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## THE LEGACY OF JOHN B. WATSON'S BEHAVIORIST MANIFESTO FOR APPLIED BEHAVIOR ANALYSIS

*EL LEGADO DEL MANIFIESTO CONDUCTISTA DE JOHN B.  
WATSON PARA EL ANÁLISIS CONDUCTUAL APLICADO*

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### Abstract

This paper addresses the legacy of John B. Watson's (1913b) article, "Psychology as the Behaviorist Views It," for applied behavior analysis, in particular, for four of its dimensions: the conceptual systems, behavioral, analytic, and applied dimensions. I begin with brief histories of behaviorism, behavior analysis, and applied behavior analysis. I situate Watson's article in the psychology of his day. And, I locate the defining features of his behaviorism in its opening sentence: "Psychology as the behaviorist views it is a purely objective experimental branch of natural science" (p. 158). The legacy of "natural science" is the conceptual systems dimension of applied behavior analysis. The system was a metaphysical behaviorism and descriptive positivism, not a methodological behaviorism and a logical positivism. The legacy of "objective" is the behavioral dimension of applied behavior analysis. Objectivity was not objectivism. The legacy of "experimental" is its analytic dimension. Prediction and control were means for understanding behavior, not goals in themselves. Application was not a defining feature of Watson's behaviorism, but he addressed experimental research on behavior of societal importance and mentioned its application in vocational bureaus. Thus, its legacy was, in part, the applied dimension of applied behavior analysis. In conclusion, I comment on the misrepresentation of the article's legacy in mainstream psychological science and its actual legacy for applied behavior analysis.

*Keywords:* J. B. Watson, *Psychology as the Behaviorist Views It*, applied behavior analysis, dimensions of applied behavior analysis, psychology, consciousness

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## Resumen

Este trabajo trata el legado del artículo de John B. Watson (1913), “La psicología desde el punto de vista del conductista” para el análisis conductual aplicado, en particular, para cuatro de sus dimensiones: los sistemas conceptuales, conductual, analítico, y aplicado. Comienzo con breves historias del conductismo, del análisis de la conducta y el análisis conductual aplicado. Sitúo el artículo de Watson en la psicología de sus días. Asimismo, ubico las características definitorias de su conductismo en su oración de apertura: “La psicología desde el punto de vista del conductista es una rama experimental puramente objetiva de la ciencia natural” (p. 158). El legado de “ciencia natural” es la dimensión de los sistemas conceptuales del análisis conductual aplicado. El sistema fue un conductismo metafísico y positivismo descriptivo, no un conductismo metodológico y un positivismo lógico. El legado de “objetivo” es la dimensión conductual del análisis conductual aplicado. La objetividad no fue objetivismo. El legado de “experimental” es su dimensión analítica. La predicción y el control eran los medios para entender la conducta, no metas en sí mismas. La aplicación no fue una característica definitoria del conductismo de Watson, pero abordó la investigación experimental de la conducta socialmente importante y mencionó su aplicación en despachos vocacionales. Por lo tanto, su legado fue, en parte, la dimensión aplicada del análisis conductual aplicado. En la conclusión, comento sobre la mala representación del legado del artículo dentro de la ciencia psicológica convencional y su legado real para el análisis conductual aplicado.

*Palabras clave:* J. B. Watson, *La psicología desde el punto de vista del conductista*, análisis conductual aplicado, dimensiones del análisis conductual aplicado, psicología, conciencia

This year marks the centenary of John B. Watson’s (1913b) article, “Psychology as the Behaviorist Views It.” As behaviorism’s founding publication, it had legacies for the behaviorisms that followed. Today, their main instantiation is the field of behavior analysis. As a field, behavior analysis includes a discipline and practice, both named *behavior analysis*. And, as a discipline, it includes a philosophy of science — *radical behaviorism*; a basic science — the *experimental analysis of behavior*; and an applied science — *applied behavior analysis*. It includes other sciences, too, for instance, translational science, but I restrict myself to the legacy of Watson’s article for applied behavior analysis. In the context of radical behaviorism and the experimental analysis of behavior, this allows me to explore the historical foundations of the discipline’s applied science. I begin with some historical background.

## Historical Background

Behaviorism’s long past lies in classical Greek naturalism, the Scientific Revolution, and Enlightenment philosophy (Day, 1998; Kantor, 1963). Its short history began

in late 19<sup>th</sup>-century and early 20<sup>th</sup>-century America. Among the participating factors were the American culture (e.g., progressive and modernist; O'Donnell, 1985); evolutionary biology (e.g., studies in comparative psychology; Boakes, 1984); general physiology (e.g., research on biological behavior; Pauly, 1987a); the philosophy of science (e.g., positivism; Lenzer, 1975); psychological systems (e.g., functionalism; Owens & Wagner, 1993); universities (e.g., Chicago, Johns Hopkins; see e.g., Goodspeed, 1916); teachers (e.g., Jacques Loeb; Pauly, 1987b); mentors (e.g., James Rowland Angell; Hunter, 1949); individuals (e.g., Watson; Buckley, 1989; Watson, 1936); and publications. Its signal publication was Watson's (1913b) article.

Behavior analysis participated in behaviorism's long past and short history, but varied enough to evolve into a separate field. Its history included not only functionalism, but also other behaviorisms (O'Donohue & Kitchener, 1999), and not only Loeb and Watson (1924), but also Francis Bacon (1960, 1962), Ivan Pavlov (1927), Bertrand Russell (1927), and later Ernst Mach (1959, 1960) (see Skinner, 1977, 1979). Moreover, it evolved at different universities (e.g., Harvard, Minnesota, Indiana; see, e.g., Hearst & Capshew, 1988), with different mentors (e.g., William Crozier; Hackenberg, 1995), and in different individuals (e.g., B. F. Skinner; Bjork, 1993; Skinner, 1967). Its signal publication was Skinner's (1938) book, *The Behavior of Organisms: An Experimental Analysis*.

Applied behavior analysis participated in the history of behavior analysis, but it too, varied. It varied enough to evolve into a separate sub-discipline. Its history included not only Skinner's science, but also his philosophy of science (Skinner, 1945), and not only Skinner (Morris, Altus, & Smith, 2005), but also basic researchers with applied interests (Kazdin, 1978, pp. 233-274). In addition, it evolved at different universities (e.g., Arizona State, Washington, Kansas), with different mentors (e.g., Sidney Bijou, Jack Michael), and in different individuals (see Goodall, 1973). Its signal publication was Baer, Wolf, and Risley's (1968) article, "Some Current Dimensions of Applied Behavior Analysis." In addressing the legacy of Watson's (1913b) article, I focus on the four dimensions that were the defining features of Watson's behaviorism. First, though, I situate Watson's article in the psychology of his day and introduce the behaviorism he proffered.

### Psychology as the Behaviorist Views It

Presented on February 24, 1913 as the first of nine public lectures Watson delivered at Columbia University that spring,<sup>1</sup> Watson's (1913b) article was published in the March issue of the *Psychological Review*. It purportedly inspired a revolution in psychology — a behavioral revolution. In celebratory history, it was the death of the psychology of consciousness studied through introspective methods and the birth of the psychology of behavior studied through objective methods. In critical historiogra-

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<sup>1</sup> These became the basis of Watson's (1914) book, *Behavior: An Introduction to Comparative Psychology*.

phy, though, Watson's article was not revolutionary (Leahey, 1992; see Samelson, 1974, 1981). By 1913, the psychology of consciousness had been struggling with the nature of its subject matter for several decades (Perry, 1904; see Wozniak, 1993) and the psychology of behavior had been thriving as comparative psychology for several more (Morgan, 1894; see Dewsbury, 1984). Psychology was evolving.

