behaviorists, including Tolman, Hull, and Skinner, were biologically oriented and rejected materialism and physicalist reduction. After the 1940s the character of philosophical naturalism in America changed. The physicalism of some logical empiricists and Quine became prominent, and behaviorism was philosophically reinterpreted in physicalist terms.

**Comments**
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# Behaviorism and Naturalism*

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Behaviorism was a peculiarly American phenomenon. As a school of psychology it was founded by John B. Watson (1878-1958), and grew into the neobehaviorisms of the 1920s, 30s and 40s. Philosophers were involved from the start, prefiguring the movement and endeavoring to define or redefine its tenets. Behaviorism expressed the naturalistic bent in American thought, which came in response to the prevailing philosophical idealism and was inspired by developments in natural science itself.

There were several versions of naturalism in American philosophy, and also several behaviorisms (Williams 1931, O'Neil 1995). Most behaviorists paid homage to Darwinian functionalism; all forswore introspection and made learned changes in behavior the primary subject matter and explanatory domain of psychology. Most behaviorists acknowledged that scientists begin from their own conscious experience, but denied that such experience could be an object of science or a source of evidence in psychology. They differed in their descriptions of behavior, modes of explanation, and attitudes toward mentalistic concepts. Watson was a strict materialist who wanted to eliminate all mentalistic talk from psychology. Edward Chace Tolman (1886-1959) regarded mind as a biological function of the organism. He permitted mentalistic terms such as 'purpose' in behavioral description, and posited intervening processes that included 'representations' of the environment, while requiring such processes be studied only as expressed in behavior. Clark L. Hull (1884-1952) developed a hypothetical-deductive version of

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behaviorism, akin to Tolman's functionalism in positing intervening variables but without his cognitivist constructs. B. F. Skinner (1904-90) rejected intervening variables and developed his own account of the behavior of the whole organism, based on the laws of operant conditioning.

The naturalism in American philosophy of the early twentieth century showed respect for the natural sciences, especially biology and psychology. John Dewey (1896, 1911), George Santayana (1905, 1920), and F. J. E. Woodbridge (1909, 1913) expressed this attitude. It animated the neorealism of E. B. Holt and Ralph Barton Perry (Holt et al., 1912), who gave special attention to psychology, and the evolutionary naturalism and critical realism of Roy Wood Sellars (1916, 1922). This naturalism differed from Watson's in regarding mind as part of nature from a Darwinian and functionalist perspective, and treating behavior as the product of the mental functioning. It fed Tolman's version of behaviorism. It was not materialistic or physical-reductionist. Only later, with Quine and logical empiricism, was behaviorism seen as essentially physicalistic.

## Birth of Behaviorism in Psychology

After the turn of the century there was increasing interest in behavior as a subject matter and form of evidence in psychology, and as an objective expression of mind. Philosophers and psychologists both were growing skeptical of introspection as a method for knowing mind. They believed traditional introspection had to rely on a shaky inference from analogy to extend its first-person results to other humans and to animals. Among philosophers, Perry (1909) and E. A. Singer (1911) promoted behavior as a means of perceiving mental functioning in humans that allegedly would not depend on introspection and analogy. Psychologists (e.g., Warren 1914), partly prompted by biological study of animal behavior (e.g., Jennings 1906),

called for greater attention to ’objective’ factors in human psychology (see Chapter 8). Behavioral evidence was touted by the comparative psychologists Thorndike (1898), Washburn (1908), and Yerkes (1907), but despite Yerkes’s claim to the contrary (1917, p. 155), that did not make them behaviorists, for they used such evidence to frame theories of the traditional subject matter of psychology, consciousness or mind regarded as an object of introspection.

Other psychologists argued that the very subject matter of psychology should be changed, from consciousness to behavior. William McDougall (1905, 1912), then at Oxford, and Walter Pillsbury (1911) at Michigan proposed to define psychology as the science of ’conduct’ or ’behavior’. But they did not ban introspective methods for finding the mental causes of behavior (McDougall 1905, p. 2; Pillsbury 1911, p. 5), and McDougall was an avowed dualist (1911, chap. 26). Behaviorism did not arise from making behavior the primary evidence or subject matter of psychology. It arose from a strict repudiation of introspective methods and a proposed change in the theoretical vocabulary of psychology.

