

Behaviorism

— “I see no evidence for an inner world of mental life.” —

B. F. Skinner

Behaviorism arose partly as a backlash against introspection, insisting on measuring only things that could be directly observed in the physical world—a fundamental requirement of sciences such as chemistry and physics. It began as a methodology, but soon developed into a body of theory to explain much of human learning and behavior. Although some of the early behaviorist views are now considered extreme, their methods provided a backbone for modern psychology.

Before behaviorism psychologists had talked about both people's behavior and the contents of their minds. The behaviorists, however, argued that the mind could not be studied scientifically.

Science involves the observation of events that everyone can see. In physics, for example, people study the movement of objects. Everyone can see an object moving from one place to another and, given the right equipment, can agree on how long it took. Similarly, when



It has long been known that dogs salivate at the sight and smell of food; Ivan Pavlov showed that they could also be taught to salivate in response to other stimuli associated with a meal.

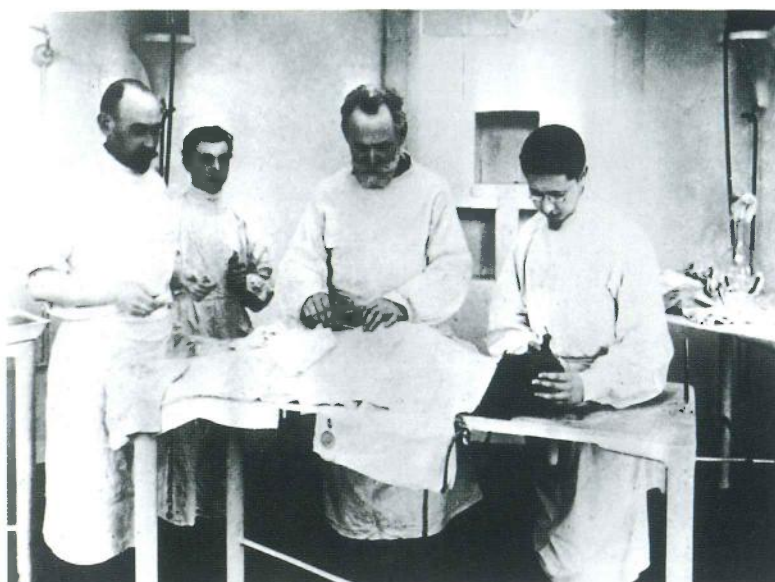


KEY POINTS

- Behaviorists believe that since no one can know what another person is thinking, psychologists can study only outwardly visible behavior.
- Behaviorist approaches, introduced early in the 20th century, replaced introspection and helped make psychology a rigorous and objective scientific discipline, rather than a branch of philosophy.
- Behaviorists theorized that all human behavior could be explained as a complex collection of highly conditioned reflexes.
- Behaviorism was widely used in education and psychotherapy.
- Today behaviorism is still important in psychology but no longer dominates. Many psychologists see early behaviorism as extreme.

observing humans and other animals, we can generally find ways to agree on whether or not they've made a certain physical movement. The behaviorists argued that psychology should only concern itself with the way in which events in the world caused changes in animal (including human) behavior.

Previously William James (see p. 41) and other psychologists had defined psychology as the study of consciousness. The only way they could observe the processes of the mind, however, was by examining their own thinking, a process



Russian physiologist and Nobel laureate Ivan Pavlov (second right) demonstrates his theory of conditioned reflex on a dog in a laboratory.

that Wundt called introspection. In the sciences, however, experiments must be repeatable. So if a scientist describes the procedure for an experiment, another scientist must be able to perform it and obtain the same results. The behaviorists believed that for psychology to be a true science, it could not depend on any one person's subjective impressions; any discussion of mind was meaningless because mental processes could not be reliably observed.

Ivan Pavlov

Behaviorism had its roots in several developments around the beginning of the 20th century. Among the most important of them were the conditioning experiments conducted by Ivan Pavlov (1849–1936). Pavlov studied the digestive process in dogs and was particularly interested in the production of saliva, which is an involuntary reflex action. The idea of a reflex—in which certain stimuli produce an automatic response—was well known. One of the most familiar examples in people is the jerk of the lower leg when a certain nerve at the kneecap is tapped. In animals the salivary reflex causes them to produce more saliva when food is placed in their mouths.

Pavlov devised a method of measuring this saliva flow, but soon noticed that his

dogs began to salivate even before they were given food. The sight of the white coats of the lab attendants who brought food to the dogs was enough to trigger this response. To test this reaction formally, he rang a bell just before the food was presented. After a while he found that he could make the dogs salivate merely by ringing the bell without giving them any food. Pavlov called this behavior a “conditioned reflex,” and it later became known as a “conditioned response.” He also found that additional repetitions of the bell-food connection strengthened the effect, while many repetitions of the bell without food made the effect diminish and eventually go away, a process termed “extinction.”

E. L. Thorndike

Shortly after the turn of the 20th century E. L. Thorndike (1874–1949) also began to carry out experiments on learning. He was interested in finding out whether dogs and cats could learn by observation.

He placed the animals in cages called puzzle boxes that they could open from inside by pressing a lever, and he tried to teach them how to do so. He found that when an animal simply observed another

“A man’s mind...is his connection system, adapting the responses of thought, feeling, and action that he makes to the situation that he meets.”

— E. L. Thorndike, 1943

animal, or a person, pressing the lever to open the cage, no learning took place. Even when he guided the animal’s paw onto the lever, the animal did not learn. But sooner or later the animal would step on the lever by accident, and after this happened many times, the animal eventually learned that stepping on the lever opened the cage and would do so immediately after it was put inside.

