

## **JOHN B. WATSON'S EARLY WORK AND COMPARATIVE PSYCHOLOGY**

### *LOS PRIMEROS TRABAJOS DE JOHN B. WATSON Y LA PSICOLOGÍA COMPARATIVA*

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#### **Abstract**

John B. Watson's 1913 "Psychology as the Behaviorist Views It," the so-called behaviorist manifesto, is examined in the context of its time and of its influence on the history of comparative psychology. The key ideas in the article were, a.) reliance on the experimental method, b.) prediction and control as goals of psychology, c.) elimination of the construct of consciousness d.) the importance of continuity of species, e.) direction of knowledge not solely toward humans, and f.) a role for instinctive behavior. These ideas can be seen to have been present before Watson and in the literature of his day. The article itself did not have a great immediate impact on psychology. Comparative psychology around 1913 had been strong but was entering a period of partial dormancy from which it recovered during the 1920s and 1930s. It was then that Watson' early work, and other work of the time, had their greatest impact. Comparative psychology matured in subsequent decades. The impact of behaviorism varied through different phases of its development. Watson's primary role was to integrate assorted ideas so as to form a fairly coherent package that he, a master salesman, could label and promulgate first to other psychologists and then to a broader public. His specific influences on comparative psychology are sometimes difficult to evaluate.

*Keywords:* John B. Watson, "Psychology as the behaviorist views it", influence, comparative psychology

## Resumen

El artículo de 1913 de John B. Watson “La psicología desde el punto de vista del conductista”, llamado el manifiesto conductista, se examina en el contexto de su tiempo y su influencia en la historia de la psicología comparativa. Las ideas clave del artículo fueron a.) la dependencia en el método experimental, b.) la predicción y el control como las metas de la psicología, c.) la eliminación del constructo de la consciencia, d.) la importancia de la continuidad de las especies, e.) la dirección del conocimiento no sólo hacia los humanos y f.) el papel para la conducta instintiva. Puede verse que estas ideas habían estado presentes antes de Watson y en la literatura de sus días. El artículo en sí mismo no tuvo un gran impacto inmediato en la psicología. La psicología comparativa alrededor de 1913 había permanecido fuerte, pero estaba entrando en un periodo de inactividad parcial del cual se recuperó durante las décadas de 1920 y de 1930. Fue entonces cuando los primeros trabajos de Watson, y otros trabajos de ese tiempo, tuvieron su mayor impacto. La psicología comparativa maduró en las décadas subsiguientes. El impacto del conductismo varió a través de las diferentes fases de su desarrollo. El papel primordial de Watson fue integrar ideas variadas para formar un paquete bastante coherente que él, un vendedor maestro, pudo etiquetar y promulgar, primero a otros psicólogos y posteriormente a un público más amplio. Sus influencias específicas en la psicología comparativa son difíciles de evaluar en algunas ocasiones.

*Palabras clave:* John B. Watson, “La psicología desde el punto de vista del conductista”, influencia, psicología comparativa

This special issue is intended to recall John B. Watson’s 1913 “Psychology as the Behaviorist Views it,” the so-called behaviorist manifesto, and to consider its impact on psychology. In this article my focus will be primarily on comparative psychology but I will discuss some of its broader context as well.

## The “Manifesto” in Psychology at Large

In 1913 James McKeen Cattell invited Watson to deliver a series of eight lectures at Columbia University. The initial lecture was later published in the *Psychological Review* (Watson, 1913). The first paragraph of Watson’s article summarizes some of the key issues of concern: a.) that psychology would be strictly objective and scientific, b.) psychology’s goals are the prediction and control of behavior, c.) introspection and consciousness are irrelevant, d.) there is no dividing line between humans and other species, and e.) not all psychological knowledge is directed at human behavior. This article was soon followed by an expanded version of the series in book form (Watson, 1914).

This appeal to be “scientific” resonated at a time when psychology was striving for a place among the sciences. Watson was not the first to favor a scientific approach but

he offered a coherent, organized program. He became a kind of symbol for the objective approach. While condemning some arguments by analogy, Watson used such an argument to show that biology made progress when it adopted a broad perspective and stopped directing its search for knowledge specifically toward humans; Watson wanted psychology to follow suit.

### **Antecedents and Context**

Much has been written showing that very few, if any, ideas in this list were new with the manifesto (e.g., Burnham, 1968; O'Donnell, 1985). It was Watson's synthesis and energetic promotion of this combination that made the article special. Watson's proposals can also be seen as part of a broader cultural shift. Defining features of the Progressive era were the notion that humans and their environments could be manipulated and controlled and that science and technology could play important roles in this endeavor (e.g., Logue, 1978; O'Donnell, 1985). The move away from anecdotes and subjective reports toward objective experimentation following the writings of C. Lloyd Morgan was especially advocated in the United States by Edward L. Thorndike (1898, 1911). However, it was already becoming the dominant approach by academic psychologists studying nonhuman animals.

The focus on behavior without regard to consciousness or introspection was becoming apparent albeit in somewhat isolated patches within psychology (e.g., Cattell, 1904; McDougall, 1908; Pillsbury, 1911). A case can be made for the influences of Jacques Loeb, one of Watson's teachers (Pauly, 1987), his Johns Hopkins colleagues Knight Dunlap (Dunlap, 1930), H. S. Jennings (Burnham, 1968), and others. Watson himself had sketched out some of the ideas in the manifesto earlier (e.g., 1907b).