Nonetheless, something happened. In a forceful exegesis, Watson's (1913b) article marked a mindful transition between the two psychologies. In it, Watson coined the term *behaviorist* and, later that year, the name for the psychology of behavior — *behaviorism* (Watson, 1913a, p. 421; see Schneider & Morris, 1987). His article also marked a transition in his career from a comparative psychologist and proto-ethologist (e.g., Watson, 1914) to a systematist in the psychology of behavior (e.g., Watson, 1919, 1924), promoter and popularizer of behaviorism (e.g., Watson, 1915, 1922), leader in organized psychology (e.g., president of the American Psychological Association; see Watson, 1916), and public figure (Buckley, 1989; e.g., MacGowan, 1928). These were among the reasons his article was acknowledged as behaviorism's founding publication (Boring, 1929, pp. 582-583), ranked as the most important publication in the *Psychological Review's* first 50 years (Langfield, 1943, p. 152), and regarded as the centerpiece of Watson's "behaviorist manifesto" (Woodworth, 1948, p. 69) and, by itself, as *the* manifesto (Leahey, 2004, pp. 367-370).

Although Watson's behaviorism evolved after his article's publication (see Watson, 1916, 1919, 1924, 1928), his opening paragraph offers a succinct and accurate summary of 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 on the readiness with which they lend themselves to interpretations 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 its refinement and complexity, forms only part of the behaviorist's total scheme of investigation. (Watson, 1913b, p. 158)

Following this, Watson described the psychology of consciousness, criticized it on several grounds, advanced the psychology of behavior, placed his research in that psychology, and extended that psychology to human behavior (e.g., memory, thinking, judgment).

### **Watson's Legacy: Applied Behavior Analysis**

As for applied behavior analysis, Baer et al. (1968) described its seven dimensions in the following order: The field "must be *applied*, *behavioral*, and *analytic*. In addition, it should be *technological*, *conceptually systematic*, and *effective*, and it should display

some generality" (p. 92; emphasis in original). This arguably reflected their order of importance when the *Journal of Applied Behavior Analysis* (JABA) was founded in 1968.<sup>2</sup> In 1913, however, not all the dimensions were important or important in the same order for founding behaviorism. This may be gleaned from Watson's (1913b) opening sentence: "Psychology as the behaviorist views it is a purely objective experimental branch of natural science" (p. 158). Here, "natural science" was the conceptual systems dimension of applied behavior analysis; "objective" was the behavioral dimension; and "experimental" was the analytic dimension. These were behaviorism's defining features in their order of importance in 1913. Application was not among them, yet Watson (1913b) emphasized its importance to the extent that it, too, was a legacy of his article. In what follows, I review Baer's et al.'s (1968) descriptions of these four dimensions, address Watson's (1913b) treatment of them, and summarize Watson's (1913b) legacy for them. Before beginning, though, I offer two caveats.

First, I restrict the legacy of Watson's (1913b) article to his article, even though his behaviorism evolved afterward (Logue, 1985). For instance, he revised his views on the continuity of species, the role of biology in behavior, the principles of learning, and the nature of thinking (Watson, 1913a, 1916, 1919, 1924). He also extended behaviorism's purview to, for instance, child development, in particular, to emotional development (e.g., Watson & Rayner, 1920; see Reese, this issue). The evolution and extension of Watson's behaviorism notwithstanding, his 1913 article marked its founding.

Second, I refrain from making strong, direct claims about the legacy of his article for applied behavior analysis. When the latter was being founded in the late 1950s, his article's legacy had been tempered by many factors. For instance, between 1900 and 1930, Watson's behaviorism was but one of many behaviorisms. It was not the only behaviorism (Woodworth, 1924). Between 1930 and 1960, it was eclipsed by the neobehaviorisms. Watson's was not among them (Leahey, 2004). Between 1920 and 1960, it was among the behaviorisms and neobehaviorisms that advanced applied research and behavioral applications. Watson's was not the only behaviorism with a legacy for application (see O'Donohue, Henderson, Hayes, Fisher, & Hayes, 2001). And, between 1960 and 1980, its legacy was enabled by an American culture that sought to improve society (e.g., social justice; see Rakos, this issue), social institutions (e.g., mental health), and individual lives (e.g., lifestyles) (Rutherford, 2009; Smith, 1996).

Nonetheless, Watson's (1913b) article participated in a cultural zeitgeist conducive to a practical psychology in America, an intellectual zeitgeist conducive to behaviorism as America's psychology, and a modernist zeitgeist conducive to Watson's behaviorism. Thus, it has a legacy for behavior analysis as a field and a discipline and for applied behavior analysis as a sub-discipline. I begin with its legacy for the latter's conceptual systems dimension.

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<sup>2</sup> Or, perhaps, the first three dimensions were simply the first three words in the name of the new sub-discipline and journal — applied, behavior, and analysis (Brent Jones, personal communication, July 15, 2013).

### The Conceptual Systems Dimension: Naturalism

Baer et al. (1968) listed this dimension fifth among the seven dimensions of applied behavior analysis. By then, behavior analysis was psychology's leading neobehaviorism and well-enough established as a system that other dimensions were more important for founding applied behavior analysis. In 1913, though, Watson's (1913b) conceptual system was the first and defining feature of his behaviorism. It was his behaviorism. In defining psychology as "a purely objective experimental branch of natural science" (p. 158), naturalism was the first legacy of his article for applied behavior analysis.

Much depends, of course, on the meaning of the terms, here, on the meaning of *conceptual systems*. Baer et al. (1968) described the conceptual systems dimension his way:

The field of applied behavior analysis will probably advance best if the published descriptions of its procedures are not only precisely technological, but also strive for relevance to principle. To describe exactly how a preschool teacher will attend to jungle-gym climbing in a child frightened of heights is good technological description; but further to call it a social reinforcement procedure relates it to basic concepts of behavioral development. Similarly, to describe the exact sequence of color changes whereby a child is moved from a color discrimination to a form discrimination is good; to refer also to "fading" and "errorless discrimination" is better. In both cases, the total description is adequate for successful replication by the reader; and it also shows the reader how similar procedures may be derived from basic principles. This can have the effect of making a body of technology into a discipline rather than a collection of tricks. (p. 96)

Although Baer et al. (1968) did not specify a particular system, it was Skinner's (1938, 1953). They referred only to operant principles (e.g., reinforcement), operant processes (e.g., fading), and operant concepts (e.g., errorless discrimination).

In the 1987 update on their 1968 article, Baer et al. (1987) wrote: "*Conceptual* meant relevance to a comprehensive theory about behavior" (p. 318). In behavior analysis, a comprehensive theory is an empirically-induced integration of behavioral principles, processes, and concepts (Skinner, 1947) that, in turn, participates in a philosophy of science (e.g., the unique confluence of empiricism and pragmatism in behavior analysis; Day, 1998; Skinner, 1945). Thus, the conceptual systems dimension ranges from (a) basic principles, processes, and concepts to (b) a comprehensive theory of behavior to (c) a philosophy of science. Baer et al. (1968) emphasized principles, processes, and concepts. Watson (1913b) emphasized the philosophy of science. The difference reflected different purposes in their respective foundations.



## Psychology as the Behaviorist Views It

Although naturalism was the first legacy of Watson's (1913b) article for applied behavior analysis, it was more implied than apparent. His article did not defend naturalism so much as criticize the psychology of consciousness and advance the psychology of behavior, as follows.

**The psychology of consciousness.** Watson (1913b) criticized two psychologies of consciousness.<sup>3</sup> In both cases, consciousness was their subject matter, but not, in both cases, what they studied. One studied consciousness for metaphysical reasons; the other studied behavior for methodological reasons.