From this Thorndike deduced what he called the “Law of Effect,” which stated



JOHN B. WATSON

BIOGRAPHY

John Broadus Watson grew up in South Carolina. His family was very religious, something against which he tended to rebel. He attended a small college in Greenville, South Carolina, and after graduation was supposed to enter Princeton Theological Seminary. However, he failed an important course, possibly deliberately, and was forced to spend another year in Greenville. During that time his mother died, and thus freed from parental pressure to study for the ministry, he studied psychology at the University of Chicago.

Watson was trained there in the introspective methods current in psychology, which he disliked, but he also met the German biologist Jacques Loeb (1859–1924), who was working on the conditioned reflex in humans, and neurologist H. H. Donaldson (1857–1938), who was studying the nervous system of the rat. Watson became an animal caretaker for Donaldson and went on to conduct his own research on rat learning.

After gaining his Ph.D. in a record three years, Watson continued to conduct research in Chicago until he was offered a professorship at Johns Hopkins University in Baltimore. He soon became chair of the department and used his influence to separate the psychology department from the philosophy department. His influential position also gave him the authority to spread the ideas of behaviorism, beginning with his famous 1913 lecture,



John B. Watson (1878–1958) moved from academe to advertising, where he used his behaviorist theories to influence consumer spending.

published in *Psychological Review* as "Psychology as the Behaviorist Views It." At first Watson's ideas were well received, and he was elected president of the American Psychological Association. He wrote two influential textbooks: *Behavior* (1914) and *Behaviorism* (1925).

After an interruption to serve in the army in World War I (1914–1918) Watson returned to Johns Hopkins, but because of a matrimonial scandal and a divorce he was forced to resign. He spent the rest of his working life in advertising (see box on facing page), but he continued to lecture and publish books and articles on psychological topics, including a book on child-rearing according to behaviorist principles entitled *Psychological Care of Infant and Child* (1928).

that a behavior that produces a positive result is likely to be repeated. Like Pavlov's conditioned reflex, this behavior seemed to be independent of conscious thought.

THE RISE OF BEHAVIORISM

Darwin's theory of natural selection (see p. 134) and an acceptance of the idea that people had evolved from lower animals led to a belief in a continuity between people and animals. Previously people were not considered to be animals—what made them different was their possession of "mind," which most philosophers regarded as equivalent to "soul" (see pp. 10–15). If there was indeed continuity between people and animals, then "mind" might also have to be taken into account in any attempt to explain animal behavior.

Early in the 20th century John B. Watson studied learning in rats, first as a student at the University of Chicago and later as a professor at Johns Hopkins University. The ideas of Darwinism,

"It can be just as thrilling to watch the growth of a sales curve of a new product as to watch the learning curve of animals or men."

— John B. Watson, 1937

coupled with the introspective approach to the study of the mind, demanded that he explain his results in terms of conscious thought by the animals, which he found unacceptable. Ironically, the idea

that lower animals might possess what had come to be called “mind” led him to reject the idea that there was such a thing as this separate, unique feature.

Drawing on the works of Pavlov, Thorndike, and others, Watson concluded that for psychology to be a true science, it must study only an organism’s observable behavior. We can, he said, observe only a stimulus (an event that takes place before

an organism does something) and the response (the behavior that follows). Whatever occurs in between is a “black box” about which we can know nothing. The stimulus could be a signal, such as Pavlov’s bell, or some internal event, such as the contractions of the stomach that signal hunger. In either case the response would have to be an observable action, such as salivation or getting up and



BEHAVIORISM AND ADVERTISING

After leaving academic life, John B. Watson went to work for the J. Walter Thompson advertising agency in New York City. There he attempted to use the principles of behaviorism to “predict and control human behavior.”

Through his research with babies Watson decided that people are born with only three emotions: love, fear, and rage. In advertising he tried to associate these basic emotions with products. Accordingly, he decided that to be effective, advertisements should not simply state “buy this” or describe the qualities of the product, but should try to associate a product with positive or emotive images. An ad for automobile tires, for example, might show a picture of a baby both to arouse positive feelings and to instill fear of an auto accident. Ads for beer and soft drinks might feature young, attractive people having a good time, thus appealing to a general desire for pleasure.

Watson’s attempts to apply the principles of conditioning to advertising were not entirely successful, but he also launched the idea of conducting consumer research. During his early training at J. Walter Thompson he was sent to work as a clerk at Macy’s department store, New York, where he discovered that he knew little about what consumers really wanted. He therefore introduced consumer surveys. Their purpose was partly to learn what products people preferred, but mainly to establish what their wants and desires were in order to associate products with those basic feelings.

Most of the research ideas used in the modern advertising industry can be traced to Watson’s influence. He is also credited with modifying the culture of large corporations to emphasize decision-making based on scientific research rather than instinct and preconception.



By hiring Russian tennis star Anna Kournikova to advertise its watches, Omega is trying to create an association in the minds of potential customers between its watches, female beauty, and sporting prowess.

walking to the refrigerator. Although several other psychologists had been moving toward a behaviorist approach, Watson was the first to popularize the idea in 1913, with a famous lecture that has come to be called "The Behaviorist Manifesto," later published in the journal *Psychological Review*.

Watson's principles

The basic principles of behavioristic psychology, as Watson proposed them, were as follows:

- Psychologists could measure only what happens outside the organism. Introspection and any concept of "mind" were irrelevant. (This led Watson to reject Freud's theories about the unconscious because the unconscious was a concept that could not be observed directly.)
- The purpose of psychological research is the prediction and control of behavior.
- There is no difference between people and animals, except a difference in degree (for example, level of intelligence).
- The behavior of people results entirely from physiological reactions and is not attributable to any nonphysical force.