### **Reception of the Manifesto**

Watson's work is often presented as catalyzing a "behaviorist revolution" in American psychology but some would argue that no true revolution occurred (e.g., Leahey, 1992). It is first worth noting that the "manifesto" was not presented as such by Watson and it was not until much later that the label took hold. Samelson (1981) made a careful study of published and unpublished reactions to Watson's paper during the first years after its publication, 1913-1920. Although some of the leading psychologists of the day commented on the article in some way (e.g., Calkins, 1913; Thorndike, 1915), Samelson noted that reactions "were not overwhelming either in their frequency or their intensity" (p. 404). Searching further, Samelson found that "no reminiscence described memories of a dramatic encounter with the manifesto" (p. 404). There were many reasons (Samelson, 1985), including disruption from World War I, the fact that Watson produced few graduate students to carry on his tradition, the rise of the mental testing movement, and the fact that Watson's original manifesto contained few supporting data and no programmatic vision.

A complicating factor concerns citation practices. Watson's *Behavior: An Introduction to Comparative Psychology* (1914), published the following year, included the manifesto along with material from the rest of his lecture series. It appears to have been mentioned more often in later literature than the manifesto itself, although the key ideas of the manifesto appeared in both works. This leads one to underestimate the importance of the ideas in the manifesto because they are cited through the book.

As is well known, Watson was forced out of the academic world in 1920. He continued to write books and magazine articles and to do some teaching during this time and his thinking continued to evolve. It was during the 1920s that behaviorism became more prominent. "From the twenties on, major discussions of psychological theory would involve taking a stand for or against radical behaviorism and Watson's bequests to the discipline: its goal of 'prediction and control of behavior,' the rejection of consciousness as unscientific subject matter, and an extreme and mechanistic environmentalism" (Samelson, 1985, p. 38).

## **The Manifesto and Comparative Psychology**

### **The Field of Comparative Psychology**

There are numerous definitions of comparative psychology. One rather broad one includes the study of a wide range of behavioral patterns in a range of species with the goal of establishing general principles concerning their genesis, control, and consequences of behavior. Contrasts can be seen in the journals of the American Psychological Association, which publishes three journals that deal primarily with animal research and may help differentiate the sub-fields. One, *Behavioral Neuroscience*, deals with the physiological correlates of behavior. Because these studies differ from the other two, it is upon these latter two fields that I focus here. These might be called comparative animal behavior studies (*Journal of Comparative Psychology*) and process-oriented animal research (*Journal of Experimental Psychology: Animal Behavior Processes*). Obviously, there is some overlap among the three. Further, this is a presentist, contemporary approach; definitions have been more fluid over the years.

### **Comparative Psychology before 1913**

I will break the history of comparative psychology down into periods. For each, I provide a brief overview and, where possible, examine issues of a.) use of the experimental method, b.) prediction and control as goals, c.) consciousness d.) continuity of species, e.) direction of knowledge toward humans, and f.) instinctive behavior with in each period.

Depending on how one defines it, comparative psychology has a history that can be traced back to cave paintings, the ancient Greeks, natural historians, British and continental evolutionists, and so on. However, I focus on North American animal

research within the discipline of psychology because it was dominant for many of the years under consideration. The pattern may be changing as more and more fine research is coming from other countries.

Comparative psychology was a field of active research but often regarded as peripheral to psychology's main focus. As I have previously written in some detail of much of the comparative research of this and other periods (e.g., Dewsbury, 1984; 1992a), I now emphasize the research related to the issues outlined above. Comparative psychology was coming into its own during the first decade of the twentieth century. Work at Clark University, Harvard, Cornell, Chicago, Johns Hopkins, and elsewhere was thriving. There were studies of both the naturally occurring behavioral patterns and learning processes in a variety of species. New students were entering the field. With increasing demand, the *Journal of Comparative Neurology* was expanded to become the *Journal of Comparative Neurology and Psychology* in 1904. In 1910 *The Journal of Animal Behavior* was budded off from that parent. Subsequent titles evolved later.

**Consciousness and the mind.** A few writers in comparative psychology wrote of consciousness or the mind. Margaret Floy Washburn (1908) published the first edition of her *The Animal Mind* during this period. Admitting the difficulties of inferring mind in animals, she nevertheless favored such inferences in a variety of situations. For example, she saw such resemblances between the nervous systems of cats and humans so great as to make "it improbable that consciousness, so complex and highly developed in us, is in them wholly lacking" (p. 36). Robert Yerkes (1911), a correspondent of Watson and future "dean" of comparative psychology, treated the subject matter of psychology as including consciousness or the world of objects and events. E. L. Thorndike argued for a place for the study of behavior but was willing to see it side-by-side with the study of mental processes. Clinical psychologist Lightner Witmer (1909) worked with chimpanzee Peter in a variety of tests he had used with human children in the Psychological Clinic at the University of Pennsylvania and found evidence that he interpreted as reflecting intelligence but stopped short of extreme mentalism. Many others, however, already eschewed such terminology.

Some authors introduced what would later be known as the study of "higher processes" with terms that were slightly less loaded, but still on the fringes of emergent behaviorism such as "curiosity," "fear," "greed," "attention," and "temperament." (Cole, 1907). According to Pettit (2010), "animal intelligence served as a shorthand for either consciousness in general or the level of mental attributes developed by a particular species as a whole" (p. 401).

**Experimentalism.** Despite the terminology that behaviorists might regard as mentalistic, the methods used in comparative psychology during this period were generally experimental. There was little use of anecdotes and non experimental method in mainstream animal psychology by this time. For example, Small's (1901) studies of maze learning were a classic. Although deemed an "experimental study of the mental processes of the rat," it dealt with learning and intelligence but not conscious intent.

Yerkes (1943) recalled that at the turn of the century American comparative psychology became experimental; Thorndike (e.g., 1898) was a leader in this regard.