In the first psychology of consciousness, human consciousness was psychology's only subject matter and what it studied through introspection. It came in two varieties — Structuralism and Functionalism. Structuralism studied conscious states and their elements, in particular, sensations, feelings, and images. Functionalism studied conscious processes, for instance, sensing, thinking, and remembering. Watson (1913b) criticized both psychologies. They were dualistic in assuming that consciousness existed independent of behavior. They were unclear about their subject matter. And, they used subjective methods — introspection. He concluded:

The time has come when psychology must discard all reference to consciousness; when it need no longer delude itself into thinking that it is making mental states into the object of observation. We have become so enmeshed in speculative questions concerning the elements of mind, the nature of conscious content...that I, as an experimental student, feel that something is wrong with our premises and the types of problems that develop from them. (p. 163)

In the second psychology of consciousness, consciousness was psychology's subject matter, but not what it studied. It studied behavior for methodological reasons: Consciousness could not be objectively defined, directly observed, or accurately and reliably measured. To become a *true* science, psychology had to be positivistic. Behavior, however, only had significance "in so far as [it] may throw light upon conscious states" (Watson, 1913b, p. 163). Otherwise, it was of "no use" (p. 163). This psychology also came in two varieties.

In the first, the consciousness of animals and humans was "constructed" through "analogical" references (Watson, 1913b, p. 159). That is, their consciousness was inferred from the consciousness of experimenters engaged in analogous behavior. This was the logic of subjective inference. Watson provided an example: An animal's vi-

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<sup>3</sup> Among Watson's (1913b) other terms for consciousness were the psychic, the phenomena of consciousness, mental machinery, conscious content, the nature of conscious content, and its elementary constituents, that is, the elements of mind. Among his examples were affection, associative memory, attention, attitudes, emotion, feelings, images, imagery, imageless thought, perception and perceptual processes, sensation, thought and thought processes, and volition.



sual discrimination between two lights would be constructed by asking: "does the animal see these two lights as I do, *i.e.*, as two distinct colors or does he see them as two grays differing in brightness, as does the totally color blind?" (pp. 170-171). That is, the experimenter "thinks of the animal's response in terms of his own experiences of colors and grays" (p. 171). Watson argued that subjective inference was "absurd" (p. 159) and "false" (p. 160; see Morris, Higgins, & Bickel, 1982, on the fallacy of affirming the consequent). This variety of the psychology of consciousness was not a legacy for psychology today, except perhaps in thought experiments about theories of mind.

In the second variety, the consciousness of animals and humans was "constructed" through "indirect" references (Watson, 1913b, p. 159). That is, their consciousness was inferred from "criteria of the psychic," specifically, from "a set of objective, structural or functional criteria which, when applied in a particular instance...enable us to decide whether such and such responses are positively conscious..." (p. 161). This is the logic of objective inference. Watson noted several criteria (e.g., associative memory, habit formation), but returned to his example of visual discrimination. It was a basis for inferring "the possible mental processes of our animals" (p. 160). The legacy of this variety of the psychology of consciousness became the dominant form of methodological behaviorism (Leahey, 2004, pp. 402-444; see Moore, *in press*, on the methodological behaviorisms). Its criteria of the psychic became operational definitions of hypothetical constructs that explained behavior, for instance, mental representations of the environment (e.g., cognitive maps; see Tolman, 1932) and mediating organismic variables (e.g., drives; Hull, 1943). Today, this is mainstream psychology (e.g., information processing; see Mandler, 2007).

**The psychology of behavior.** The psychology of behavior Watson (1913b) advanced also came in two varieties. In both, behavior was their subject matter *and* what they studied, but for different reasons. One studied behavior for methodological reasons; the other studied it for metaphysical reasons. Both were forms of Watson's (1913b) behaviorism, but only the latter was the legacy of his article for applied behavior analysis.

Watson's (1913b) methodological behaviorism did not deny the existence of consciousness. As he wrote in his introductory paragraph, "Introspection forms no *essential* part of [psychology's] methods, nor is the scientific value of its data *dependent* on the readiness with which they lend themselves to interpretations in terms of consciousness" (p. 158; *emphasis added*). That is, introspection was not an essential method, but it was a method, and psychology's data were independent of consciousness, but consciousness still existed. For Watson, though, "One can assume either the presence or the absence of consciousness anywhere in the phylogenetic scale without affecting the problems of behavior one jot or one tittle; and without influencing in any way the mode of experimental attack upon them" (p. 161; see Watson, 1913a, p. 422). As a result, "The plans which I most favor for psychology lead *practically* to the ignoring of consciousness... I have virtually denied that this realm of psychics is open to experimental investigation" (p. 175). That is, consciousness existed, but could not

be objectively defined, directly observed, or accurately and reliably measured. Only behavior was intersubjectively verifiable. Hence, it was psychology's subject matter. Watson likely advanced this argument because it could be easily understood in a practical culture and in a psychology that sought to be useful. Philosophical nuances could be set aside (Morris & Todd, 1999). Today, this form of methodological behaviorism is not much practiced in psychology (but see Uttal, 2008), yet it may be held by applied behavior analysts who are not radical behaviorists.

Watson's (1913b) metaphysical behaviorism, in contrast, denied the dualistic assumption that consciousness existed as a *thing* independent of behavior. For him, psychology was a "natural science." Naturalism is the monistic view that nothing exists outside of nature. In psychology, naturalism explains behavior without reference to hypothetical constructs. Whether behavior is explicit or public (e.g., social relations) or implicit or private (e.g., problem-solving in one's head), behavior is all that exists. Returning to his example of visual discrimination, Watson wrote that the behaviorist "wishes to establish the fact whether wave-length is a factor in that animal's adjustment. If so, what wave-lengths are effective and what differences in wave-length must be maintained in the different regions to afford bases of differential responses" (p. 171). That is, Watson's metaphysical behaviorism accepted objective inferences about behavior's controlling variables, but not about the dualistic construct of consciousness.

Watson's (1913b) denial of consciousness, though, was not a denial of behaving consciously (e.g., sensing, feeling, imagining; Watson, 1919, 1924; see Malone, 1990):

The individual is always examining objects, in the one case objects in the now accepted sense [i.e., explicit, public], in the other their substitute, viz. the movements of the speech musculature [i.e., implicit, private]. From this it follows that there is no theoretical limitation of the behavior method. There remains, to be sure, the practical difficulty, which may never be overcome, of examining [implicit, private] speech movements in the way that general bodily behavior may be examined. (p. 174)

He concluded, "If you will grant the behaviorist the right to use consciousness in the same way that other natural scientists employ it — that is, without making consciousness a special object of observation — you will have granted all that my thesis requires" (p. 175). Watson's metaphysical behaviorism was, ultimately, his behaviorism (Watson, 1924; see Morris & Todd, 1999).

### **Watson's Legacy**

Naturalism was the first legacy of Watson's (1913b) article for applied behavior analysis, in particular, for its conceptual systems dimension. His article presaged the

science in applied behavior analysis as a natural science, even though Watson's and Skinner's sciences differed. Watson's was a science of stimulus-response psychology (Watson, 1916); Skinner's was a science of operant behavior (Skinner, 1938, 1953). Watson's article also presaged the philosophy of applied behavior analysis as naturalism, even though again, Watson's and Skinner's philosophies differed. Watson's was positivistic and mechanistic; Skinner's (1945, 1953, 1974) was pragmatic and contextualistic (Hayes, Hayes, & Reese, 1988; Morris, 1988; Moxley, 2001).