Though he didn't say it directly, Watson also rejected the widely held idea that consciousness resided in the "soul."

The conditioned reflex

Watson saw the methodology of behaviorism as essential in making psychology a true science on a par with physics, chemistry, and other established disciplines. He went on to develop behaviorism as a theory, attempting to explain complex human behavior entirely in terms of the conditioned reflex.

He began by rejecting the idea that many common human activities are guided by "instinct." An instinct is a behavior that is hard-wired into the organism; present from birth, it does not need to be learned. Insects appear to operate entirely by instinct: As soon as they hatch, they are ready to hunt for prey. Higher animals seem to operate on a mix of hard-wired and learned behaviors.



CASE STUDY

ALBERT AND THE RAT

After observing infants in hospitals John B. Watson determined that children are born with only a few basic fears: of falling, loud sounds, pain, and of having their bodies restrained. All other fears, he said, were the result of conditioning, as objects or events in their lives became associated with the basic fears.

He first tested this idea on an 11-month-old boy known as Albert B., or "Little Albert," the son of a hospital nurse. Albert was first introduced to a white laboratory rat. He touched it, stroked it, and played with it completely without



Behaviorists believe that the common human fear of rats is learned rather than natural.

fear. Then, just as Albert reached for the rat, experimenters behind the boy struck an iron bar with a hammer. The noise frightened Albert, and after just a few repeats of the experience the rat became a conditioned stimulus that brought

out the same fear response as the loud noise. Now presenting the rat alone would cause Albert to shy away and cry.

Watson also planned to use Albert to test conditioning as a method for removing fears, but his mother decided to remove him from the hospital, so Watson conducted subsequent experiments in fear reduction on other children. He found that positive stimuli, such as food, could be used to condition children out of their fears. A child who was afraid of rats was given food while a rat in a cage was placed a long distance away. Each day the cage was moved closer at feeding time, until the child was eating with one hand and stroking the rat with the other.

A kitten, for example, knows how to groom itself even if it has been removed from its mother immediately after birth; but a kitten that has not been taught by its mother to hunt will usually not regard mice as prey because hunting is learned and not instinctive.

When Watson began his research, most other psychologists believed that people performed many everyday actions instinctively. William James had claimed that behaviors such as climbing, hunting, showing sympathy, playing, curiosity,

modesty, shame, and parental love were all instinctive. After extensive observation of human infants Watson decided that only a few basic behaviors, such as grasping, sucking, and random movements of the limbs, were built into every infant. The complex behaviors James had mentioned grew out of conditioning, Watson claimed. An example was smiling: Infants smile in response to stroking and to internal pressure in the digestive system. "Quickly it [smiling] becomes conditioned," Watson wrote. "The sight of the mother calls it out, then vocal stimuli, finally pictures, then words, and then life situations either viewed, told, or read about."

Emotions, Watson said, also resulted from conditioning early in life. During experiments he found that newborn babies showed only a few emotional responses: They would exhibit fear when they heard a loud sound, felt pain, or experienced a loss of support; rage when their limbs were restrained; and pleasure when they were stroked or fed. All these responses, he thought, would have evolved as survival mechanisms. As life went on, other stimuli became associated with these experiences. For example, the mother's stroking and feeding would condition the child to "love" its female parent.

Similarly, no one was "instinctively" afraid of, say, spiders or bats. Such fears were conditioned early on by association with the simple inbuilt fears. Watson demonstrated this in a famous experiment with a boy and a rat (*see box left*).

Generation of emotion

When people experience emotion, it generally involves the association of physiological responses with thoughts and events. Fear and anger, for example, are accompanied by the release of adrenaline, which gives the organism more speed and strength for fight or flight.

Watson believed complex emotions grew through conditioning of reflexes. He suggested the example of the "shame" associated with sex and nudity. An infant will become flushed when stroked,

especially if the sex organs are touched. But when children touch themselves in these places, adults may yell at them and force them to stop. Eventually, Watson said, the flushing becomes conditioned to accompany references to, and even thoughts of, those parts of the body. More complex emotions resulted from

"John B. Watson was the most important figure in the history of psychological thought during the first half of the [20th] century."

— Gustav Bergman, 1956

more complex associations. Jealousy, for example, could result from the association first of love from a parent and then of rage if love was directed at another child.

Watson cautioned that he had not made enough observations to be sure of such explanations. He was sure, however, that all but the simplest emotions were results of conditioning physiological reactions to events in a person's environment.

Behaviorists believe that infants have only a few basic emotions and that all their other feelings are learned later in life.



Skills and conditioning

According to Watson, even the simplest physical skills were the result of early conditioning. A newborn is constantly bombarded by stimuli, both from the sights and sounds of the world around her and from internal events such as hunger and digestion. At the same time, the baby makes all sorts of random movements, and certain movements become conditioned to follow certain stimuli. Eventually, the movements that produce no reward fade away, through extinction of the conditioned response. So, Watson said, a baby seeing a bottle will first move

at random, but will quickly become conditioned to perform a simple sequence of reaching, grasping, and pulling the bottle to his or her mouth.

As the child grows, increasingly complex behaviors are conditioned, building up from the simpler ones. A virtuoso playing a piece of music he or she knows well on the piano is executing a long series of conditioned responses in which each step (response) becomes the stimulus for the next. Eventually, stimuli from outside the organism are no longer needed, and the movements of muscles themselves serve as the conditioned

**B. F. SKINNER****BIOGRAPHY**

The son of a self-taught lawyer, Burrhus Frederic Skinner was born and raised in Susquehanna, Pennsylvania. Through high school and college he studied English, intending to become a professional writer. He also gained a reputation as a rebel and a practical joker.

