

## YOU KNOW YOU HAVE MASTERED THE MAIN TOPICS IN THIS CHAPTER IF YOU ARE ABLE TO. . .

- ∞ Define learning.
- ∞ Explain what classical conditioning is, how it works, and how it was discovered.
- ∞ Describe the mechanisms of operant conditioning, its application in the real world, and the researchers who contributed to our understanding of the process.
- ∞ Introduce cognitive learning theory.
- ∞ Define observational learning and describe Bandura's classic experiments in the area of observational learning.

### RAPID REVIEW

**Learning** is the process that allows us to adapt to the changing conditions of the environment around us and is defined as any relatively permanent change in behavior brought about by experience or practice (as opposed to changes brought about by maturation). Ivan Pavlov, a Russian physiologist, discovered one of the simplest forms of learning called **classical conditioning**. In classical conditioning, an organism learn to make a reflex response to a stimulus other than the original stimulus that produced the response in the first place. The original stimulus is called the **unconditioned (or "unlearned") stimulus (UCS)** and the reflex response is the **unconditioned response (UCR)**. If a **neutral stimulus (NS)** is repeatedly paired with the UCS, it will eventually produce the same kind of reflexive response. At this point, the NS is called a **conditioned stimulus (CS)** and the response is called a **conditioned, or learned, response (CR)**. The repeated pairing of the NS and UCS is known as **acquisition**. In order for classical conditioning to occur, the CS must occur before the UCS, the CS and UCS must occur close together in time, the CS and UCS must be paired together repeatedly, and the CS should be distinctive. Two other principles of classical conditioning are **stimulus generalization**, the ability of a stimulus that resembles the CS to produce a CR and **stimulus discrimination**, learning to respond to different stimuli in different ways. In classical conditioning, **extinction** occurs after the CS is repeatedly presented without the UCS and no longer produces a CR. **Spontaneous recovery** occurs when the CS is presented after being absent for a period of time and produces a mild CR. When a powerful conditioned stimulus is paired with a neutral stimulus, the conditioned stimulus itself can function as a UCS and turn the neutral stimulus into a second conditioned stimulus. This process is called **higher-order conditioning**.

John Watson demonstrated a particular type of classical conditioning called **conditional emotional response** with Little Albert and his learned phobia of white rats. **Vicarious conditioning** occurs when a person becomes classically conditioned simply by watching someone else respond to a stimulus. **Conditioned taste aversions** are a unique form of classical conditioning that can occur with only one neutral stimulus – unconditioned stimulus pairing. Conditioning is believed to occur so rapidly due to the **biological preparedness** of most mammals. Pavlov suggested that classical conditioning works through the process of **stimulus substitution**, in that the close pairing in time of the CS with the UCS eventually leads to the CS serving as a substitute stimulus for the UCS and activating the same brain area as the UCS. Psychologists who agree with the **cognitive perspective**, such as Robert Rescorla, suggested that the CS must provide some information about the upcoming UCS and that it is this expectancy that causes the association to occur.

**Operant conditioning** is a type of learning more strongly associated with voluntary behavior and is based on Edward Thorndike's work with cats and the puzzle box. Based on his research, Thorndike formulated the **Law of Effect** which states that if a response is followed by a pleasurable consequence it will tend to be repeated and if a response is followed by an unpleasant consequence it will tend not to be repeated. B.F. Skinner expanded on Thorndike's Law of Effect and coined the term operant conditioning for this type of learning, since the term **operant** refers to any voluntary behavior. While classical conditioning focuses on what happens *before* the response, the key to operant conditioning is what

happens *after* the response, or in other words, the consequence. **Reinforcement** is a consequence that is pleasurable and strengthens the response that came before it. There are two types of reinforcers, **primary reinforcers** satisfy basic needs and don't need to be learned. **Secondary reinforcers** get their reinforcing power through prior associations with a primary reinforcer and thus are learned. Reinforcement works by adding a pleasurable consequence after a response occurs (**positive reinforcement**) or removing something unpleasant after a response occurs (**negative reinforcement**). Both positive and negative reinforcement increase the likelihood that the response will occur again.

**Punishment**, on the other hand, always decreases the likelihood of a response. Punishment is any consequence of a response that causes that response to be less likely to happen again. While reinforcement strengthens a response that already exists, the goal of punishment is often to eliminate the response, which is usually a much harder task. Typically punishment only temporarily suppresses the response. **Punishment by application** describes the situation in which a response is followed by the addition of something unpleasant. Punishment by application is not the most effective way to modify behavior and has a number of serious drawbacks. **Punishment by removal** occurs when a response is followed by the removal of something pleasant. Punishment can be made more effective if it is administered immediately after the undesired behavior, is administered consistently, and is paired with reinforcement for the right behavior.

**Shaping** involves the use of operant conditioning to reward **successive approximations** until the desired response is obtained. Operant conditioning has several parallels with classical conditioning such as, **extinction** involves the removal of the reinforcement and **spontaneous recovery** occurs when an organism attempts a previously learned response in order to receive a reward. In addition, a **discriminative stimulus** is defined as any stimulus that provides an organism with a signal or cue for making a certain response in order to get reinforcement. In the lab, researchers found that even though animals could be operantly conditioned to perform certain tasks, they often had a tendency to go back to their genetic, or natural, way of doing things. This tendency to revert to genetically controlled patterns is called **instinctive drift**.