To be more specific, Skinner (1945) first articulated the philosophy of his science of behavior in his article, "The Operational Analysis of Psychological Terms" (Moxley, 1992, 2001). There, he made three contributions. First, he named his philosophy *radical behaviorism* because everything psychological is ultimately behavioral, where *radical* meant "thoroughgoing" or "root" (Schneider & Morris, 1987). His behaviorism was a metaphysical behaviorism, not a methodological behaviorism. Second, he incorporated private responses and stimuli into his system. Although unobserved by others, they were not, in principle, *unobservable*. His positivism was a descriptive positivism, not a logical positivism (Smith, 1986, pp. 256-297). And third, he analyzed psychological terms such as "consciousness," "will," and "feeling" as verbal behavior occasioned by qualities of behavior, for instance, behaving consciously, willfully, and with feeling. These qualities can be objectively defined, directly observed, and accurately and reliably measured (Skinner, 1989). The terms describe behavioral relations, not hypothetical constructs independent of them. Likewise, the term "subjectivity" is verbal behavior occasioned, in part, by individual differences within the behavior of individuals over time and across the behavior of individuals at any one time. Again, the term describes behavioral relations, not a hypothetical construct independent of them (Skinner, 1957). This analysis of psychological terms was also Watson's (1913b), but it was so undeveloped in Watson's analysis of language to be understood or appreciated (see, e.g., Skinner, 1957) or a legacy of his behaviorism for applied behavior analysis.

### **The Behavioral Dimension: Objectivity**

Baer et al. (1968) listed the behavioral dimension second among the seven dimensions of applied behavior analysis. In 1913, it was also a second defining feature of Watson's (1913b) behaviorism. However, he did not use the term *behavioral*, but instead, the term, *objective*: "Psychology as the behaviorist views it is a purely *objective* experimental branch of natural science" (p. 158; emphasis added). Objectivity was the second legacy of his article for applied behavior analysis.

### **The Behavioral Dimension**

Again, much depends on the meaning of terms, here, on the meaning of *behavioral*. Baer et al. (1968) described the behavioral dimension this way:

Applied research...usually studies what subjects can be brought to do rather than what they can be brought to say; unless, of course, a verbal response is of interest. Accordingly a subject's verbal description of his own non-verbal behavior usually would not be accepted as a measure of his actual behavior unless it were independently substantiated... The relevant question is not what he can say, but what he can do. Application has not been achieved until this question has been answered satisfactorily. (p. 93)

Given a conceptual system in which behavior was what the science studied and its subject matter, applied behavior analysis would, of course, emphasize objective definitions, direct observation, and accurate and reliable measurement. Although accuracy and reliability are problems in all science, Baer et al. (1968) noted that:

The problem is the same for applied research as it is for non-applied research. However, non-applied research typically will choose a response easily quantified in a reliable manner [e.g., mechanical, permanent products], whereas applied research will rarely have that option.... The reliable use of human beings to quantify the behavior of other human beings is an area of psychological technology long since well developed, thoroughly relevant, and very often necessary to applied behavior analysis. (p. 93)

That is, when behavior cannot be measured accurately and reliably through mechanical means or through permanent products, the validity of behavior's observation and measurement is supported by obtaining interobserver agreement (IOA) between simultaneous observations of primary observers and independent secondary observers (see Johnston & Pennypacker, 2009, pp.146-152).

### **Psychology as the Behaviorist Views It**

By the time Watson (1913b) published his article, he was an expert in the objective definition, direct observation, and accurate and reliable measurement of behavior (see Todd & Morris, 1986). Starting with his dissertation, he had conducted intensive studies in neuropsychology, for instance, on the sensory and neural bases of learning (e.g., Watson, 1907); in psychophysics, for instance, on vision in monkeys (Watson, 1909); in ethology, for instance, on the homing and the mating habits of birds and their egg-recognition (e.g., Watson, 1908a); in comparative psychology, for instance, on the behavior of noddy and sooty terns (e.g., Watson, 1910); and in animal behavior, for instance, on learning in rats (e.g., Watson, 1903). He was also well-published in research methods (e.g., Watson, 1906) and reviews of the research literature (e.g., Watson, 1908b). Thus, Watson's (1913b) article was taken seriously, in part, because of the stature he had achieved through his science and scholarship (Bergmann, 1956), as well as in professional service, for instance, as an editorial board member of the *Journal of Comparative Neurology and Psychology*.

Not only was Watson's (1913b) article taken seriously because of his science and scholarship, but also because he supported it by citing research literatures across many species. He referred to "animals," meaning nonhumans<sup>4</sup>, over 40 times, from most to least often: birds, rats, amoebae, ants, chicks, mice, and paramecia. Fifteen percent of his references were to evolution: 66% of them on animal species, 17% on inheritance, and 17% on the continuity of species. Twenty-two percent of his references were to sensory systems: 11% of them on the senses in general and 89% on vision in particular. Most of his references, though — 63% of them — were to behavior: 27% of them on animal research in general and 63% on animal behavior, which included instinctive activities, reflexes, associations, adjustments, habits, and learning.

For Watson (1913b), the use of objective definitions, direct observation, and accurate and reliable measurement in animal behavior could also be applied to research on human behavior. Indeed, after criticizing the psychology of consciousness for holding that research on animal behavior was useful only in an analogical or indirect relation to human consciousness, he argued:

It seems reasonably clear that some kind of compromise must be effected: either psychology must change its viewpoint so as to take in facts of behavior, whether or not they have bearings upon the problems of "consciousness," or else behavior must stand alone as a whole separate and independent science. Should human psychologists fail to look with favor upon our overtures and refuse to modify their position, the behaviorists will be driven to using human beings as subjects and to employ methods of investigation which are exactly comparable to those now employed in the animal work. (p. 159).

These objective methods should not be conflated with the philosophy of objectivism. Objectivism is the view that the functions of objects and events are essentialist, immutable, and independent of the behavior of organisms (Mahoney, 1989; contra Morris, 1990).

Watson (1913b) allowed one exception to direct observation in human behavior, which he called an "abridged behavior method," specifically, a "language method" (p. 172). For instance, instead of using differential consequences in discrimination training, experimenters could ask humans to (a) "respond by setting a second apparatus until standard and control [stimuli] offered no basis for a differential response" to them (p. 171) or (b) report verbally whether the stimuli were different or the same. When the accuracy of these results was doubted, however, Watson returned to direct observation. In fact, he was not sanguine about the language method: "To make the data obtained by the language method virtually the whole of behavior — or to attempt to mould [sic]

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<sup>4</sup> The "animal-human" distinction was Watson's, which I honor. The technically correct distinction is between nonhumans and humans (see Poling, 1984).

all the data obtained by other methods in terms of the one which has by all odds the most limited range — is putting the cart before the horse with a vengeance” (p. 172).

### **Watson’s Legacy**

Objectivity was the second legacy of Watson’s (1913b) article for applied behavior analysis, in particular, for its behavioral dimension. When Watson used self-reports that were doubted, he reverted to direct observations. This presaged Baer et al.’s (1968) caveat that a self-report “usually would not be accepted as a measure of...actual behavior *unless it were independently substantiated...*” (p. 93, emphasis added). When Watson observed behavior directly, however, he did not obtain IOA, but neither did early reports of applied research in applied behavior analysis that used nonmechanical means for collecting data (e.g., Flanagan, Goldiamond, & Azrin, 1958). This was also true of early reports of research on behavioral applications (e.g., Ayllon & Michael, 1959). Interobserver agreement was not reported until Wolf’s research on the effects of teacher attention on young children’s behavior (e.g., Allen, Hart, Buell, Harris, & Wolf, 1964; see Morris, Altus, & Smith, 2013). Today, IOA is required when mechanical means for collecting data and permanent products are not available.

### **The Analytic Dimension: Experimental**

Baer et al. (1968) listed the analytic dimension third among the seven dimensions of applied behavior analysis. In 1913, it was also a third defining feature of Watson’s (1913b) behaviorism. However, he did not use the term *analytic*, but instead, the term, *experimental*: “Psychology as the behaviorist views it is a purely objective *experimental* branch of natural science” (p. 158; emphasis added). Experimental was the third legacy of his article for applied behavior analysis.