Behaviorism as a self-conscious movement was initiated by Watson in two articles (1913a&b) and two books (1914, 1919). He proposed changing psychology’s subject matter, evidence, and theoretical vocabulary. The subject matter would now be behavior, described as muscle movements and glandular secretions; the evidence would be this same behavior, along with a physical description of the stimulus setting; the theoretical vocabulary of reflex arcs and Pavlovian conditioned learning would be used to explain stimulus-response relations. Animals were to be regarded as complex machines whose current behavioral propensities are a function of innate structure and previous stimulus exposure. Instinct was to be minimized, and could perhaps be explained through Lamarckian inheritance of acquired characteristics (1914,

p. 174). What a complex animal does is primarily a function of its reactional or conditioning biography, that is, its history of observable pairings of stimulus and response. While Watson believed that the chain of events from stimulus to response would eventually be accounted for in purely physical-chemical terms, he offered behaviorism as the science that would presently lead to the prediction and control of animal behavior. Behaviorism differs from physiology in studying the responses of the whole organism, but Watson permitted postulation of unobserved physiological states (glandular or muscular). Nonetheless, everything of importance is in principle available at the periphery of the organism; 'there are no centrally initiated processes' (1913a, p. 423). Behaviorist principles apply to humans and other animals alike. If one must account for the processes previously labeled 'thought' in humans, they should be seen as laryngeal subvocalizations (again, in principle detectable at the surface of the throat). Emotions are to be equated with glandular secretions and genital tumescence. Perception is a matter of sensory discrimination as manifested through differential behavioral response, including, for humans, verbal response.

As Heidbreder observed, Watson wanted to extend 'the methods and point of view of animal psychology into human psychology' (1933, p. 236). It was not just any animal psychology, but the mechanistic version propounded by Jacques Loeb, who taught Watson at Chicago (where he took his Ph.D. after studying philosophy and psychology at Furman University in Greenville, South Carolina). Loeb (1900) considered himself a biologist and an opponent of 'comparative psychology', which drew analogies between human and animal cognition based upon introspection. Even the animal biologist H. S. Jennings (1906), at Johns Hopkins when Watson arrived in 1908, permitted attribution of consciousness down the phylogenetic scale to amoeba and paramecium. Watson's comparative

psychology, and his general psychology of humans, were to be of the Loeb style--mechanistic, materialist, and deterministic, and for that reason presumably objective and scientific. Watson left Hopkins in 1920 and went into advertising, where he flourished. When after 1930 he withdrew from psychology behaviorism was on the way up; the young Skinner (1976, p. 299) and W. V. O. Quine (1985, p. 110) had already been drawn to Watson's variety.

## Philosophical and Critical Responses

Watson's articles drew immediate response from both psychologists and philosophers. Sustained discussion occurred in the Psychological Review and the Journal of Philosophy, Psychology and Scientific Methods (which published psychological articles and results even after abbreviating its name in 1921). Titchener 1914 argued that Watson's new movement was not really new. Its criticisms of introspection could be found in Comte and Maudsley (see Chapter 8). Its positive teaching should be seen as a continuation of the biological study of animal behavior, something Titchener welcomed, including its extension to humans, but which he believed neither could nor should replace mentalistic psychology. Angell 1913 was more favorably disposed to the new movement, though he refused to forgo introspection.

Among philosophers, Dewey 1914, Holt 1915, and De Laguna 1916, 1918 praised the new movement. An enthusiastic Holt was all but prepared to do away with introspective methods. Dewey believed mind is best studied as it functions purposively to adjust organism to environment. De Laguna developed this functionalist outlook but she was unwilling to preclude introspection. All agreed in seeing behavior as the expression of mind. None was prepared to reject mentalistic descriptions of behavior. Holt and Dewey argued that behavioral acts are unified as expressions of purpose. The behavior of an animal that moves about and then eats when it finds food expresses the fact

that the animal was looking for food. Holt argued that such 'objective reference' of behavior is too often neglected. Such reference may be to things that do not exist, that existed only in the past, or that will exist in the future (Holt 1915 [1915, pp. 172-3]).

