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Behaviorism

Bekki Brau, Nathan Fox, & Elizabeth Robinson

Learning Theory

Behaviorism

Behaviorism is an area of psychological study that focuses on observing and analyzing how controlled environmental changes affect behavior. The goal of behavioristic teaching methods is to manipulate the environment of a subject — a human or an animal — in an effort to change the subject's observable behavior. From a behaviorist perspective, learning is defined entirely by this change in the subject's observable behavior. The role of the subject in the learning process is to be acted upon by the environment; the subject forms associations between stimuli and changes behavior based on those associations. The role of the teacher is to manipulate the environment in an effort to encourage the desired behavioral changes. The principles of behaviorism were not formed overnight but evolved over time from the work of multiple psychologists. As psychologists' understanding of learning has evolved over time, some principles of behaviorism have been discarded or replaced, while others continue to be accepted and practiced.

History of Behaviorism



A basic understanding of behaviorism can be gained by examining the history of four of the most influential psychologists who contributed to the behaviorism: Ivan Pavlov, Edward Thorndike, John B. Watson, and B.F. Skinner. These four did not each develop principles of behaviorism in isolation, but rather built upon each other's work.

Ivan Pavlov

Ivan Pavlov is perhaps most well-known for his work in conditioning dogs to salivate at the sound of a tone after pairing food with the sound over time. Pavlov's research is regarded as the first to explore the theory of classical conditioning: that stimuli cause responses and that the brain can associate stimuli together to learn new responses. His research also studied how certain parameters — such as the time between two stimuli being presented — affected these associations in the brain. His exploration of the stimulus-response model, the associations formed in the brain, and the effects of certain parameters on developing new behaviors became a foundation of future experiments in the study of human and animal behavior (Hauser, 1997).

In his most famous experiment, Pavlov started out studying how much saliva different breeds of dogs produced for digestion. However, he soon noticed that the dogs would start salivating even before the food was provided. Subsequently he realized that the dogs associated the sound of him walking down the stairs with the arrival of food. He went on to test this theory by playing a tone when feeding the dogs, and over time the dogs learned to salivate at the sound of a tone even if there was no food present. The dogs learned a new response to a familiar stimulus via stimulus association. Pavlov called this learned response a conditional reflex. Pavlov performed several variations of this

experiment, looking at how far apart he could play the tone before the dogs no longer associated the sound with food; or if applying randomization — playing the tone sometimes when feeding the dogs but not others — had any effect on the end results (Pavlov, 1927).

Pavlov's work with conditional reflexes was extremely influential in the field of behaviorism. His experiments demonstrate three major tenets of the field of behaviorism:

1. Behavior is learned from the environment. The dogs learned to salivate at the sound of a tone after their environment presented the tone along with food multiple times.
2. Behavior must be observable. Pavlov concluded that learning was taking place because he observed the dogs salivating in response to the sound of a tone.
3. All behaviors are a product of the formula stimulus-response. The sound of a tone caused no response until it was associated with the presentation of food, to which the dogs naturally responded with increased saliva production.

These principles formed a foundation of behaviorism on which future scientists would build.

Edward Thorndike

Edward Lee Thorndike is regarded as the first to study operant conditioning, or learning from consequences of behaviors. He demonstrated this principle by studying how long it took different animals to push a lever in order to receive food as a reward for solving a puzzle. He also pioneered the law of effect, which presents a theory about how behavior is learned and reinforced.

One experiment Thorndike conducted was called the puzzle box experiment, which is similar to the classic “rat in the maze” experiment. For this experiment, Thorndike placed a cat in a box with a piece of food on the outside of the box and timed how long it took the cat to push the lever to open the box and to get the food. The first two or three times each cat was placed in the box there was little difference in how long it took to open the box, but subsequent experiments showed a marked decrease in time as each cat learned that the same lever would consistently open the box.

A second major contribution Thorndike made to the field is his work in pioneering the law of effect. This law states that behavior followed by positive results is likely to be repeated and that any behavior with negative results will slowly cease over time. Thorndike's puzzle box experiments supported this belief: animals were conditioned to frequently perform tasks that led to rewards.

Thorndike's two major theories are the basis for much of the field of behaviorism and psychology studies of animals to this day. His results that animals can learn to press levers and buttons to receive food underpin many different types of animal studies exploring other behaviors and created the modern framework for the assumed similarities between animal responses and human responses (Engelhart, 1970).

In addition to his work with animals, Thorndike founded the field of educational psychology and wrote one of the first books on the subject, *Educational Psychology*, in 1903. Much of his later career was spent overhauling the field of teaching by applying his ideas about the law of effect and challenging former theories on generalized learning and punishment in the classroom. His theories and work have been taught in teaching colleges across the world.