### **The Analytic Dimension**

Once again, much depends on the meaning of terms, here, on the meaning of *analytic*. Baer et al. (1968) described the analytic dimension this way:

The analysis of behavior...requires a believable demonstration of the events that can be responsible for the occurrence or non-occurrence of...behavior. An experimenter has achieved an analysis of behavior when he can exercise control over it.... [This] has meant an ability of the experimenter to turn the behavior on or off...at will. (pp. 93-94)

Baer et al. (1968) then reviewed the use of within-individual research designs for achieving experimental control through systematic replication. In updating their article in 1987, they wrote that “*analytic* meant a convincing experimental design”

(Baer, 1987, p. 318). This, however, conflated the meanings of *analytic* and *experimental* (see Sidman, 1960; Skinner, 1966). In applied behavior analysis, the terms are used for (a) the experimental analysis of behavior of societal importance, that is, of variables that control it and (b) the experimental analysis of applications that change behavior of societal importance, that is, of applications that control it. The former discovers functional relations in behavior; the latter demonstrates functional relations in applications. Discovery and demonstration are not the same (Morris, 1991).

### Psychology as the Behaviorist Views It

In the sentence following Watson's (1913b) definition of psychology as an "objective experimental branch of natural science" (p. 158), he wrote: "Its theoretical goal is the prediction and control of behavior" (p. 158). However, *theoretical* has several meanings. One meaning is *unachieved*, as in an unachieved goal, but the prediction and control of behavior had been achieved in research on animal behavior for at least a half century before Watson's article. Indeed, Watson, himself, had contributed to this literature (e.g., Watson, 1903, 1907, 1908a; see Boakes, 1984; Dewsbury, 1984). Still, as Watson (1913b) noted, much remained to be achieved:

I cannot for one moment assume that the paramecium responds to light; that a rat learns problems more quickly by working at the task five times a day than once a day, or that the human child exhibits plateaus in his learning curves. These are questions which vitally concern behavior and which must be decided by direct observation under experimental conditions. (p. 161)

That is, such assumptions about behavior were empirical questions for research, not givens.

Another meaning of *theoretical* is *abstract*, as in an abstract goal. Here, prediction and control are abstract descriptions of relations between independent and dependent variables, just as the terms "learning," "conditioning," and "reflex" are abstract descriptions for classes of behavioral processes (see Skinner, 1931). As such, prediction and control were not necessarily goals in themselves, but abstractions describing means to other goals (e.g., Watson, 1913b, p. 167). For instance, prior to 1913, Watson wrote little about prediction and control per se because his goal was to discern the lawful nature of behavior by means of its prediction and control (i.e., experimental analyses; see Morris, Todd, & Midgley, 1993). As a comparative psychologist, he was interested "in getting all the processes of adjustment which the animal as a whole employs, and in finding how these various processes are associated, and how they fall apart, thus working out a systematic scheme for the prediction and control of response in general" (p. 162). Moreover, in systematizing the behavioral processes discerned by means of prediction and control, he could develop a theory of behavior, that is, in the vernacular, an understanding of behavior. Bacon (1960, 1962) advanced this approach



to science at the start of the Scientific Revolution (Pérez-Ramos, 1988). Watson acquired it through coursework with Loeb (1905; see Hackenberg, 1995; Pauly, 1987b).

Watson (1913b) illustrated these points with his ethological studies of birds. For instance, in seeking to “understand” the relation between habit and heredity, he wrote: “My efforts in determining the stimuli which called forth [their] adjustments were crude indeed. Consequently my attempts to control behavior and to produce responses at will did not meet with much success” (p. 167). That is, although Watson used prediction and control to understand the birds’ behavior in their natural habitats, he was sometimes unsuccessful. In these cases, he wrote that field research “must be supplemented by carefully controlled laboratory experiments” (p. 168). Moreover, had he “been called upon to examine the natives of some Australian tribes” or “to work out the psychology of the educated European” (p. 168), he wrote that he would have taken the same approach, using field and laboratory research, not introspection. Watson summarized his position as follows: “In the main, my desire in all such work is to gain an accurate knowledge of adjustments and the stimuli calling them forth. My final reason for this is to learn general and particular methods by which I may control behavior” (p. 168).

Watson (1913b) arguably meant general and particular methods of experimental prediction and control in the analysis of behavior. However, his article quickly delved into research on behavior of societal importance and the application of this research to behavior of both societal and individual importance. Even here, though, prediction and control were not goals in themselves (Morris et al., 1993). They were means for experimentally analyzing or understanding (a) behavior of societal importance and (b) applications that changed behavior of societal and individual importance, even though application was not a defining feature of his behaviorism in 1913.

### **Watson’s Legacy**

Experimentation was the third legacy of Watson’s (1913b) article for applied behavior analysis, in particular, for its analytic dimension. The experimental methods Watson described were mainly prediction and control, which presaged Baer et al.’s (1968) description of the analytic dimension: “An experimenter has achieved an analysis of behavior when he can exercise control over it” (p. 94). Watson used prediction and control as means to two goals. First, he used them in experimental research on behavioral processes (e.g., conditioning; see Watson, 1903, 1907). This contributed to a science of behavior in general (e.g., behavioral principles), which Baer et al. (1968) emphasized in the conceptual systems dimension (i.e., Skinner’s science). Second, he advanced the use of prediction and control in experimental research on behavior of societal and individual importance (e.g., Watson & Rayner, 1920). This contributed to a science of, for instance, child development (e.g., fears), education (e.g., learning) and the law (e.g., eyewitness testimony). In 1913, Watson did not use prediction and control in applications to behavior of societal and individual importance, although

later, he did (e.g., Lashley & Watson, 1920; Watson & Watson, 1928). He mainly advanced applications in arguments about the usefulness of the psychologies of behavior in contrast to the psychologies of consciousness (see Watson, 1924, 1928).

### **The Applied Dimension: Applied Research, Behavioral Applications, and Practice**

Baer et al. (1968) listed the applied dimension first among the seven dimensions of applied behavior analysis. By then, the preceding dimensions were well-known and widely used in psychology and behavior analysis, yet none of them distinguished the new sub-discipline. Only the applied dimension did, yet it was not a defining feature of Watson's behaviorism in 1913. Watson did, though, appeal to behaviorism's usefulness in understanding behavior of societal importance in a socially progressive America (Bakan, 1966) and in applications to behavior of individual importance in an American psychology that sought to be useful (O'Donnell, 1985). This significantly advanced his behaviorism. Thus, applied research was a fourth legacy of Watson's (1913b) article for applied behavior analysis.

#### **The Applied Dimension**

For one last time, much depends on the meaning of terms, here, the meaning of *applied*. Baer et al. (1968) described the applied dimension as follows:

The label applied is not determined by the research procedures used but by the interest in which society shows in the problems being studied. In behavioral application, the behavior, stimuli, and/or organism under study are chosen based on their importance to man and society, rather than on their importance to theory. (p. 92)

They then distinguished between "applied" research and behavioral "applications." Applied research addressed behavioral relations of societal importance, but not for any particular "behavior, stimuli, and/or organism" (p. 92; see Birnbrauer, 1979; Deitz, 1983; Johnston, 1996). In fact, four of the 26 articles published in the first volume of *JABA* were reports of such research, for instance, of generative plural morpheme use by a child with intellectual disabilities (Guess, Sailor, Rutherford, & Baer, 1968) and eye movements by adults in a signal-detection preparation (Schroeder & Holland, 1968). These were reports about behavior of societal importance (e.g., radar detection), but not about behavior important to the individual participants. In contrast, the remaining 22 *JABA* articles reported applications to behavior that was of societal and individual importance (Azrin, 1977), for instance, classroom management (Hall, Lund, & Jackson, 1968) and group-homes for pre-delinquent youths (Phillips, 1968).