After graduation Skinner returned home and spent a year writing fiction but without success. Then he happened to read an article on behaviorism by his favorite author, Bertrand Russell, and went on to read Watson's book *Behaviorism* along with articles on the work of Pavlov. He decided that behaviorism could explain many of the aspects of human behavior that he had been exploring in the characters he created as a writer, and subsequently

enrolled at Harvard as a graduate student in psychology. In 1936 he joined the faculty of the University of Minnesota and then, in 1945, the University of Indiana, where he was appointed to a chair in psychology. In 1948 he returned to Harvard, where he remained for the rest of his career.

Skinner believed conditioning could be used not only to explain human behavior but also to predict and control it. Returning to his roots as a writer, in 1948 he published a novel, *Walden Two*, about a utopian society in which conditioning was used to prevent and correct antisocial behavior. In his ideal world children were raised in community nurseries where they were conditioned to behave properly—as a result, they were “happy.” In 1971 Skinner published *Beyond Freedom and Dignity*, a work of nonfiction in which he argued that the concept of freedom was often meaningless because a person's behavior was a result of lifelong conditioning. Therefore, he said, freedoms that interfered with the establishment of a planned society should be curtailed.

Skinner also introduced operant conditioning, a behaviorist version of E. L. Thorndike's Law of Effect (see p. 53). In operant conditioning there is no initial stimulus. Instead, a reward or satisfaction of some kind conditions the organism to perform a certain action. Conditioning begins not when a stimulus is presented to the organism, but when the organism performs an action. The operant (action) that is rewarded tends to be learned. To research this idea, Skinner developed an apparatus that he called an operant chamber, but others called the Skinner box, which was easier to use than any earlier device of its type.



B. F. Skinner (1904–1990)
wrote fiction as a young man; but after becoming interested in behaviorism, he decided to study psychology.

stimulus to trigger the next movement. In playing piano, the sight of a note on the sheet music becomes conditioned to the movement of a finger onto a particular key. The muscular movement that plays any note is followed immediately by the sight of the next note on the page, and eventually the finger movement itself becomes a conditioned stimulus replacing the note on the page and triggering the next finger movement. Watson claimed that if he were given full control over a child from birth, he could soon train him to cultivate any chosen set of skills.

Language

Watson believed that even human language was just a series of conditioned muscular responses in the lungs, larynx, throat, tongue, and lips. Eventually, the patterns associated with one word become connected to those of another, and words flow in their proper order. Meanwhile, words and phrases are conditioned responses to objects in the environment. Babies say “mama” when they see their mother, and eventually the connections become many and varied. “Mama” is

“I am trying to dangle a stimulus in front of you, a verbal stimulus which, if acted upon, will gradually change this universe.”

— John B. Watson, 1937

associated with the mother herself, a photograph of mother, and finally, with the printed word “mother” in a book.

Thinking, Watson said, was simply an elaborate sequence of stimulus-response events in which the result of one connection acted as the stimulus for the next. Use of language was the result of conditioning that associated objects with words, while thought was just a flow of unspoken words. He suggested that words running through our minds might cause subvocalization—that is, electrical signals would be sent from the brain to the vocal



CASE STUDY

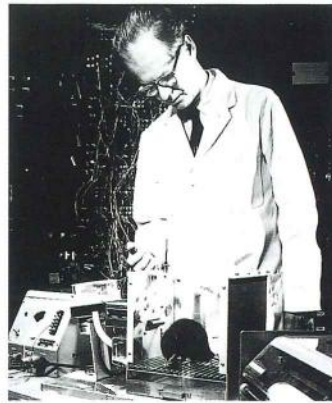
THE SKINNER BOX

A refinement of the puzzle box used by E. L. Thorndike (see p. 75), the Skinner box was a cage large enough to house an animal, such as a white rat. On one wall of the cage was a bar the animal could press, a chute through which a pellet of food could be delivered, and, usually, a source of water. The bar was connected both to a device that would deliver food according to a preprogrammed system and to a pen writing on a moving paper tape. Each press of the bar would register as a jump in the pen line, producing a graph of the animal's activity over time.

Experiments often began with a period of training for the animal. Operant conditioning depends on the subject randomly pressing the bar at the start of the experiment. But pressing a bar

is not normal behavior for a rat, so the experimenter would begin by delivering food whenever it moved in the direction of the bar, then whenever it engaged in pawing behavior. As conditioning progressed, the graph would clearly show that the time between presses of the bar decreased. It would also show how a conditioned response became “extinguished” if food was not delivered after a press of the bar.