John B. Watson

John Broadus Watson was a pioneering psychologist who is generally considered to be the first to combine the multiple facets of the field under the umbrella of behaviorism. The foundation of Watson's behaviorism is that consciousness — introspective thoughts and feelings — can neither be observed nor controlled via scientific methods and therefore should be ignored when analyzing behavior. He asserted that psychology should be purely objective, focusing solely on predicting and controlling observable behavior, thus removing any interpretation of conscious experience. Thus, according to Watson, learning is a change in observable behavior. In his 1913 article “Psychology as the Behaviorist Views It”, Watson defined behaviorism as “a purely objective experimental branch of natural science” that “recognizes

no dividing line between man and brute.” The sole focus of Watson’s behaviorism is observing and predicting how subjects outwardly respond to external stimuli.

John Watson is remembered as the first psychologist to use human test subjects in experiments on classical conditioning. He is famous for the Little Albert experiment, in which he applied Pavlov’s ideas of classical conditioning to teach an infant to be afraid of a rat. Prior to the experiment, the nine-month-old infant Albert was exposed to several unfamiliar stimuli: a white rat, a rabbit, a dog, a monkey, masks with and without hair, cotton wool, burning newspapers, etc. He showed no fear in response. Through some further experimentation, researchers discovered that Albert responded with fear when they struck a steel bar with a hammer to produce a sharp noise.

During the experiment, Albert was presented with the white rat that had previously produced no fear response. Whenever Albert touched the rat, the steel bar was struck, and Albert fell forward and began to whimper. Albert learned to become hesitant around the rat and was afraid to touch it. Eventually, the sight of the rat caused Albert to whimper and crawl away. Watson concluded that Albert had learned to be afraid of the rat (Watson & Rayner, 1920).

By today’s standards, the Little Albert experiment is considered both unethical and scientifically inconclusive. Critics have said that the experiment “reveals little evidence either that Albert developed a rat phobia or even that animals consistently evoked his fear (or anxiety) during Watson’s experiment” (Harris, 1997). However, the experiment provides insight into Watson’s definition of behaviorism — he taught Albert by controlling Albert’s environment, and the change in Albert’s behavior led researchers to conclude that learning had occurred.

B. F. Skinner

Skinner was a psychologist who continued to influence the development of behaviorism. His most important contributions were introducing the idea of radical behaviorism and defining operant conditioning.

Unlike Watson, Skinner believed that internal processes such as thoughts and emotions should be considered when analyzing behavior. The inclusion of thoughts and actions with behaviors is radical behaviorism. He believed that internal processes, like observable behavior, can be controlled by environmental variables and thus can be analyzed scientifically. The application of the principles of radical behaviorism is known as applied behavior analysis.

In 1938, Skinner published *The Behavior of Organisms*, a book that introduces the principles of operant conditioning and their application to human and animal behavior. The core concept of operant conditioning is the relationship between reinforcement and punishment, similar to Thorndike’s law of effect: Rewarded behaviors are more likely to be repeated, while punished behaviors are less likely to be repeated. Skinner expounded on Thorndike’s law of effect by breaking down reinforcement and punishment into five discrete categories (cf. Fig. 1):

- Positive reinforcement is adding a positive stimulus to encourage behavior.
- Escape is removing a negative stimulus to encourage behavior.
- Active avoidance is preventing a negative stimulus to encourage behavior.
- Positive punishment is adding a negative stimulus to discourage behavior.
- Negative punishment is removing a positive stimulus to discourage behavior.

Reinforcement encourages behavior, while punishment discourages behavior. Those who use operant conditioning use reinforcement and punishment in an effort to modify the subject’s behavior.

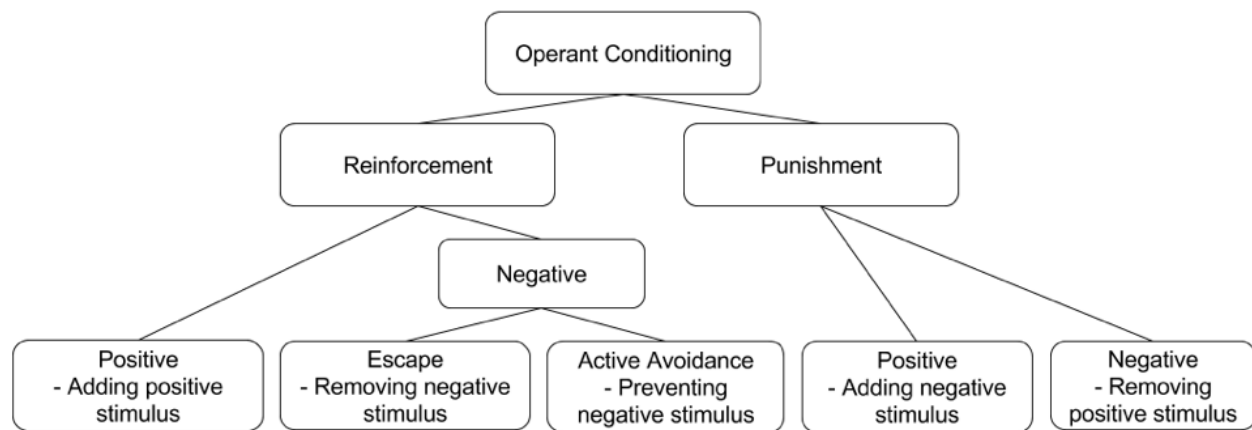


Figure 1. An overview of the five categories of operant conditioning.