## Psychology as the Behaviorist Views It

Although not a defining feature of Watson's (1913b) behaviorism, he appealed to applied research and its potential for application in his critiques of the psychologies of consciousness:

If psychology would follow the plan I suggest, the educator, the physician, the jurist and the business man could utilize our data in a practical way, as soon as we are able, experimentally, to obtain them. Ask any physician or jurist today whether scientific psychology [the psychology of consciousness] plays a practical part in his daily routine and you will hear him deny that the psychology of the laboratories finds a place in his scheme of work. I think the criticism is extremely just. One of the earliest conditions which made me dissatisfied with psychology was the feeling that there was no realm of application for the principles [in the psychology of consciousness] which were being worked out in content terms [sensations, feelings, images]. (pp. 168-169)

Watson (1913b) then appealed to the practical use of the psychologies of behavior:

What gives me hope that the behaviorist's position is a defensible one is the fact that those branches of psychology which have already partially withdrawn from the parent, experimental psychology [the psychology of consciousness], and which are consequently less dependent upon introspection are today in a most flourishing condition. Experimental pedagogy, the psychology of drugs, the psychology of advertising, legal psychology, the psychology of tests, and psychopathology are all vigorous growths. (p. 169)

Watson (1913b) described these branches as "experimental psychologies," not as applied psychology, and then wrote of the distinction: These branches of experimental psychology "are sometimes wrongly called 'practical' or 'applied' psychology. Surely there was never a worse misnomer. In the future there may grow up vocational bureaus which really apply psychology" (p. 169). In a 1911 letter to Hugo Munsterberg, Watson described what he meant by vocational bureaus:

[Watson asked Munsterberg] about the feasibility of establishing a "vocational bureau" supported by business and professional groups. Watson wanted to explore the reasons why so many promising men, owing to what he called "a lack of balance in the individual," are put at a disadvantage in competing for jobs. Watson felt that professional training could identify and eliminate tendencies that hindered successful careers and could help develop traits that were consonant with good work habits. Such a system would, he believed, not only "spare us many a neuropath and many a criminal," but also produce a "higher level of efficiency" ... (Buckley, 1989, p. 69)

Vocational bureaus would use behavioral applications, but seemingly would not conduct applied research. That was left to experimental psychologists. Watson (1913b) continued:

At present these fields are truly scientific and are in search of broad generalizations which will lead to the control of human behavior. For example, we find out by experimentation whether a series of stanzas may be acquired more readily if the whole is learned at once... We do not attempt to apply our findings. The application of this principle is purely voluntary on the part of the teacher. In the psychology of drugs we may show the effect upon behavior of certain doses of caffeine. We may reach the conclusion that caffeine has a good effect upon the speed and accuracy of work. But these are general principles. We leave it to the individual as to whether the results of our tests shall be applied or not. Again, in legal testimony we test the effects of recency upon the reliability of a witness's report. We test the accuracy of the report with respect to moving objects, stationary objects, color, etc. It depends on the judiciary machinery of the country to decide whether these facts are ever to be applied. (p. 169)

These applied branches of experimental psychology were defined by the societal importance of the behavioral relations they discovered (e.g., facts, generalizations), not by any particular behavior, stimuli, and/or organism.

### **Watson's Legacy**

Applied research was the fourth legacy of Watson's (1913b) article for applied behavior analysis, in particular, for the applied dimension, albeit not a defining feature. For him, behavioral applications were the purview of vocational bureaus (and professions), not of research on behavior of societal importance. Thus, his distinction between applied research and vocational bureaus (and professions) only partially presaged Baer et al.'s (1968) distinction between applied research on behavior of societal importance and behavioral applications of societal and individual importance. In 1968, research on behavioral applications occupied the middle ground between applied research and Watson's vocational bureaus (and professions). In 2013, they occupy the middle ground between applied research and behavior analysis as a profession. Vocational bureaus were the legacy of Watson's (1913b) article for the profession of behavior analysis (see Johnston, 2011; Wood, 1975 on behavior analysis as a profession).

### **Conclusion**

In conclusion, I have addressed the legacy of Watson's (1913b) article, "Psychology as the Behaviorist Views It," for applied behavior analysis as a means of explor-

ing the latter's historical foundations, specifically, its conceptual systems, behavioral, analytic, and applied dimensions. Although tempered by many factors, his article's legacies for them were naturalism, objectivity, experimentation, and applied research. As for the other dimensions -- technological, effective, and generality -- these were not mentioned as defining features of Watson's behaviorism in his opening sentence, "Psychology as the behaviorist views it is a purely objective experimental branch of natural science" (p. 158), or alluded to elsewhere in his article. As a result, I did not address them, even though cases could be made for their inclusion (e.g., technological).

On the centenary of Watson's publication, the forgoing legacies for behavior analysis are not the received view in psychological science, perhaps because its view is influenced by Watson's subsequent publications or a selective reading of them (Harzem, 1993). In its view, the legacy of Watson's article for the conceptual systems dimension is methodological behaviorism and logical positivism, not naturalism and descriptive positivism (see Moore, 2008). Its legacy for the behavioral dimension is objectivism, not objectivity (see Johnston & Pennypacker, 2009). Its legacy for the analytic dimension is prediction and control as ends, not as means (see Morris et al., 1993). And, its legacy for the applied dimension is behavior modification, not applied research (see Morris, Altus, & Smith, 2013). Watson's article bears a close, careful reading to understand the differences.

Finally, although Watson's 1913 article did not include application among its defining features, his appeal to them made it a legacy of his behaviorism. For this, I close with one more quotation from his article: "The psychology which I should attempt to build up would take as its starting point, first, the observable fact that organisms, man and animal alike...adjust themselves to their environment... These adjustments may be very adequate or they may be so inadequate that the organism barely maintains its existence..." (p. 167). Behavioral applications for adjustments that are "so inadequate that the organism barely maintains its existence" are among the means of applied behavior analysis. Sparing us "many a neuropath and many a criminal" with efficiency is among the ends of behavior analysis as a profession (see Kazdin, 1978; Morris et al., 2013; O'Donohue et al., 2001). Watson was prescient.

## References

- Allen, K. E., Hart, B. E., Buell, J. S., Harris, F. R., & Wolf, M. M. (1964). Effects of social reinforcement on isolate behavior of a nursery school child. *Child Development*, 35, 511-518.
- Ayllon, T., & Michael, J. (1959). The psychiatric nurse as behavioral engineer. *Journal of the Experimental Analysis of Behavior*, 2, 323-334.
- Azrin, N. H. (1977). A strategy for applied research: Learning based but outcome oriented. *American Psychologist*, 32, 140-149.