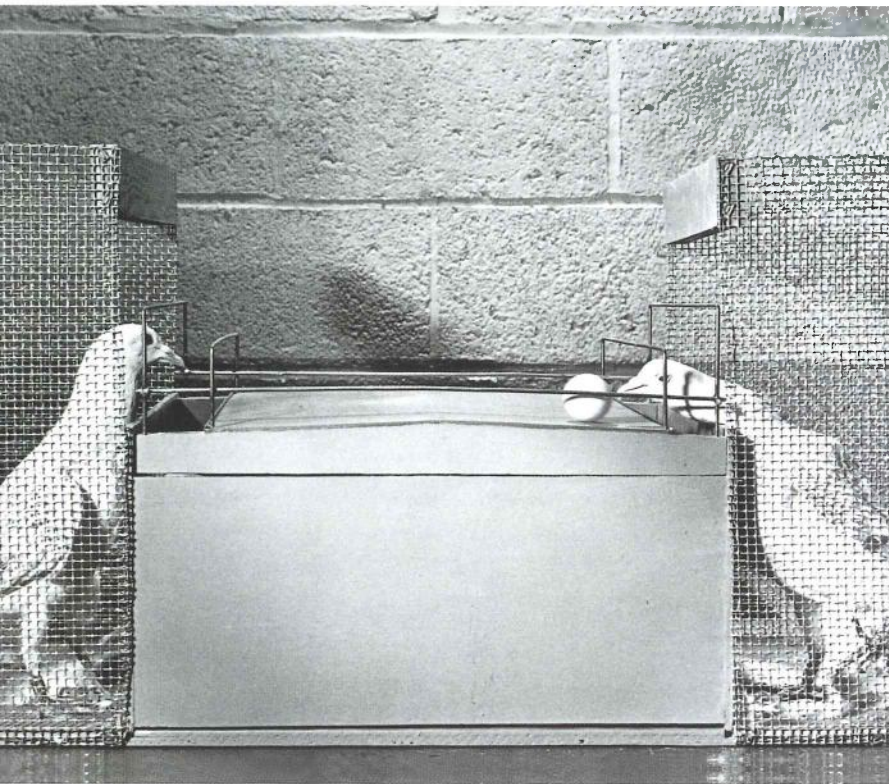
Experiments with the box



B. F. Skinner conducts an experiment on a rat using one of his operant boxes.

enabled Skinner to develop a large body of knowledge and eventually a theory about operant conditioning.

One of Skinner's pupils went on to train dogs to perform in Hollywood films. He devised a form of operant conditioning in which the animals were taught to associate a simple signal, such as a whistle, with a reward. The trainer blew the whistle and gave the animal food, repeating the process until the whistle became a reward in itself. The whistle was thus a conditioned stimulus. If the trainer wanted a dog to go to a bookshelf, pick out a particular book, and carry it to a table, he simply blew the whistle whenever the dog moved toward the bookshelf. Eventually, the dog would head straight for the bookshelf without prompting. Now the trainer blew the whistle whenever the dog moved in the direction of the particular book it was supposed to pick out. The process was continued until the dog has been conditioned to the entire sequence of events.



cords, although the signals would be too weak to cause actual speech. Watson thus believed it might be possible to read people's thoughts by measuring the electrical activity in their vocal apparatus.

Established psychologists generally resisted the behaviorist approach, but younger psychologists took it up with great conviction. Behaviorism spread slowly at first, but by the 1930s had become the most common approach in psychology. There were various "flavors" of behaviorism: Some allowed for a redefined idea of "consciousness," but all stayed close to Watson's basic principles.

The teaching machine

The next major step forward in behaviorism resulted from the work of B. F. Skinner (see boxes pp. 80 & 81). Skinner is well-known for creating "programmed instruction," a method of teaching based on conditioning principles. He introduced programmed instruction in a "teaching machine": a box with a window called a "frame" in which a small amount of information was

Pigeons playing ping-pong: a task that might have been thought beyond them. This was one of the experiments devised by B. F. Skinner to demonstrate that animals could be conditioned to perform as long as the reward (in this case a grain of wheat) was a sufficiently attractive incentive to action.

displayed. After absorbing the information, his students were shown a question written in such a way that they almost always got the right answer. The satisfaction of giving the correct answer, Skinner said, served as a reinforcement to help students remember the material. Mechanical teaching machines were quickly replaced by books designed to present short frames followed by questions on adjacent pages.

Effects on education

Unfortunately, the term "teaching machine" proved to be bad for public relations since real teachers worried that their jobs would be at risk, while most believed that the programmed instruction approach would be useful only for teaching simple tasks. Programmed instruction is seldom used in schools today, but is still common in business and industry, and its principles survive in computer-aided teaching.

Skinner wanted to follow Watson's proposal that psychology should be used to predict and control behavior, and he advocated a society in which

"Behaviorism is treading on the hoof of somebody's sacred cow."

— John B. Watson, 1930

conditioning was used to prevent and correct antisocial behavior. His ideas were widely applied to education, formalizing something teachers had always known: that behavior, if rewarded, is repeated. The elementary school teacher's gold star is a simple example of operant conditioning.

Before long, behaviorist methods were taught formally in teachers' colleges and incorporated into textbooks. Teachers were taught that students needed grades and other incentives to perform to their maximum potential and that material should be carefully sequenced to condition related ideas to each other. Undesired behavior in the classroom was

also to be corrected by behaviorist techniques, such as reinforcing positive behavior and eliminating the stimuli that triggered negative behavior. Skinner did not advocate punishment, however, noting that pain and penalties might eliminate unwanted behavior but could not teach the correct action to replace them.

THE COGNITIVE CHALLENGE

For about three decades many psychologists agreed with Watson. They limited their studies to the relationship between events and behavior, and did not speculate about the mental processes causing these relationships. Consequently behaviorism grew more and more influential, dominating psychology in the 1940s and 1950s. In the mid-1950s, however, a new philosophy began to take hold. In 1956 a group of researchers, including Jerome Bruner, George Miller, and Herbert Simon, met at MIT. These cognitive psychologists (see pp. 104–117), as they later became known, revived interest in the mind. By the mid-1970s nearly all psychologists were again talking about how the mind worked. The behaviorists' views seemed irrelevant.

Controversial issues

Behaviorism was widely criticized on both emotional and logical grounds. For one thing, Watson, Skinner, and other behaviorists conducted most of their experiments on laboratory animals, and



KEY DATES

1903 Ivan Pavlov publishes the results of his experiments on dogs and introduces the concept of conditioning.

1925 John B. Watson publishes *Behaviorism*, stating that all behavior is based on conditioning and that psychology should be the scientific study of human behavior.

1938 B. F. Skinner publishes *The Behavior of Organisms*, the first of many publications on operant conditioning.

mid-1950s The emphasis shifts to cognitive psychology and the study of the mind rather than behavior.