The notions of purpose and objective reference in behavior were developed by Perry (1918, 1921a&b). Perry approvingly saw behaviorism as a return to the Aristotelian view that 'mind and body are related as activity and organ' (1921a, p. 85). According to the usual introspectivist, who adopts psychophysical parallelism, the mind simply 'supervenes' on physiological events; but for the behaviorist the mind 'intervenes' between stimulus and response (1921a, p. 87). Behaviorism closes the gap between mind and body. Perry did not rule out introspection, and he claimed the behaviorist did not either (citing De Laguna 1916). He believed behavioral evidence enlarged the data of psychology, and that behaviorism would yield improved psychological explanations. Consider his discussion of psychological dispositions, whether 'instincts' or Freudian 'complexes'. He regarded such dispositions as nonconscious and considered three types of explanation for them. They could be mental and not physiological, a possibility he found nonsensical for unconscious states; they could be physiological and nonmental; or, 'accepting the behavioristic version of mind, one may regard dispositions as both physical and mental: physical because consisting in certain physiological structures, mental because of the peculiar type of function or activity in which these structures are engaged' (1921a, p. 94). Perry used the same notion of disposition to analyze purposive action, which he found to consist of a 'set' or 'determining tendency' to pursue a course of action in appropriate environmental circumstances, bringing in 'auxiliary responses' as needed to achieve the desired end. Such dispositions toward purposive action

are linked conditionally to cognitive states such as beliefs, which are 'suppositions' about environmental circumstances ascribed to organisms in virtue of their dispositions to behave (1921b).

Bertrand Russell adopted the view that behavior is an expression of mind in Russell 1921, a work that attempted to solve the mind-body problem through the neutral monism of James and the neorealism of Holt and Perry, hence one that did not preclude introspection. He spoke approvingly of Watsonian behaviorism throughout Russell 1927, again retaining introspection as the means of knowing the ontologically neutral 'data' of both physics and psychology. Woodbridge (1921, 1925) argued that behavior is inherently teleological and so must be understood in relation to ends. His position was consonant with earlier functionalism and with Perry's recent work. Psychological critics of behaviorism cited these and other philosophical discussions (see Roback 1923, chaps. 3-7). Such critics charged Watson with using a double standard in denying theoretical posits to the mentalists while invoking unseen physiological states, argued that behaviorist descriptions tacitly rely on the psychologist's own introspective knowledge, predicted Watson's account of learning would be shown factually inadequate, and questioned whether his talk of muscle twitches and glandular secretions could effectively describe behavior without Holt's notion of 'objective reference'.

## Neobehaviorism and Philosophy: Tolman, Hull, Skinner

Behaviorism became the leading school of scientific psychology through the research and theorizing of the neobehaviorists, notably Tolman, Hull, and Skinner. None were simple stimulus-response reflexologists; all considered behavior to be a function of variables beyond previous and current stimulation. All were methodologically reflective and philosophically engaged. Tolman and Hull were strongly influenced by American neorealism and

pragmatist functionalism. Hull took theoretical and methodological inspiration from philosophical and scientific classics, especially Hume's associationism and the deductive exposition of Newton's Principia. Skinner came to behaviorism through Russell 1927, his philosophical outlook being further shaped by Mach 1912 [1919], Poincaré 1902, and the operationism of P. W. Bridgman 1927. As neobehaviorism was coming to maturity, the logical empiricists alleged that all psychological statements can be translated into physical statements referring to physical states of a person's body (Carnap 1932, affirming epistemological solidarity with American behaviorism; Carnap 1935, pp. 88-99; Hempel 1935). The neobehaviorists took note of the scientific philosophy of the Vienna Circle and its Berlin allies, but it was not formative of or influential on their positions (see Smith 1986).