Positive and negative reinforcements can be given according to different types of schedules. Skinner developed five schedules of reinforcement:

- Continuous reinforcement is applied when the learner receives reinforcement after every specific action performed. For example, a teacher may reward a student with a sticker for each meaningful comment the student makes.
- Fixed interval reinforcement is applied when the learner receives reinforcement after a fixed amount of time has passed. For example, a teacher may give out stickers each Friday to students who made comments throughout the week.
- Variable interval reinforcement is applied when the learner receives reinforcement after a random amount of time has passed. For example, a teacher may give out stickers on a random day each week to students who have actively participated in classroom discussion.
- Fixed ratio reinforcement is applied when the learner receives reinforcement after the behavior occurs a set number of times. For example, a teacher may reward a student with a sticker after the student contributes five meaningful comments.
- Variable ratio reinforcement is applied when the learner receives reinforcement after the behavior occurs a random number of times. For example, a teacher may reward a student with a sticker after the student contributes three to ten meaningful comments.

Skinner experimented using different reinforcement schedules in order to analyze which schedules were most effective in various situations. In general, he found that ratio schedules are more resistant to extinction than interval schedules, and variable schedules are more resistant than fixed schedules, making the variable ratio reinforcement schedule the most effective.

Skinner was a strong supporter of education and influenced various principles on the manners of educating. He believed there were two reasons for education: to teach both verbal and nonverbal behavior and to interest students in continually acquiring more knowledge. Based on his concept of reinforcement, Skinner taught that students learn best when taught by positive reinforcement and that students should be engaged in the process, not simply passive listeners. He hypothesized that students who are taught via punishment learn only how to avoid punishment. Although Skinner's doubtful view on punishment is important to the discipline in education, finding other ways to discipline are very difficult, so punishment is still a big part in the education system.

Skinner points out that teachers need to be better educated in teaching and learning strategies (Skinner, 1968). He addresses the main reasons why learning is not successful. The biggest reasons teachers fail to educate their students are because they are only teaching through showing and they are not reinforcing their students enough. Skinner gave examples of steps teachers should take to teach properly. A few of these steps include the following:

1. Ensure the learner clearly understands the action or performance.
2. Separate the task into small steps starting at simple and working up to complex.
3. Let the learner perform each step, reinforcing correct actions.
4. Regulate so that the learner is always successful until finally the goal is reached.
5. Change to random reinforcement to maintain the learner's performance (Skinner, 1968).

Criticisms and Limitations



While there are elements of behaviorism that are still accepted and practiced, there are criticisms and limitations of behaviorism. Principles of behaviorism can help us to understand how humans are affected by associated stimuli, rewards, and punishments, but behaviorism may oversimplify the complexity of human learning. Behaviorism assumes humans are like animals, ignores the internal cognitive processes that underlie behavior, and focuses solely on changes in observable behavior.

From a behaviorist perspective, the role of the learner is to be acted upon by the teacher-controlled environment. The teacher's role is to manipulate the environment to shape behavior. Thus, the student is not an agent in the learning process, but rather an animal that instinctively reacts to the environment. The teacher provides input (stimuli) and expects predictable output (the desired change in behavior). More recent learning theories, such as constructivism, focus much more on the role of the student in actively constructing knowledge.

Behaviorism also ignores internal cognitive processes, such as thoughts and feelings. Skinner's radical behaviorism takes some of these processes into account insofar as they can be measured but does not really try to understand or explain the depth of human emotion. Without the desire to understand the reason behind the behavior, the behavior is not understood in a deeper context and reduces learning to the stimulus-response model. The behavior is observed, but the underlying cognitive processes that cause the behavior are not understood. The thoughts, emotions, conscious state, social interactions, prior knowledge, past experiences, and moral code of the student are not taken into account. In reality, these elements are all variables that need to be accounted for if human behavior is to be predicted and understood accurately. Newer learning theories, such as cognitivism, focus more on the roles of emotion, social interaction, prior knowledge, and personal experience in the learning process.

Another limitation to behaviorism is that learning is only defined as a change in observable behavior. Behaviorism operates on the premise that knowledge is only valuable if it results in modified behavior. Many believe that the purpose of learning and education is much more than teaching everyone to conform to a specific set of behaviors. For instance, Foshay (1991) argues that "the one continuing purpose of education, since ancient times, has been to bring people to as full as realization as possible of what it is to be a human being" (p. 277). Behaviorism's focus on behavior alone may not achieve the purpose of education, because humans are more than just their behavior.

Conclusion



Behaviorism is a study of how controlled changes to a subject's environment affect the subject's observable behavior. Teachers control the environment and use a system of rewards and punishments in an effort to encourage the desired behaviors in the subject. Learners are acted upon by their environment, forming associations between stimuli and changing behavior based on those associations.

There are principles of behaviorism that are still accepted and practiced today, such as the use of rewards and punishments to shape behavior. However, behaviorism may oversimplify the complexity of human learning; downplay the role of the student in the learning process; disregard emotion, thoughts, and inner processes; and view humans as being as simple as animals.

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