1972 A mathematical equation for rat behavior, the Rescorla-Wagner rule, is devised.

1986 James McClelland and David Rumelhart create a computer program that can learn the past tense of verbs and makes mistakes similar to those that a child makes.

Eleanor, who is three years old, is pointing to the stickers on her motivational chart.

Behaviorists focus on the relationship between events and behavior. Good behavior is rewarded, and bad behavior is ignored. The stickers may be a reward in themselves, or they may be exchanged for a treat such as candy.

critics said it was unacceptable to assume that the results they obtained applied automatically to the more complex nervous systems of people.

Like Watson, Skinner believed that language was built entirely of conditioned responses connecting words to objects

“Behaviorism is indeed a kind of flat-earth view of the mind.”

— Arthur Koestler, 1967

and actions. Critics argued that individual differences in language learning meant there was also a genetic inherited component—that people learned language because they were prepared to form certain associations and not prepared for others. In other words, the organism itself was a part of the stimulus-response sequence, and thus not all behavior was determined simply by learning. But even the most hostile critics agreed that behaviorism was a useful theory when limited to certain areas of psychology.

BEHAVIORISM TODAY

Today, although most psychologists regard the behaviorism of Watson and Skinner as an extreme and overly simplistic explanation of behavior, they recognize that the theory opened a small window





THE FEAR OF PUBLIC SPEAKING

Most people feel a little nervous when asked to speak in public. Some people, however, are made so anxious by the prospect of talking to a crowd that they seek to avoid it at all costs. If their job requires public speaking, this can be a serious problem. Behavioral therapy can provide a fast and effective remedy to this situation. For the behavioral therapist anxiety is a response produced by certain objects or situations. A crowded classroom, for example, is a situation that, for some, produces the response of anxiety. One way of stopping this reaction is to train a new response to the situation. Psychiatrist Joseph Wolpe (born 1915) pioneered a technique called systematic desensitization that allowed the behavioral therapist to do just that. The technique helps the patient be less sensitive (desensitized) to frightening situations.

Systematic desensitization involves the therapist and client drawing up a list of anxiety-producing situations related to the problem under treatment. The client puts them in order, starting with the one that produces the

least anxiety and ending with the most anxiety-producing situation. The client is then taught ways to relax such as controlled breathing and muscle relaxation. Once these techniques are mastered, the client is asked to relax while imagining the least anxiety-producing situation on the list. Should the client begin to feel anxious, he stops imagining the situation and uses the relaxation techniques again until ready to resume. This sequence is repeated many times, slowly working up the list to more stressful anxiety-producing situations. What the therapist is trying to do is train new relaxation responses to the situations that once produced anxiety. It is not possible to be both anxious and relaxed at the same time, so learning these new responses eliminates the earlier anxiety.

Research showed that five sessions using Wolpe's systematic desensitization methods could effectively treat the fear of public speaking. This behavioral treatment was also found to be more effective than five sessions with a traditional psychotherapist.



A confident public speaker, President Bill Clinton addresses a crowd of applauding students at Beijing University on the last day of his visit to the capital city of China in June 1998.

onto the human mind. Behaviorism's first major contribution to psychology was methodology—a way of doing science. The second was therapy—a way of treating psychological problems. The third was a philosophy—an idea about what psychology should and should not be. The first two contributions are still important in modern psychology; it is only the philosophy that is disputed.

Behavioral conditioning

The behaviorists' focus on the relationship between events and behavior led them to explore whether undesirable behaviors could be changed. Thus their contribution

to therapy has been much longer-lasting than in other areas of psychology.

For instance, one of the goals of doctors in a psychiatric ward is to help the patients lead a normal life, and this often starts with basic tasks that address the patient's problems. In several cases these goals have been achieved by rewarding normal, healthy behaviors with tokens: small objects that have little value in themselves, but can be exchanged for rewards, such as going to the movies or receiving extra food. In token systems patients receive immediate rewards for appropriate behaviors that they would not receive for inappropriate behaviors. Rules

are posted so that everyone knows how tokens are gained and how many tokens are needed for particular rewards.

Research showed that the introduction of a token economy had real, positive effects on the behavior of patients who had spent many years in hospital. The tokens were used to reward behavior such as dressing properly or socializing with other patients and were exchanged for privileges such as watching television. By the end of one experiment more than one in ten of the patients were well enough to leave. Without the token economy they would all have been expected to stay put. More sociable patients also improved the running of the ward.

Token economies have also been used effectively to improve behavior in both mainstream and special needs schools.

Behavior modification

More generally, behavioral methods have been shown to be effective in treating a wide range of problems, such as fear of

spiders and anxiety about public speaking (see box left). The methods used to treat such phobias (irrational fears) usually depend on the principle of a conditioned reflex. Just as Watson banished a child's fear of a rat by gradually bringing the animal closer, the patient is gradually exposed to mild versions of the thing feared, often accompanied by pleasurable stimuli. People with agoraphobia (fear of going out in public) might begin by just sitting on the front porch. Later they might move to the end of the front walk, then to the corner, and so on, until they can tolerate crowded public places.

Other researchers developed a more extreme approach called "aversion therapy," which was particularly popular in the late 1960s and early 1970s. Based on Skinner's conditioning experiments with animals, this approach attempted to correct bad habits by associating them with unpleasant stimuli, such as loud sounds and unpleasant smells. In one example people who wanted to quit

A still from Stanley Kubrick's movie A Clockwork Orange (1971), a version of Anthony Burgess's novel of 1962. In this scene the protagonist, Alex, is injected with drugs and forced to watch violent imagery while listening to music. The drugs make him vomit, thus conditioning him against using violence and also against the music of Ludwig van Beethoven.