**Direction of knowledge toward humans.** In Germany Wilhelm Wundt (1901) framed the issue clearly. He contrasted the use of animal research to develop “a universal history of the development of mental life in the organic world” with that making human life the focus so that “the expressions of mental life in animals will be taken into account only so far as they throw light upon the evolution of consciousness in man” (p. 340). He adopted the latter approach.

The Harvard philosophy department chair Hugo Münsterberg supported animal research in his department but emphasized the relation to humans. For example, he wrote to Robert Yerkes that “if the animal psychologist neglects human research, he seems to me to belong more properly in the biological department” (1911b). Linus Kline, a student at G. Stanley Hall’s Clark University, often considered animal studies for their relevance to humans. Kline’s (1898) paper on “the migratory impulse vs. love of home” was clearly aimed at making comparative research relevant to humans. Kline reviewed the literature on determinants of migration in nonhuman animals with that of humans in an overt attempt to find commonalities. Kline (1904) related “zoological psychology” (a term that he preferred as do I) to child study, concluding that “zoological psychology has given the key to a full appreciation of the distinguishing traits of the human infant, and has thus contributed to a philosophy of education based on the doctrine of evolution” (p. 782).

**Instinct.** Most of these psychologists accepted the existence of instincts although it aroused some controversy. Some research related to the “nature-nurture problem” was being conducted. Conradi (1905), for example, studied the interaction of inheritance and environment in song learning in sparrows. He eschewed the anthropomorphic language of earlier studies to conduct experiments reasonably controlled for the day. Kline (1904) wrote that “instincts are a sphinx to the introspectionist psychologist. No problem of psychology has created such a Babel of tongues and been treated with more meager results; surely he would be a bold man who should even now attempt to write the last word on the subject” (p. 778). Some controversy developed over the possibility that predatory behavior might be instinctive (e.g., Yerkes & Bloomfield, 1910).

**Other characteristics.** At this point in the development of the field, most workers in comparative psychology accepted the notion of continuity of species and, indeed, that assumption affected their decisions to conduct comparative work. I find little to suggest that prediction and control of behavior were the primary goals of comparative psychologists at this time.

**The state of the field circa 1913.** At the same time as all of this activity was occurring in comparative psychology, there was a disturbing undercurrent as well. As psychology often was defined in relation to human behavior, comparative psychologists often were marginalized. For example, Münsterberg, wrote to Harvard president Abbott Lawrence Lowell that “anyone interested in those animal studies alone is in no way a real psychologist” (1911a).

On top of this, animal psychology was difficult to support. It required not only sufficient space but specialized equipment and a location that would minimize odors and inconveniences for other department members. Protestors against animal research for humane reasons were beginning to appear (Dewsbury, 1990). Further, students were beginning to hesitate committing to the field for fear of their future job prospects. Looking back, Chicago's Harvey Carr (1936) wrote that "many of our students expressed an aversion to choosing a thesis topic in the field for fear that they would become known as comparative psychologists, and that this label would be detrimental to their professional placement and advancement" (p. 79). His emphasis on animal research made promotion difficult for Yerkes at Harvard (Dewsbury, 1992a). Although comparative psychology had developed a substantial base, it was in trouble. The drive for more applied psychology resulted in most of the young psychologists who had worked on animal research leaving the field (O'Donnell, 1985; Dewsbury, 1992a). This is where the jobs lay and where the path to promotion was much easier. Even the American dean of the field, Edward L. Thorndike, switched fields. Letters written to Yerkes were typical:

"I have not lost my interest in comparative work by any means, but fate, or something as inevitable has long prevented me from following my inclinations in this regard" (Rouse, 1908).

"I have found it necessary to give some attention to other phases of psychology than the animal work. This is imperative because of the fact that I have complete charge of the laboratory and also that there is a demand for general and applied psychology courses" (Haggerty, 1912).

Two exceptions to this trend were Harvey A. Carr and Walter S. Hunter, who succeeded in maintaining prolonged careers in animal research. But even Watson himself had turned away from animal research by about 1915. Obviously, these defections affected the spread of behaviorist principles into comparative psychology as there was less comparative psychology into which to spread.

**Watson in the pre-1913 context.** Watson proved to be a fine researcher in the field of comparative animal behavior (see Todd & Morris, 1986). However, he worked primarily on problems already broadly present in comparative psychology albeit with the experimental methods that were coming to characterize the field. His dissertation was a classic of developmental psychobiology (Watson, 1903). Watson correlated the ontogeny of behavior with that of the central nervous system. First he showed that, contrary to the beliefs of many others of the day, young rats could solve problems presented in a variety of problem boxes. Then he tried to correlate the development of learning ability with neuroanatomical development. The monograph includes many pages of histological sections of rat nervous systems that were used to correlate central nervous system development, especially myelination, with the development of behavior.



Another classic was his study of the roles of specific sensory systems as rats learned a maze problem. In work begun with Harvey Carr, Watson (1907c) surgically removed various sensory organs and studied the effects on learning performance. He found his rats to be remarkably resilient in their abilities to learn even after he removed one or more senses. Rotation of the maze disrupted performance and Watson concluded that kinesthetic sensations were critical to maze learning. This research left Watson pilloried in the press for inhumane practices of vivisection (Dewsbury, 1990).

Another significant topic in comparative research was the possibility of imitation in nonhuman animals, with some researchers reporting evidence of imitation and others finding none. Watson (1908), working with four monkeys of various species, fell into the latter category. Watson also worked with Robert Yerkes to perfect methods of studying color vision in animals (Yerkes & Watson, 1911).