Tolman studied psychology at Harvard, with instruction from Holt and Perry. He converted to behaviorism after going to Berkeley, where he spent his career, producing laboratory studies of maze-learning in rats, theoretical and methodological papers (collected in Tolman 1951a), and a major book (1932). He adopted an avowedly nonmetaphysical, pragmatist stance in metaphysics and epistemology (1932, chap. 25), and did not deny the existence of 'raw feels' or qualia accessible to individuals. From early on he characterized Watson's brand of behaviorism as a 'muscle twitchism' directed at the 'molecular' behavior of muscle contractions and glandular secretions. Tolman (1932, chap. 1) argued that even molecular behaviorism must rely on 'molar' descriptions of what animals do as whole organisms interacting with their environments (something Watson had acknowledged in other terms, 1919, p. 13). Believing that effective behavior classification requires consideration of the animal's purpose or end, Tolman advocated a 'purposive behaviorism' (with credit to Holt and Perry). He regarded the inherent teleology of

behavior as a biological and psychological fact. His work with rats in mazes, including their running into walls when a shortened path was substituted for a previously longer one, led him to attribute 'cognitive postulations', 'expectations', and 'representations' to rats (1926, 1927 [1951a, pp. 60, 65]). These representations might be of objects that no longer exist, thereby exhibiting intentionality (see Amundson 1983). In response to Gestalt psychology, Tolman came to attribute 'sign-Gestalt expectations' to his animals, consisting of a sign-object perceived as standing in a means-end relation to a signified object or state of affairs. Inspired by Bridgman 1927, he developed the notion of 'intervening variables' as operationally-defined internal states of animals (listed in Tolman 1938 [1951a] as demand, appetite, sensory differentiation, motor skill, hypotheses, and biases), which, together with stimulation, heredity, maturity, physiological drive, and previous training, combine to yield a response. For Tolman such intervening variables were realistically interpreted and not reducible to a purely physical or (positivistic) observational language. Intervening variables are defined in relation to observable features of the animal's environment and behavior, described (as he thought they must be) in the functionalist language of purpose. When MacCorquodale and Meehl (1948) proposed that 'intervening variables' be viewed as merely empirical correlations and that 'hypothetical construct' be used when internal entities or processes are posited, Tolman (1951b) explained that his intervening variables were hypothesized processes and states of the organism proper to psychology, not requiring physiological interpretation to be classed as hypothetical constructs (though he was newly tolerant of neurophysiological hypotheses, Tolman 1949).

Although Tolman's self-classification as a behaviorist was questioned (Harrell and Harrison 1938), it became widely accepted (Williams 1931,

Woodworth 1948, O'Neil 1995). In the 1920s many saw behaviorism as rendering study of mental activity objective, by substituting behavioral for introspective evidence. Hull and Skinner insisted on more austere vocabularies for describing such evidence than Tolman, though without returning to Watsonian twitchism.

Unlike Tolman, Hull was an avowed materialist, adopting the working hypothesis that the organism can be wholly described within a 'physical or mechanistic' view (1930, 1937 [1984, pp. 140, 319]). He was not an eliminativist regarding conscious phenomena, but his vision of behavioral science excluded introspective methods. He allowed mentalistic language such as 'goal response' into his system, but unlike Tolman demanded it be rigorously defined in pure stimulus-response language containing no mentalistic terms (and no intentional notions). Hull earned his Ph.D. at Wisconsin in 1918 and taught there until moving to Yale in 1929. At first interested in hypnosis and mental testing, he converted to behaviorism while teaching it in seminars during the mid-1920s (using Watson 1924 and Roback 1923 as texts). At Yale he produced a series of important papers (collected in Hull 1984) and two major books (1943, 1952). He conceived the organism in a functionalist and Darwinian framework; he took Newtonian physics as his model of theory structure, with definitions, postulates, and theorems. He is best known for his highly formalized theory of learning or 'habit strength'. He identified himself as a 'molar' behaviorist, arguing that behavior theory could progress despite the lack of knowledge in neurophysiology, and granting behavioral science its own observational and theoretical vocabulary. At the same time, he treated intervening variables such as 'drive' (e.g., hunger) or 'need reduction' as referring to as-yet-unknown neural states. Hull was familiar with Carnap 1935, but did not interpret his theoretical apparatus