- Bacon, F. (1960). *The new organon* (F. H. Anderson, Ed.). Indianapolis: Bobbs-Merrill. (Original work published 1620)
- Bacon, F. (1962). *The advancement of learning*. London: Dent. (Original work published 1605)
- Baer, D. M., Wolf, M. M., & Risley, T. R. (1968). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis*, 1, 91-97.
- Baer, D. M., Wolf, M. M., & Risley, T. R. (1987). Some still-current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis*, 20, 313-327.
- Bakan, D. (1966). Behaviorism and American urbanization. *Journal of the History of the Behavioral Sciences*, 2, 5-28.
- Bergmann, G. (1956). The contribution of John B. Watson. *Psychological Review*, 63, 265-275.
- Birnbrauer, J. S. (1979). Applied behavior analysis, service and the acquisition of knowledge. *The Behavior Analyst*, 2, 15-21.
- Bjork, D. W. (1993). *B. F. Skinner: A life*. New York: Basic Books.
- Boakes, R. (1984). *From Darwin to behaviourism: Psychology and the minds of animals*. New York: Cambridge University Press.
- Boring, E. G. (1929). *A history of experimental psychology*. New York: Century.
- Buckley, K. W. (1989). *Mechanical man: John Broadus Watson and the beginnings of behaviorism*. New York: Guilford.
- Conklin, E. G. (1939). Henry Herbert Donaldson (1857-1938). *Biographical Memoirs of the National Academy of Sciences* (Vol. 20, pp. 228-243). Washington, D.C.: National Academy of Sciences.
- Day, W. F. (1998). The historical antecedents of contemporary behaviorism. In R. W. Rieber & K. Salzinger (Eds.), *Psychology: Theoretical- historical perspectives* (2nd ed.). (pp. 301-352). New York: Academic Press.
- Deitz, S. M. (1983). Two correct definitions of "applied." *The Behavior Analyst*, 6, 105-106.
- Dewsbury, S. A. (1984). *Comparative psychology in the twentieth century*. Stroudsburg, PA: Hutchinson Ross.
- Flanagan, B., Goldiamond, I., & Azrin, N. H. (1958). Operant stuttering: The control of stuttering behavior through response-contingent consequences. *Journal of the Experimental Analysis of Behavior*, 1, 173-177.
- Goodall, K. (1972, November). Shapers at work. *Psychology Today*, 6(6), 53-62, 132-138.
- Goodspeed, T. W. (1916). *A history of the University of Chicago*. Chicago: University of Chicago Press.
- Guess, D., Sailor, W., Rutherford, G., & Baer, D. M. (1968). An experimental analysis of linguistic development: the productive use of the plural morpheme. *Journal of Applied Behavior Analysis*, 1, 297-306.
- Hackenberg, T. D. (1995). Jacques Loeb, B. F. Skinner, and the legacy of prediction and control. *The Behavior Analyst*, 18, 225-236.

- Hall, R. V., Lund, D., & Jackson, D. (1968). Effects of teacher attention on study behavior. *Journal of Applied Behavior Analysis*, 1, 1-12.
- Harzem, P. (1993). The discrediting of John Broadus Watson. *Mexican Journal of Behavior Analysis*, 19, 39-66.
- Hayes, S. C., Hayes, L. J., & Reese, H. W. (1988). Finding the philosophical core: A review of Stephen C. Pepper's *World Hypotheses*. *Journal of the Experimental Analysis of Behavior*, 50, 97-111.
- Hearst, E., & Capshew, J. H. (Eds.). (1988). *Psychology at Indiana University: A centennial review and compendium*. Bloomington, IN: Indiana University Department of Psychology.
- Hull, C. L. (1943). *Principles of behavior*. New York: Appleton-Century-Crofts.
- Hunter, W. S. (1949). James Rowland Angell, 1869-1949. *American Journal of Psychology*, 62, 439-450.
- Johnston, J. M. (1996). Distinguishing between applied research and practice. *The Behavior Analyst*, 19, 35-47.
- Johnston, J. M. (2011). What is happening to our field? *The APBA Reporter*, 26, 1-7.
- Johnston, J. M., & Pennypacker, H. S. (2009). *Strategies and tactics of behavioral research* (3<sup>rd</sup> ed.). New York: Routledge.
- Kantor, J. R. (1963). *The scientific evolution of psychology* (Vol. 1). Chicago, IL: Principia Press.
- Kazdin, A. E. (1978). *History of behavior modification: Experimental foundations of experimental research*. Baltimore, MD: University Park Press.
- Langfield, H. S. (1943) Fifty years of the *Psychological Review*. *Psychological Review*, 50, 143-155.
- Lashley, K. S., & Watson, J. B. (1920). A psychological study of motion pictures in relation to venereal disease campaigns. *Social Hygiene*, 7, 181-219.
- Leahey, T. H. (1992). The mythical revolutions of American psychology. *American Psychologist*, 47, 308-318.
- Leahey, T. H. (2004). *A history of psychology* (6<sup>th</sup> ed.). Upper Saddle River, NJ: Pearson/Prentice-Hall.
- Lenzer, G. (Ed.) (1975). *Auguste Comte and positivism: Essential writings*. New York: Harper.
- Logue, A. W. (1985). The growth of behaviorism: Controversy and diversity. In C. E. Buxton (Ed.), *Points of view in the modern history of psychology* (pp. 169-196). Orlando, FL: Academic Press.
- Loeb, J. (1905). *Studies in general physiology*. Chicago, IL: University of Chicago Press.
- Mach, E. (1959). *The analysis of sensations and the relation of the physical to the psychological* (C. Williams, Trans.). New York: Dover. (Original work published 1897)
- Mach, E. (1960). *The science of mechanics: A critical and historical account of its development* (T. J. McCormack, Trans.). LaSalle, IL: Open Court. (Original work published 1883)



- Mahoney, M. J. (1989). Scientific psychology and radical behaviorism: Important distinctions based in scientism and objectivism. *American Psychologist*, 44, 1372-1377.
- Malone, J. C. (1990). *Theories of learning: A historical approach*. Belmont, CA: Wadsworth.
- Mandler, G. (2007). *A history of modern experimental psychology: From James and Wundt to cognitive science*. Cambridge, MA: MIT Press.
- MacGowan, K. (1928, October 6). Profiles: The adventure of the behaviorist. *The New Yorker*, 32-34.
- Moore, J. (1980). On behaviorism and private events. *The Psychological Record*, 30, 459-475.
- Moore, J. (2008). *Conceptual foundations of radical behaviorism*. Cornwall-on-Hudson, NY: Sloan.
- Moore, J. (in press). Methodological behaviorism as the radical behaviorist views it. *Behavior and Philosophy*.
- Morgan, C. L. (1894). *Introduction to comparative psychology*. London, England: Walter Scott.
- Morris, E. K. (1988). Contextualism: The world view of behavior analysis. *Journal of Experimental Child Psychology*, 46, 289-323.
- Morris, E. K. (1990). What Mahoney "knows." *American Psychologist*, 45, 1178-1179.
- Morris, E. K. (1991). Deconstructing "technological to a fault." *Journal of Applied Behavior Analysis*, 24, 411-416.
- Morris, E. K., Altus, A. E., & Smith, N. G. (2005). B. F. Skinner's contributions to applied behavior analysis. *The Behavior Analyst*, 28, 99-131.
- Morris, E. K., Altus, D. E., & Smith, N. G. (2013). A study in the founding of applied behavior analysis through its publications. *The Behavior Analyst*, 36, 73-107.
- Morris, E. K., Higgins, S. T., & Bickel, W. K. (1982). Comments on cognitive science in the experimental analysis of behavior. *The Behavior Analyst*, 5, 109-125.
- Morris, E. K., & Todd, J. T. (1999). Watsonian behaviorism. In W. T. O'Donohue & R. Kitchener (Eds.), *Handbook of behaviorisms* (pp. 15-69). New York: Academic Press.
- Morris, E. K., Todd, J. T., & Midgley, B. D. (1993). Prediction and control: From Watson to Skinner and beyond. *Mexican Journal of Behavior Analysis*, 19, 103-131.
- Moxley, R. A. (1992). From mechanistic to functional behaviorism. *American Psychologist*, 47, 1300-1311.
- Moxley, R. A. (2001). Sources of Skinner pragmatic selectionism in 1945. *The Behavior Analyst*, 24, 201-212.
- O'Donnell, J. M. (1985). *The origins of behaviorism: American psychology, 1870-1920*. New York: Columbia University Press.
- O'Donohue, W. T., Henderson, D. A., Hayes, S. C., Fisher, J. E., & Hayes, L. J. (Eds.). (2001). *A history of the behavioral therapies: Founders' personal histories*. Oakland, CA: New Harbinger.