Perhaps the most significant of Watson's truly comparative studies was that on two species of terns in the field during three summers on Bird Key in the Dry Tortugas islands off the coast of Florida (Dewsbury, 1994; Todd & Morris, 1986). In a series of studies, the last coauthored with Karl Lashley (Watson & Lashley, 1915), Watson studied a variety of aspects of the behavior of noddy and sooty terns. They were most interested in the cues used by the terns in migrating between Texas and Florida. In addition they studied the status and population characteristics of the species. Watson described and analyzed their life histories in a manner anticipating later ethologists. This included eating and drinking, the nesting cycle, mating behavior, brood care, nest, egg, and mate recognition, development, orientation, and learning. He also conducted experiments in the field, as in work on nest recognition.

During one summer, Watson brought his monkeys along to Florida. He was amazed at the richness and spontaneity of behavior these animals displayed when outdoors, compared with his laboratory in Chicago (Watson, 1907a). Together, these and other works established Watson as an important comparative psychologist in his day. He both used and developed methods that earned him a respectable place, though not as a true revolutionary contributor.

**Behavior: An introduction to comparative psychology (1914).** As mentioned, material from the Columbia lectures was presented in more complete form by Watson (1914). This book was intended as a textbook and thus has many features and much material typical of textbooks of the time. Some features are notable as further contributions to comparative psychology, however. They often differ from Watson's later views. For example, there are two chapters on instinct in addition to a then-recent paper fully addressing the topic (Watson, 1912). At this time Watson viewed instincts as "a combination of congenital responses unfolding serially under appropriate stimulation" (p. 166), "a series of concatenated reflexes," (p. 166), and "phylogenetic modes of response" (pp. 166-167). This was typical of the day but quite different from many presentations of later Watson as an extreme environmentalist. He believed there to be "certain characteristic instincts in every species of vertebrates" (p. 112) and



provided a table listing eleven such classes thereof. He wrote of natural selection and fitness in the evolution of morphology and behavior. Watson reviewed material on various “clever” animals and both anticipated and advocated the home rearing of nonhuman primates of the sort later conducted by Yerkes Laboratory scientists (Dewsbury, 2006) in the interest of more fair comparisons with humans. Even at this time, however, Watson was somewhat cautious about the classes of instincts that may be displayed in humans (see Watson, 2012).

As might be expected, there is much material on sensory function, learning, and habit formation. Throughout a variety of topics, Watson used data from a variety of species. Although not addressing comparative cognition by name, he believed that “there seems to be almost no limit to the number of habits which the higher vertebrates may form, or to the complexity of such habits” (p. 46). He believed that solid information regarding the sensory processes and instinctive modes of response was necessary before good studies of learning could be conducted, and properly evaluated.

The topic of emotion often was minimized in early experimental psychology (Rose, 2012). In 1914 Watson believed that mental states such as emotions were essentially internal states and not subject to behavioral (i.e., scientific) analysis. Of course that differed from his later views (e.g., Watson, 1924). Altogether, the survey of comparative psychology in the 1914 book anticipates many later developments in the field but most of these anticipations were not unique to Watson; thus, it is difficult to evaluate his influences on them.

### **Comparative Psychology in the Decade After the Manifesto**

The next decade was not a great one for comparative psychology. The drive for applied work continued and was exacerbated by American entry into World War I, forcing many from the cadre of newly minted comparative researchers into applied areas in education and industrial fields. By 1918 more than 400 psychologists were in uniform, many of them involved in mental testing work. Any immediate impact of the manifesto was overshadowed by these institutional and political events. Comparative psychology was relatively dormant.

Watson himself served in the military during 1917-1919. He essentially left comparative psychology during this period and concentrated on humans for the rest of his career. His major book during this period was his *Psychology from the Standpoint of a Behaviorist* (1919). Watson’s shifting emphasis toward humans is apparent in both the research he was conducting and in the 1919 book. A case can be made that *Psychology from the Standpoint of a Behaviorist* was the work that really established the behaviorist approach (see Todd, 1994). Although the core emphasis on the objective study of behavior remained, in other respects, this is a very different work from the manifesto. This reflects changes in Watson’s own interests and offers less for comparative psychology. For Watson psychology now became the study of *human* activity and conduct, contrasting sharply with his 1913 statement. Watson maintained the goal of

prediction and control but added a second goal, “*the study of laws and principles whereby man’s actions can be controlled by organized society*” (p. 2, italics in original). His views on heredity were better developed as he wrote that “the hereditary and acquired forms of activity begin to overlap early in life” (p. 194). He decreased emphasis on unlearned behavior, especially in humans.

Similarly, Robert Yerkes temporarily left the field to spearhead the U. S. Army’s testing work. His primary contribution to comparative psychology during this period was his 1916 *The Mental Life of Monkeys and Apes: A Study of Ideational Behavior*. As is apparent from its title, Yerkes was not a full convert to behaviorism. He contended that in using these terms he was attempting to be descriptive and not speculative. He wrote of ideational behavior in primates “simply because they seemed to exhibit the essential features of what we call ideational behavior in man” (p. 124) but added that “the terms idea and ideation have been used to designate contents of consciousness which are primarily representative” (p. 124).

There were other pockets in which the field survived. In that the focus was on behavior rather than less observable processes, that work was generally in line with some of the basic principles of the manifesto and consistent with what was being done prior to its publication. There were studies of learning from invertebrates to vertebrates (e.g., Day & Bentley, 1911; Yerkes & Coburn, 1915). Controversy over the research with raccoons continued (e.g., Cole, 1915). John F. Shepard quietly conducted a series of studies of maze learning at the University of Michigan and at the University of Missouri Perry Swindle (1919) studied nest building in birds.