using the analyses of theory and observation proposed by the Vienna Circle. Later interpreters retrospectively characterized his position in that light (e.g., Bergmann and Spence 1941, Spence 1944, Feigl 1951, Koch 1954), thereby eliding his materialistic realism (see Amundson and Smith 1984).

Like Tolman and Hull, Skinner wanted to produce a science of behavior together with an account (or 'philosophy') of that science. He absorbed Machian positivism before and after arriving at Harvard in 1928 to study psychology, adopting Mach's anti-metaphysical inductivism, his focus on biological adjustment, and his suspicion of posited theoretical entities. For a time Skinner wanted to marry this Machian bent with Bridgman's operationism. Then he came to see operationism in psychology as allied with logical positivism, and so as overly formal and physicalistic (1938, 1945). Skinner rejected mind and any mentalistic talk that could not be translated into neutral behavioral descriptions. But he did not think behaviorist psychology should be reduced to physiology or that its descriptions should be restated in physical language, and he was unenthusiastic about the unity of science. He avoided materialism because it led to prejudice against the behavioral level of analysis and in favor of concrete physical states of the organism (1938, chaps. 12-13). He was a molar behaviorist who sought to discover the laws of behavioral change. He rejected intervening variables of any kind (causing his behaviorism to be dubbed that of an 'empty' or 'hollow' organism), looking instead for empirical correlations among empirically determined factors such as stimulus, response, reinforcer, and hours of deprivation (of food, water, etc.). He emphasized Thorndikian conditioning, that is, behavioral changes occurring when reinforcement (getting food or another reinforcer) is contingent upon a particular type of response 'emitted' by the organism (such as pressing a bar or pecking a target). His most noted results related the

speed and permanence of learning to schedules of reinforcement (Ferster and Skinner 1957). Skinner spent the mid-1930s in the Society of Fellows at Harvard, then held positions at Minnesota and Indiana before returning to Harvard in 1947. He extended his behavioristic analysis to perception and language, where his efforts were superseded by perceptual psychologists and linguists. He lived to see the behavioristic revolution replaced by new cognitive approaches inspired by work on perception, memory, and attention, and influenced by communication theory and the rise of computer science, linguistics, and artificial intelligence.

## Behaviorism and American Naturalism

The main movements in American philosophy during the first third of the century, pragmatism, neorealism, and critical realism, were naturalistic (Perry 1912, Sellars 1916). They foresaw extending the cognitive practices of the sciences to all inquiry. These philosophies were not physicalistic or materialistic. They numbered biology and psychology among the sciences, and included biological and psychological phenomena, imbued with teleology and known through introspection, within the sphere of the natural. This was naturalism without materialism (Dewey, Hook, and Nagel 1945). This sort of naturalism was critical of Watsonian behaviorism as narrow-mindedly denying plain facts of nature (Pepper 1923, Woodbridge 1925). Mind was to be integrated into nature, not excluded from it (Dewey 1925, chaps. 6-8). This sort of naturalism was embraced by Tolman, but Hull and Skinner agreed only with its general biological orientation. Their neobehaviorisms shaped the perception of American behaviorism in later decades, while Tolman came to be seen as a predecessor of the newer cognitive approaches.

After the 1940s the character of philosophical naturalism in America changed. The physicalism of some logical empiricists and Quine became

prominent. Behaviorism was philosophically reinterpreted in physicalist terms. The biological bent of earlier American naturalism and the functionalism of neobehaviorism were thereby masked. These developments conditioned retrospective interpretations of the philosophical context of behaviorism in the first half of the century, though they themselves belong to the history of philosophy after mid-century.

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