CASE STUDY

THE REMARKABLE MEMORY OF PIGEONS

Look at the two pictures in this box. Imagine someone showing them to you and saying, "In two years time I will show you these pictures again. If you pick the road sign, I will give you some money; but if you pick the house, you'll get nothing." Do you think you'd be able to remember which picture to choose two years later? And what if you had to learn not one pair but 160 pairs of pictures, all different, with no obvious theme or connection between them? How many would you get right after a gap of two years?

An experiment by William Vaughan and Sharon Greene showed that if you were a pigeon, the answer would be "nearly all of them." Vaughan and Greene collected two



You will not be rewarded for choosing this image. Out of 320 pictures a pigeon would remember not to choose this picture.

sets of 160 pictures each.

The pictures in each set were chosen randomly and had no obvious themes or relations to each other. Let's call these sets of pictures set A and set B. Vaughan and Greene then trained pigeons to peck at pictures in set A, but to avoid pecking at pictures in set B. They did so by rewarding the pigeons for pecking at the pictures from set A by giving them some grain. The pigeons did not

get grain for pecking at the pictures from set B. Learning which 160 of 320 random pictures to peck at was no easy task, and it took almost 200 sessions before the pigeons mastered it. But once they had, they remembered them even two years later, storing away the information. Even after the long delay the pigeons pecked almost exclusively at those pictures for which they had previously been rewarded.



Two years from now, if you choose this image from a huge selection, you will be given a cash reward. Do you think you could remember it?

smoking were administered with mild electric shocks (euphemistically described as "Faraday treatment") as they went through the motions of lighting a cigarette. A program based on this technique is still in use at Schick Shadel Hospital in Seattle, Washington, and

"Do we lose our humanity if we are deprived of the choice between good and evil?"

— Stanley Kubrick, 1971

claims a 95 percent success rate. Similar techniques have been applied to alcohol and drug addiction, obsessive-compulsive behavior and to "cure" homosexuality. The ultimate extreme was portrayed in the book and movie *A Clockwork Orange*, in which a delinquent called Alex is

conditioned to be incapable of violence and antisocial behavior using drugs that induce nausea (see photo p. 85).

Learning

The behaviorists were also well known for promoting particular ways of approaching psychology, particularly people like Ivan Pavlov (see p. 75) and B. F. Skinner (see pp. 80–82). These scientists did much to promote the use of carefully controlled experiments with rats and pigeons as a way of discovering more about ourselves. Today the methods they developed are used to investigate the complexity of the animal mind. Many animals have been shown to have remarkable memories (see box above), and we now know that they use these to learn more efficiently and to help them survive.

The behaviorists showed that animals such as rats can learn that two events go

together, for example, that a certain behavior will result in a reward such as food or a punishment such as an electric shock. In 1968 research showed that if a rat has already learned that a flashing light predicts shock and a buzzer sounds at the same time as the light flashes, the rat will not waste time learning about the buzzer. The rat already knows that a shock is coming because the light is flashing.

Rats and other animals seem to be continually anticipating what will happen next. If their predictions are right, then they understand the world sufficiently and do not need to learn. If their predictions are wrong, however, more learning is required. Consequently, they pay more attention to the unexpected.

The surprise factor

In 1972 two U.S. psychologists, Bob Rescorla and Alan Wagner, made an important discovery. They first pointed out that in many situations the amount a rat learned was affected by how surprised it was: An unexpected stimulus meant that more conditioning occurred. They went on to say that the rat's behavior in such

situations could be explained by a single mathematical equation. This equation became known as the Rescorla-Wagner rule. At the time, most psychologists were not particularly interested in this formula for learning. They thought that because it described rat behavior, it could not be applied to people.

"Everything important in psychology...can be investigated in essence through the...analysis...of rat behavior at a choice point in a maze."

— Edward Tolman, 1938

That began to change in the 1980s when James McClelland and David Rumelhart developed the delta rule, based on the Rescorla-Wagner rule. The delta rule applied the theory of conditioning in rats and enabled a computer to learn. In this way McClelland and Rumelhart showed that a computer could learn the past tense of verbs. For example, given the word "go," their program could tell you



OUT OF SIGHT, OUT OF MIND?

FOCUS ON

If you were to travel to a neighboring town, you would no longer be able to see your house, but you would know that it was still there. For a long time many psychologists believed that infants could not grasp this fundamental concept. Unfortunately, the problem with trying to test theories about babies is that babies have difficulty interacting with people and objects in ways researchers can measure accurately. In the 1990s psychologists got around this by using the techniques developed by behaviorists to test rats and pigeons.

Virtually all animals, including people, habituate (get used to repeated events). For example, the first time a blue light flashes in a rat's cage, the rat will turn and look at it for a while. However, by the time the light has flashed perhaps 40 times, the rat ignores it. This gradual reduction in responding is called habituation. Habituation vanishes if something surprising happens: If a red light flashes, the

blue-habituated rat will start to pay attention to the light again. This means the rat must be able to tell the difference between the red and blue lights.

Researchers have used the fact that surprise removes habituation to see whether babies find certain events surprising or not. For example, a baby will be repeatedly shown an event until she shows habituation. The event is then changed. If the baby starts looking again, she must be able to detect that change.

In one experiment two different changes were made. One of them involved an object that babies could no longer see stopping another object from moving. The babies did not find this event particularly surprising, which suggested they knew the first object still existed. The other event, thanks to some stage magic, appeared impossible unless the babies believed that the initial object did not exist. The babies were particularly surprised by this event.

that the past tense was “went”—and it could do this for more than 500 verbs. Not only that, but as the program first began to learn past tenses, it made the same kind of errors that children do. Many young children go through a phase in which they forget that the past tense of “go” is “went” and will use “goed” instead. Rumelhart and McClelland’s computer program did exactly the same thing.