A very different approach was developing in German psychology where Wolfgang Köhler conducted research with chimpanzees on the island of Tenerife during World War I. He used the famous box-stacking and stick problems, among others, to assess intelligence. The suddenness with which the apes solved some of these problems led him to conclude that processes more complex than association learning, generally translated as “insight,” were involved (Köhler, 1925).

Washburn (1917) published a second edition of *The Animal Mind*. She continued to defend a mentalistic approach to comparative psychology: “there exists an inner aspect to behavior, the realm of sensations, feelings, and thoughts, which is not in itself identical with behavior or with any form of movement” (p. 23).

Although this was a generally fallow period for comparative psychology, the research that was completed was usually behavioral in nature. The holdouts of psychologists such as Köhler, Washburn, and Yerkes, however, suggest that, although Watson probably had some influence, the impact of behaviorism was surely less than universal.

### **The Next Decade: Building a Foundation**

**Behaviorism.** Watson and Lashley completed their work on education about venereal diseases. In his new career in advertising Watson was able to do much writing

and some academic work. Behaviorism had a substantial influence on psychology although perhaps more gradually than is often suggested. Whether or not there was a revolution in psychology at the time, behaviorism, in one form or another, came into prominence and was accepted by many psychologists. For many, especially during the middle part of the twentieth century, psychology became “the study of behavior.” It is important to remember throughout that Watson’s views evolved and must be considered in the context of where he was at the time and the context in which he found himself. Samelson (1994) argued for the importance of Watson as a symbol rather than for a coherent position.

During the 1920s, outside of academia, Watson wrote more popular works intended for a broader audience. During this period the controversy over behaviorism finally grew. Probably because the University of Chicago Press elected to reprint an edition of his 1924 *Behaviorism*, that work became accepted by many as the fullest expression of Watsonian behaviorism. However, therein Watson expanded some of his ideas that were not really core principles of behaviorism and the work may not have been the best choice as the defining document. It is here, not earlier, that we get Watson’s oft quoted statement about his potential ability to control the futures of a dozen healthy infants. Logue (1994) argued that this work damaged behaviorism and that “his later image of behaviorism extreme and illogical as it was, is used to discredit behaviorism as a whole” (p. 122). Although Watson (1936) later wrote that the 1924 book “shows its hasty origin” (p. 280) it was this version of this book that was later reprinted and widely distributed in paperback form and became the only version of his behaviorism that most students came to know.

**Nature and nurture.** Perhaps this decade is most notable for its controversies in interpretation. An important issue revolved around instinct and the possibility of innate behavior. Watson, of course, was at the center of much of it. By now he had shifted his attention in two ways: he studied mainly humans and took a strong environmentalist stance downplaying the role of instinct. The two were clearly related. McDougall proposed a very broad definition of instinct that met with much opposition (see Dewsbury, 1984). After years of debate in print, Watson took him on in the “battle of behaviorism” (Watson & MacDougall (*sic.*, 1929). Kuo took more environmentalist positions which shifted during the decade. Carmichael conducted experiments showing that practice was not essential for the development of some behavioral patterns in frogs and salamanders and concluded that “heredity and environment are *interdependently* involved in the ontogeny of behavior” (1928, p. 259). The study of this interplay continues to the present and appears ever more complex every year.

**Comparative psychology.** With the war over psychologists began to get back to business. But, in general, 1920s psychology was much more applied than that earlier in the century. Nevertheless, a cadre of experimentally oriented psychologists maintained the experimental tradition in basic research. More universities were adding courses in comparative psychology. Tolman (1922) wrote that “the idea of behav-

iorism is abroad. In the most diverse quarters its lingo, if not its substance, is spreading like wildfire" (p. 44). Most of the research during this period was essentially experimental and behavior-oriented in character but it is not clear that this can be traced to Watson's influence. The *Journal of Animal Behavior* was disbanded during the war to be replaced by *Psychobiology*, which lasted only until 1920. *The Journal of Comparative Psychology* was founded the next year and became the primary journal in the field.

Karl S. Lashley had completed a PhD at Johns Hopkins with H. S. Jennings but collaborated with Watson on several projects. Although known primarily as a physiological psychologist, he was key in educating the new generation that would build comparative psychology in future decades. Calvin P. Stone led the group completing his Ph.D. with Lashley at Minnesota in 1921. Others received graduate education and a more diverse array of schools: H. B. Bingham Curt Richter from Johns Hopkins, Carl Warden from Chicago, Henry Nissen from Columbia, Zing-Yang Kuo at the University of California, Berkeley, and Leonard Carmichael from Harvard. The best known contributions of this group occurred in the next decade.

Richter is particularly interesting as Watson's influence was direct. He first went to Watson's laboratory in 1919. He recalled "little did I think that morning while walking up the three flights of stairs to Dr. Watson's laboratory, that I would still be walking up those same three flights of stairs every morning sixty-three years later" (Richter, 1985, p. 370). Watson explained that Richter's only responsibility was to produce good research and he would be left to his own devices to do so. This environment was perfect for this student, who later called it "the great event of my life" (p. 371); it led to his PhD of 1922, followed in turn by a career featuring more than 375 papers, and book and ancillary contributions on the study of behavior and physiology.

During the same period, Watson inspired Mary Cover Jones, whom he met in New York that same year, 1919. Jones's work on the unconditioning of fear in a human child is not strictly comparative psychology but this illustrates the influence he could have on students. Jones completed a dissertation at Columbia with Watson's support in 1924 (Rutherford, 2006).