- O'Donohue, W. T., & Kitchener, R. (Eds.). (1999). *Handbook of behaviorisms*. New York: Academic Press.
- Owens, D. A., & Wagner, M. (Eds.). (1993). *Progress in psychology: The legacy of American functionalism*. Westport, CT: Praeger.
- Pavlov, I. P. (1927). *Conditioned reflexes: An investigation of the physiological activity of the cerebral cortex* (G. V. Anrep, Trans.). London: Oxford University Press.
- Pauly, P. J. (1987a). General physiology and the discipline of physiology, 1890-1935. In G. L. Geison (Ed.), *Physiology in the American context* (pp. 195-207). Bethesda, MD: American Physiological Society.
- Pauly, P. J. (1987b). *Controlling life: Jacques Loeb and the engineering ideal in biology*. New York: Oxford University Press.
- Pérez-Ramos, A. (1988). *Francis Bacon's idea of science and the maker's knowledge tradition*. Oxford, England: Oxford University Press.
- Perry, R. B. (1904). Conceptions and misconceptions of consciousness. *Psychological Review*, 11, 282-296.
- Phillips, E. L. (1968). Achievement Place: Token reinforcement procedures in a home-style rehabilitation setting for "pre-delinquent" boys. *Journal of Applied Behavior Analysis*, 1, 213-223.
- Poling, A. (1984). Comparing humans to other species: We're animals and they're not infrahumans. *The Behavior Analyst*, 7, 211-212.
- Rutherford, A. (2009). *Beyond the box: B. F. Skinner's technology of behavior from laboratory to life, 1950s-1970s*. Toronto, Canada: University of Toronto Press.
- Russell, B. (1927). *Philosophy*. New York: Norton.
- Samelson, F. (1974). History, origin myth, and ideology: "Discovery" of social psychology. *Journal for the Theory of Social Behavior*, 4, 217-232.
- Samelson, F. (1981). Struggle for scientific authority: The reception of Watson's behaviorism, 1913-1920. *Journal of the History of the Behavioral Sciences*, 17, 399-425.
- Schneider, S. M., & Morris, E. K. (1987). A history of the term radical behaviorism: From Watson to Skinner. *The Behavior Analyst*, 10, 23-39.
- Schroeder, S. R., & Holland, J. G. (1968). Operant control of eye movements. *Journal of Applied Behavior Analysis*, 1, 161-166.
- Sidman, M. (1960). *Tactics of scientific research*. New York: Basic Books.
- Skinner, B. F. (1931). The concept of the reflex in the description of behavior. *Journal of General Psychology*, 5, 427-458.
- Skinner, B. F. (1938). *The behavior of organisms: An experimental analysis*. New York: Appleton-Century.
- Skinner, B. F. (1945). The operational analysis of psychological terms. *Psychological Review*, 52, 270-277, 291-294.
- Skinner, B. F. (1947). Experimental psychology. In W. Dennis (Ed.), *Current trends in psychology* (pp. 16-49). Pittsburgh, PA: University of Pittsburgh Press.
- Skinner, B. F. (1953). *Science and human behavior*. New York: Macmillan.
- Skinner, B. F. (1957). *Verbal behavior*. New York: Appleton-Century-Crofts.

- Skinner, B. F. (1966). What is the experimental analysis of behavior? *Journal of the Experimental Analysis of Behavior*, 9, 213-218.
- Skinner, B. F. (1967). B. F. Skinner. In E. G. Boring & G. Lindzey (Eds.), *A history of psychology in autobiography* (Vol. 5, pp. 387-413). New York: Appleton-Century-Crofts.
- Skinner, B. F. (1974). *About behaviorism*. New York: Knopf.
- Skinner, B. F. (1977). *Particulars of my life*. New York: Knopf.
- Skinner, B. F. (1979). *The shaping of a behaviorist*. New York: Knopf.
- Skinner, B. F. (1983). *A matter of consequences*. New York: Knopf.
- Skinner, B. F. (1989). The origins of cognitive thought. *American Psychologist*, 44, 13-18.
- Smith, L. D. (1986). *Behaviorism and logical positivism: A reassessment of the alliance*. Stanford, CA: Stanford University Press.
- Smith, L. D. (1996). Situating B. F. Skinner and behaviorism in American culture. In L. D. Smith & W. R. Woodward (Eds.), *B. F. Skinner and behaviorism in American culture* (pp. 294-315). Bethlehem, PA: Lehigh University Press.
- Todd, J. T., & Morris, E. K. (1986). The early research of John B. Watson: Before the behavioral revolution. *The Behavior Analyst*, 9, 71-88.
- Tolman, E. C. (1932). *Purposive behavior in animals and men*. New York: Century.
- Uttal, W. R. (2008). *Time, space, and number in physics and psychology*. Cornwall-on-Hudson, NY: Sloan.
- Watson, J. B. (1903). *Animal education: An experimental study of the psychical development of the white rat, correlated with the growth of its nervous system*. Chicago: University of Chicago Press.
- Watson, J. B. (1906). A need for an experimental station for the study of certain problems in animal behavior. *Psychological Bulletin*, 3, 149-156.
- Watson, J. B. (1907). Kinesthetic and organic sensations: Their role in their reactions of the white rat to the maze. *Psychological Review Monographs Supplement*, 8, 1-100.
- Watson, J. B. (1908a). The behavior of noddie and sooty terns. In *Papers from the Tortugas Laboratory of the Carnegie Institution of Washington*, 2, 187-255.
- Watson, J. B. (1908b). Recent literature on mammalian behavior. *Psychological Bulletin*, 5, 195-205.
- Watson, J. B. (1909). Some experiments bearing on color vision in monkeys. *Journal of Comparative Psychology and Neurology*, 19, 1-28.
- Watson, J. B. (1910). Further data on the homing sense of noddie and sooty terns. *Science*, 32, 470-473.
- Watson, J. B. (1913a). Image and affection in behavior. *Journal of Philosophy, Psychology, and Scientific Methods*, 1, 421-428.
- Watson, J. B. (1913b). Psychology as the behaviorist views it. *Psychological Review*, 20, 158-177.
- Watson, J. B. (1914). *Behavior: An introduction to comparative psychology*. New York: Holt.

- Watson, J. B. (1915). Recent experiments with homing birds. *Harper's Monthly Magazine*, 131, 457-464.
- Watson, J. B. (1916). The place of the conditioned-reflex in psychology. *Psychological Review*, 23, 89-116.
- Watson, J. B. (1919). *Psychology from the standpoint of a behaviorist*. Philadelphia, PA: Lippincott.
- Watson, J. B. (1922). The analysis of mind. *Dial*, 72, 97-102.
- Watson, J. B. (1924). *Behaviorism*. New York: Norton.
- Watson, J. B. (1928). *The ways of behaviorism*. New York: Harper and Brothers.
- Watson, J. B. (1936). John Broadus Watson. In C. Murchison (Ed.), *A history of psychology in autobiography* (Vol. 3, pp. 271-281). Worcester, MA: Clark University Press.
- Watson, J. B., & Rayner, R. (1920). Conditioned emotional responses. *Journal of Experimental Psychology*, 3, 1-14.
- Watson, J. B., & Watson, R. R. (1920). *Psychological care of infant and child*. New York: Norton.
- Wood, W. S. (Ed.). (1975). *Issues in evaluating behavior modification*. Champaign, IL: Research Press.
- Woodworth, R. S. (1924). Four varieties of behaviorism. *Psychological Review*, 31, 257-264.
- Woodworth, R. S. (1948) *Contemporary schools of psychology* (rev. ed.). New York: Ronald Press.
- Wozniak, R. H. (1993). Theoretical roots of early behaviourism: Functionalism, the critique of introspection, and the nature and evolution of consciousness. In R. H. Wozniak (Ed.), *Theoretical roots of early behaviourism: Functionalism, the critique of introspection, and the nature and evolution of consciousness* (pp. ix-liii). London, England: Routledge/Thoemmes.