Today many psychologists use computers to mimic the human mind in order to understand it better. Crucial to these attempts is the Rescorla-Wagner model that explains conditioning and the relationship between conditioned and unconditioned stimulus.

Breaking the habit

Behaviorism has also helped psychologists and other scientists develop medical treatments for psychological problems. Many people get addicted to illegal and dangerous substances, such as cocaine. Once addicted, it is difficult to stop taking the drug without help. It is also easy to start taking it again, even if you have stopped for a long time. One reason seems to be that drug-taking becomes a habit.

Habits are learned behaviors that are automatically produced by familiar environments. Many habits are normal and useful, such as brushing your teeth in the morning. Others, such as nail-biting, are useless and can be irritating. Some habits, such as drinking alcohol or taking drugs, are physically addictive, difficult to stop without medical or professional help, and cause long-term health problems.

In 1999, in an article in *Nature*, Maria Pilla and colleagues described how they got rats addicted to cocaine. After they had done so, they set up a situation in which a light being turned on indicated that cocaine would soon be available. After a while the rats tried to get cocaine as soon as the light came on: The rats associated the light coming on with satisfying their addiction to cocaine.

Once the rats had acquired a cocaine habit, could they be cured of it? Using

what they knew about the effects of cocaine on the brain, the scientists developed a new medicine. The medicine itself did not seem to be addictive, and if rats were given it, they would not look for cocaine when the light came on. Obviously, there is still a long way to go, but experiments such as these offer hope for a solution to some difficult social problems. Such experiments would not have been possible without the procedures developed by the behaviorists.

“The better we understand how people learn...the better able we will be to help them learn appropriate behaviors and eliminate inappropriate ones.”

— David Lieberman, 1990

The most significant contribution the behaviorists made to modern psychology is the one that is hardest to see. They insisted that psychology should be a science. Scientists perform carefully controlled experiments, and so should psychologists. Psychology, the behaviorists said, could not make progress simply through discussion and debate. It needed objectivity and hard facts.



Some habits (or learned behaviors) are useful, but others, such as smoking, will damage your health. Once a person is physically addicted to nicotine, it is difficult to give up smoking without some sort of medical assistance such as wearing a nicotine patch, as this woman is, or chewing gum.

THE BEHAVIORIST LEGACY

Most modern psychologists would agree with the need for psychology to be an objective science. Look at many areas of psychology, and you will see how they have been revolutionized by the behaviorists' views.

In the late 19th century, for instance, early psychologists such as Wilhelm Wundt (see p. 32) had tried to understand the mind by training people to break down their conscious experience into its "raw" components. For example, Wundt would ask his students to describe what they saw out of a window in terms of patches of light of particular shapes and colors, not in terms of objects like trees.

Many modern psychologists believe that our conscious experience is composed of simple components, and we can see things like trees only because we combine these components into objects. However, the reasons modern psychologists would give for this belief are more scientific than Wundt's and would probably point to something like visual search experiments.

Seeing red

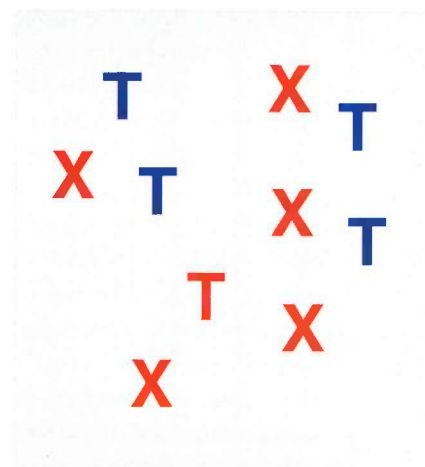
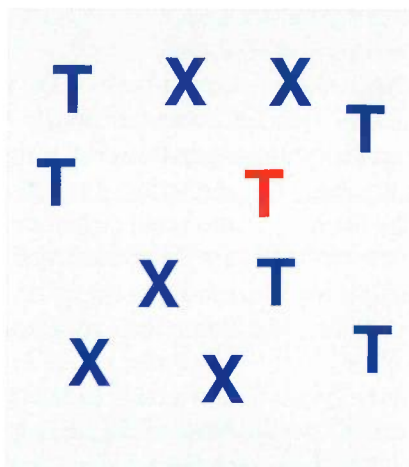
Visual search experiments are a bit like children's games. Look at the two pictures to the right of this page. Try to find the red T in each picture as quickly as you can. Game 1 is easy. The T seems to "pop out" at you. Game 2 is more difficult. Perhaps the reason for this is that you have to construct each object from its components of color and shape. You don't need to do that for the first picture. All you have to do is see a patch of red.

Before behaviorism most psychologists would not have analyzed these results any further. In contrast, modern psychologists



KEY POINTS

- Behaviorism proved successful as a method for making psychological observations and as a therapy.
- Behaviorism was not successful as a philosophy: It was superseded in many ways by cognitive psychology.
- Behaviorist methods can be used successfully to change certain problematic behaviors.
- Experiments using behaviorist methods help in investigating the mind of an animal.
- Results from behavioral experiments have been useful in the development of computers that can learn.



demand some evidence. In 1980 a researcher called Anne Treisman provided it by showing people many pictures like those above. For each picture she asked them to find an object as quickly as they could and press a button as soon as they had. She measured the time between showing the picture and the button being pressed, and found that people took a lot longer to find objects in the second game, providing clear evidence that they found the second game harder than the first. The way forward for psychology is through objective experiments like these.

In which game is it easier to find the red T? Visual search experiments such as this provide psychologists with an objective test that can be duplicated by other researchers.



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