Some comparative psychologists, especially the newcomers, continued to produce research. For example, Tolman (1924) and Robert Tryon (1930) published studies of genetic selection for learning ability. Stone (1922) published a nice series of studies on reproductive behavior. H. S. Liddell (1925) and others studied learning and conditioning.

Meanwhile, Yerkes was beginning to further his interest in primate research. He conducted research with a group of primates in a private colony in Cuba (Yerkes, 1925). Yerkes and Yerkes (1929) published a comprehensive overview of the great apes. Yerkes remained more generous than Watson in writing of ideas, abstractions, and other more cognitive terms. Washburn's 1926 edition remained the only real textbook in comparative psychology but she remained remarkably unchanged in her skeptical stance toward behaviorism.

## Comparative Psychology in the 1930s

At this point, it is necessary to repeat the distinction between two kinds of “comparative psychology”: process-oriented animal research and comparative animal behavior. It was the former that came to dominate the next few decades. This approach, termed “neobehaviorism,” clearly was derived from Watson’s behaviorism. Although the foundations were laid earlier, the 1930s were a period of the development of neobehaviorism, as in the work of Edward C. Tolman, Clark L. Hull, Edwin R. Guthrie, and B. F. Skinner. Because another article in this issue deals with neo-behaviorism, I will generally avoid it here. This was also a time of increased vigor in the other branch, what I am calling comparative animal behavior studies, though it was certainly less prevalent than process-oriented studies. This approach can be tied more to Watson’s early work. I focus on this branch, but I also see a smaller thread of what is now called “comparative cognition” (Dewsbury, 2000).

During this period a field of comparative animal behavior was developing albeit somewhat in the shadows of the dominating neobehaviorists. Following Watson, these psychologists studied behavior, not the mind. They manipulated observable variables and measured observable consequences. This group would finally bring the sub-field back to where it was prior to World War I. They were able to secure academic position and train students who would go out and help the field to grow. Equally important, there was some funding available from the Rockefeller Foundation and other private sources. After World War II federal funding became a major factor in the growth of this, and other, fields.

Perhaps the most pivotal individual in all this was Lashley, Watson’s student-associate from the Johns Hopkins days. Lashley moved to the University of Minnesota, Chicago, and Harvard before becoming a director of the Yerkes Center for Primate Biology in Florida. The first of his students in the group was the aforementioned Calvin Stone at Minnesota. Stone had a long career at Stanford University where future protégées Harry Harlow and C. R. Carpenter completed their graduate training. Harlow had a long and productive career at Wisconsin and Carpenter became the dean of field studies of primates at Penn State.

At the University of Chicago, Lashley worked with a group of students and post-doctoral fellows I have called the “Chicago 5”: Frank A. Beach, Donald O. Hebb, David Krech, Norman R. F. Maier, and T. C. Schneirla (Dewsbury, 2002). Beach had a long career at the American Museum of Natural History, Yale, and the University of California, Berkeley. He produced many students and postdoctoral fellows and published widely, in social and reproductive behavior, neural and hormonal correlates of behavior, and comparative psychology in general. Hebb established a program in psychobiology at McGill University and was equally influential. Schneirla became the mainstay of the American Museum of Natural History where he worked with many influential students, such as Jay Rosenblatt, Daniel Lehrman, and Ethel Tobach. Krech and Maier departed a bit from the other three. At Berkeley Krech worked more on

learning and early experience. Maier's work at the University of Michigan will be discussed below, but after a somewhat stormy career in animal research, he became a prominent industrial psychologist.

This period was rich with others working in the field as well. To name but a few, W. N. Kellogg, Henry Nissen, Carl J. Warden, and L. H. Warner studied at Columbia, H. C. Bingham at Johns Hopkins, and Otto L. Tinklepaugh at Berkeley. To varying degrees, these psychologists conducted and published research and helped to attract more scientists to the field. A critical threshold seems to have been reached during this period.

Early on, Watson (1906) had proposed an experimental station for the study of animal behavior. These finally began to appear. In 1930 Robert Yerkes, another pivotal scientist in this development, founded what became the Yerkes Laboratories of Primate Biology (Dewsbury, 2006). Many prominent comparative psychologists worked there including Lashley, Hebb, Carpenter, and Bingham. Later, Lehrman founded the Institute of Animal Behavior at Rutgers University. Early in the century comparative psychologists had dreamed, written, and proposed institutes where animal behaviorists could get together to work. These are examples of how effective these can be.

It was during the 1930s that comparative psychology saw the development of textbooks that helped to define the field. In 1936 Washburn published her 4<sup>th</sup> and final edition; her opinion of behaviorism had not changed substantially. She went so far as to claim that "the principal change in the attitude of investigators of animal behavior since the third edition of this work appeared is the decay of behaviorism...extreme behaviorism, which ignored the existence of qualitative differences in sensations, would not have long endured" (p. v). The most influential textbook was Maier and Schneirla's (1935) *Principles of Animal Psychology*. For the most part, the authors more or less took it for granted that their task was to study behavior as such. They used a taxonomic format in covering material. Late in the book, however, they finally made their approach explicit. They wrote that "the study of conscious states...was rather empty as far as the study of animals was concerned" (p. 444), adding that "interest in animal psychology was therefore confined to behavior, and through the influence of Watson (1914) the emphasis on behavior even influenced psychological investigation of man" (p. 444). Fred Moss edited *Comparative Psychology* (1934), the first of a string of edited volumes that appeared at somewhat regular intervals but with different sets of editors. Early in the book, Waters (1934) assigned a significant role for behaviorism in the development of the field. He credited it with providing impetus for "an important phase in the development of comparative psychology (p. 32) and traced its emphasis on objective methods to Morgan and Loeb.

By the end of the 1930s comparative animal behaviorists had a solid cadre of scientists, the beginning of external funding, and textbooks that helped to define the field. The *Journal of Comparative Psychology*, another defining feature of the maturing field, carried on. It was expanded to become the *Journal of Comparative and Physiological Psychology* in 1947, but reverted to its original title in 1983.



Another trend for the 1930s that is often missed is the development of a small, but significant area of comparative cognition (Dewsbury, 2000). Each of the textbooks included a section on “higher mental processes,” “complex processes,” or the same material under similar titles. The methods remained behavioral but interpretations were often more cognitive. In one major program Yerkes working with chimpanzees continued to write of “ideation” and to seek evidence of symbolic functioning. Maier developed a program on “reasoning” that he believed could be differentiated from learning processes. A variety of tasks, including tests of insight, reasoning, tool use, delayed response, oddity learning, problem solving and double alternation, among others, were interpreted as reflecting cognitive function. Tolman developed a “cognitive behaviorism” and wrote of constructs such as “cognitive maps.” These approaches were generally marginalized as compared with mainstream neo-behaviorism and they certainly were not organized into a coherent approach, but they grew nevertheless.

Surely, Watson’s influence was still present — especially in the methodology used. Many of these studies would have fit into Watson’s 1914 book and enriched it considerably. However, with the march of time the direct influence of his early work is harder to trace.

### **The 1940s, 1950s, and 1960s**

The 1940s were a period of gradual growth and stability. The major facilities supporting research continued function and were joined by the Jackson Laboratory in Bar Harbor, ME (Dewsbury, 2012b). Comparative psychologists had influence in the APA with two, Carmichael and Stone, elected as presidents. A Conference on Genetics and Social Behavior held at Bar Harbor helped to define those fields. Research continued as exemplified by Carpenter and Schneirla’s field studies, the work of Stone and Beach on reproductive behavior, primate research at the Yerkes Laboratories, and studies of behavior genetics, development, and learning. Neobehaviorism was flourishing and the research of the European ethologists was becoming better known in North America.

One may consider three prominent influences on comparative psychology in the last 60 years: the interaction between the European ethologists and American scientists (Dewsbury, 1992b), the arrival of sociobiology/behavioral ecology, and the so-called cognitive revolution. The ethologists, the first source of influence, were led by Konrad Lorenz and Niko Tinbergen. They promoted the study of so-called instinctive behavior under field conditions in a greater variety of species than was common in psychology at the time. Many young scientists in psychology and zoology found the ethological approach appealing and flocked to Europe to work with them (Dewsbury, 1995). They influenced and broadened animal behavior studies in North America. Like others, the ethologists eschewed mentalistic interpretations. The ethologists vilified Watson but this was mainly for their perceptions of his later work and his empha-



sis on learned behavior to the exclusion of that reflecting innate influences; this was not the Watson of 1913. In fact, Watson's tern research can be regarded as proto-ethology as the study of naturally occurring behavior of birds under field conditions (Dewsbury, 1994). His work on nest recognition could have been done by the ethologists 40 years later. At any rate, some strong position papers were exchanged back and forth between ethologists and psychologists (e.g., Lehrman, 1953; Lorenz, 1965) before peace was restored between the two groups under Lehrman's leadership and a rapprochement was established. Greater attention to Watson's early work may have made this integration easier to effect.

In other respects, the comparative psychology of the 1950s was built upon what came earlier and was characterized by increased funding, more conferences, more publications, and job stability. Meanwhile the process-oriented work of neobehaviorists reached its zenith during the 1940s and early 1950s. For many, animal research during this period meant the study of learning as conducted by one of the forms of neo-behaviorism that developed.

The 1960s were an era of unprecedented growth. Federal funding for research was plentiful and graduate programs blossomed. More research facilities were established and comparative psychology spread widely. Additional textbooks and publication outlets became available and various organizations held meetings where research results and perspectives could be exchanged. The Animal Behavior Society and organizations promoting behavior genetics, research on aggression, developmental research, and primate studies all grew. At the same time, however, this was a period of great questioning and self-reflection by comparative psychologists. Hodos and Campbell (1969) and Lockard (1971), for example, saw the field in decline as they believed it had lost its proper connection to biological realities. These critiques were prominent in their day and it is hard to estimate the effects that they had. Although interpretations of results varied; as suggested by Watson (1913) most psychologists continued to focus on overt behavioral reports rather than unobservable phenomena. An exception to Watson's influence lay in the goal of prediction and control, which became the mantra of Skinner and the behavior analysis movement but was rarely found in the literature of comparative psychology.

### **The 1970s to the Present**

In this era the traditional interests of comparative psychologists, genetics, development, learning, reproductive and social behavior and the like, continued to flourish. However, a second major new influence on the field was the arrival of sociobiology (e.g., Wilson, 1975). Wilson believed that comparative psychology was disappearing and that the field that remained would include ethology and physiological psychology, integrative neurophysiology, and sociobiology and behavioral ecology. This touched off a vehement reaction among comparative psychologists (e.g., Demarest, 1980; Wyers et al., 1980). In fact, however, some comparative psychologists incorpo-

rated some of the principles of behavioral ecology, as the approach took on a less controversial label than sociobiology. Parts of comparative psychology profited greatly from this new perspective. The key aspects were that natural selection, a topic discussed by Watson (1914), seemed to work primarily at the level of the individual, not the group, and that individuals can increase their reproductive fitness through kin selection.

The third major influence on comparative psychology stemmed from the so-called cognitive revolution. Beginning in the 1950s but coming to fruition in the next few decades, the cognitive approach is generally presented as having obliterated behaviorism (e.g., Griffin, 1992; Miller, 2003; see also Todd, 1994). Again, Watson became the favorite whipping boy. It is true that some forms of behaviorism declined greatly. The primary exception is behavior analysis, or Skinnerian psychology, that continued to thrive, albeit primarily among a group of strong advocates.

Nevertheless, the cognitive approach came to dominate experimental psychology as a whole. Within animal cognition there were at least two strands. The main one, comparative cognition, continued to use behaviorist methods reminiscent of Watson's approaches, though the problems presented to animals became more complex and the interpretation of the results took on a more cognitive flavor. This form of comparative cognition has become increasingly prevalent in recent decades. It can be viewed as a partial retreat from some aspects of the behaviorist program but still rooted in its methods. Representative research includes the remarkable language studies in apes, concept formation, mirror self-recognition, tool use, Piagetian tasks, and social cognition. The "theory of mind" has become a popular topic (e.g., Premack & Woodruff, 1978). As noted earlier, such research has been present, if not prominent, though much of the history of the field.

Furthest from the Watsonian program has been the reintroduction of mentalism led by zoologist-animal behaviorist Donald R. Griffin, as for example in his *The Question of Animal Awareness* (Griffin, 1976). As had some earlier comparative psychologists, Griffin proposed that the similarity between human and nonhuman communication systems suggests that animals "have mental experiences and communicate with conscious intent" (p. 104). Provocative as it may be, this mentalistic cognitive approach has not gained the number of adherents that more behaviorally based forms of cognition have.

A recent content analysis of the *Journal of Comparative Psychology* from 1983 to 2010 divided reports into different areas over successive decades (Dewsbury, 2012a). Studies of basic behavioral processes dropped from 62% in 1983 to 53% in 2010. Studies in learning and memory dropped from 38% to 7% whereas studies of cognition and higher processes jumped from 0 to 40%. It must be noted that some of this increase represents only a kind of rebranding of more behavioristic learning studies into the language of cognition. Other trends revealed increases in the percentage of female senior authors, the mean number of collaborators on manuscripts, and in the diversity of national affiliation of the authors and editorial boards.

To a degree, at least parts of the field have come full circle. There has been a return of mentalistic explanations. The justification for this is that we have had a century of behaviorism and we now can afford the luxury of more speculative conjectures. Some psychologists may disagree with this justification. Comparative psychology today is increasingly fragmented and dominated by comparative cognition. Perhaps some of Wilson's (1975) predictions are coming to pass.

### Overview

Comparative psychology has evolved over the years as it has moved first in one direction and then another as a result of both internal and external forces. I return to overt consideration of the influence of Watson in general and the manifesto in particular. The first proposal in the manifesto was that psychology should be strictly objective and scientific. It is not always easy to define objective and scientific. Comparative psychologists have been scientific in that usually independent variables are manipulated and dependent variables measured. Correlational or other methods are sometimes employed. Surely, the methods have been objective throughout most of this history.

The notions of prediction and control have dominated behavior analysis. However, they have been less evident in much of the rest of comparative psychology, where the goals appear to be explanation and understanding. Prediction and control might be desirable but they are viewed by many more as aids in formulating and testing hypotheses regarding explanations.

The issue of introspection has not been relevant in comparative psychology. Throughout most of its history, consciousness has not been an issue for most comparative psychologists. Its return under the influence of Griffin (e.g., 1976; 1992) has been of real, but limited, influence in comparative psychology. The influence of Watson and others seems apparent here. The return of consciousness and postulation of unobservable processes in recent years will surely be regarded by some as a departure from Watson's goals.

Watson's notion was that there is no fundamental difference between humans and other species, that is, that there is continuity of species and of psychological processes. This principle has been accepted by most comparative psychologists for the last century. There are some growing cracks in this solidarity, however, particularly with research on the great apes. For example, Povinelli (2000) argued that there are fundamental differences between the "folk physics," mental states, of humans and even our closest living relatives. In his conclusion, he wrote that "we question whether the great apes 'explain' or 'interpret' the world in any real sense whatever" (p. 339) and illustrates this with a hypothetical example of how a 3-year-old human child and a chimpanzee would respond to the simple riddle of "why did the chicken cross the road?"

Watson's final point that not all psychological knowledge is directed at human behavior also has now been accepted by most comparative psychologists. However, as recently as 1960, Beach found it necessary to repeat Watson's point of 1913:

"If we remove man from the central point in a comparative science of behavior, this may, in the long run, prove to be the very best way of reaching a better understanding of his place in nature and of the behavioral characteristics which he shares with other animals as well as those which he possesses alone or which are in him developed to a unique degree." (Beach, 1960, p. 17).

In recent years, funding agencies have pressured scientists to conduct "translational" research of relevance to humans. Psychologists writing grant proposals often seem to stretch the translational implications of their work in order to meet the demands of funding agencies. This appears to be having a chilling effect on basic research. Some genuinely applied animal behavior work has also appeared.

In summary, then, the core ideas of Watson's program surely were not unique for the time. However, they were highly influential in comparative psychology. It was Watson who gave behaviorism its name and was its strongest early advocate. His major service was to take ideas that were nascent and scattered at the time and to mold them into a coherent set. He promulgated and pontificated upon these core principles. It is in that way, rather than for any truly unique ideas, that he was most influential. This is the way of many influential pioneers in science. In part, that was the influence of Darwin with evolutionary theory and of Wilson with sociobiology. The latter two, however, generalized after first accumulating a substantial base of supporting data; this was less so for Watson. Isolated ideas gathering dust in obscure journals often have little influence. Behaviorism needed selling and Watson was a consummate salesman.

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