An important principle that Skinner discovered is that the timing of reinforcement can make a significant difference on how fast a response is learned. **Continuous reinforcement** occurs when a reinforcer is presented after every response. **Partial reinforcement** occurs when a reinforcer is given after some, but not all, of the correct responses. Partial reinforcement takes longer to go through extinction, or in other words, is more resistant to extinction. This is known as the **partial reinforcement effect**. The timing of partial reinforcement is referred to as the **schedule of reinforcement**. There are four different schedules of reinforcement: **fixed ratio**, **variable ratio**, **fixed interval**, and **variable interval**. A ratio schedule occurs when a reinforcer depends on the number of responses that are made. In an interval schedule, reinforcers are presented after a certain period of time has passed. If the reinforcers are always given after a set period of time or number of responses, the schedule is said to be fixed. If the reinforcer is given after varying periods of time or numbers of responses the schedule is labeled as variable.

The term **behavior modification** is used to describe the process of using operant conditioning to change behavior. A **token economy** involves the use of tokens to modify behavior. **Time-outs** are an example of punishment by removal where the child is removed from a situation where they could get attention from others. **Applied behavior analysis or ABA** uses shaping techniques to obtain a desired behavior and is particularly successful with children with disorders such as autism. The technique called **biofeedback** uses operant conditioning to modify involuntary behaviors such as blood pressure and heart rate. When this technique is used to try to change brain wave activity it is referred to as **neurofeedback**.

**Cognitive learning** theorists focus on the mental processes (or cognitions) that occur during learning. **Edward Tolman** studied the phenomenon of **latent learning** in rats placed in a maze but not reinforced for finding their way out. He found that when the rats were subsequently reinforced, learning occurred much faster than for rats who had never been in the maze. **Martin Seligman** studied a phenomenon he called **learned helplessness** in dogs. He found that dogs classically conditioned to a tone followed by a painful shock would not later try to escape the shock when provided the opportunity. Seligman extended the concept of learned helplessness to humans in an attempt to explain depression. A third cognitive

psychologist, Wolfgang Köhler, studied the phenomenon of **insight learning** in animals. Köhler believed insight learning involved a sudden perception of relationships that could not be gained through trial and error learning. All three theories of learning are related in that they focus on what's going on inside the learner's mind during the learning process as opposed to the external stimuli and rewards of classical and operant conditioning.

A third category of learning is that of **observational learning**, or the learning of a new behavior by observing someone else who is performing that behavior. The term **learning/performance distinction** describes the fact that learning can take place without actual performance. Albert Bandura has been a major contributor to the study of observational learning and conducted a series of classic studies observing children's learned behaviors with a blow-up "Bobo" doll. Bandura concluded that four elements were needed for observational learning to occur, the four elements are attention, memory, imitation, and motivation.

## STUDY HINTS

1. Many students get confused with the terms of classical conditioning. There are four major components to this type of learning, unconditioned stimulus (UCS), conditioned stimulus (CS), unconditioned response (UCR) and conditioned response (CR). The best way to keep these terms straight is to ask yourself two questions.

1. **Is the event I am interested in a stimulus or a response?**

2. **Is the stimulus/response something that was learned or something that occurs naturally, by instinct.**

The first question is the easiest way to break down the information. If an event is a stimulus, it will cause something else to happen. List some examples of stimuli here.

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*You might have mentioned any number of stimuli including events such as a bright light, a puff of air, a loud siren, a soft whisper, a touch on your arm, the smell of cookies, a written word. The list is quite large. A stimulus is any event that causes a response.*

Now that you have a good feeling for what stimuli are, try listing some examples of some possible responses.

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*You might have mentioned events such as blinking your eyes, laughing, crying, jumping up, heart rate increasing, feeling scared, raising your hand, driving faster. A response is any behavior (inside or outside of your body) that can be observed.*

Once you determine if your event is a stimulus or response, the second question is fairly easy. Is the stimulus something the subject had to learn how to respond to? If so, then it would be a learned or conditioned stimulus. If the stimulus is something that causes the response automatically, then it is an unlearned or unconditioned stimulus. The same rule applies for the responses. If this is a response that does not occur by instinct, but instead has been learned through experience, then this is a learned or conditioned response. If the response happens the first time you encounter the stimulus, as an instinct, then it is an unlearned or unconditioned response. Now try some examples and see how you do.

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A puff of air is aimed at your eye and you blink.  
The event we are interested in is: the blink

Question 1: Is this a stimulus or a response?

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*If you wrote response, then you are correct.  
Blinking is a behavior that we can observe.*

Question 2: Is this response learned or unlearned?

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*If you wrote unlearned, then you are correct.  
Blinking to a puff of air is an instinct.*

Now you can fill in the blanks.

The first answer tells you this is a response, so it is either a CR or a UCR.

The second answer tells you this is unlearned or unconditioned, so it must be a UCR.

Now circle the right term:

|                  | <u>Stimulus</u> | <u>Response</u> |
|------------------|-----------------|-----------------|
| <u>Learned</u>   | CS              | CR              |
| <u>Unlearned</u> | UCS             | UCR             |

Try some more on your own.

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A picture of a piece of chocolate cake causes your mouth to water.  
The event we are interested in is: the picture of the cake

Question 1: Is this a stimulus or a response?

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Question 2: Is this response learned or unlearned?

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Now circle the right term:

	<u>Stimulus</u>	<u>Response</u>
<u>Learned</u>	CS	CR
<u>Unlearned</u>	UCS	UCR

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Your heart speeds up as you see a police car pull up behind you.

The event we are interested in is: your heart speeding up

Question 1: Is this a stimulus or a response?

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Question 2: Is this response learned or unlearned?

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Now select the right term:

|                  | <u>Stimulus</u> | <u>Response</u> |
|------------------|-----------------|-----------------|
| <u>Learned</u>   | CS              | CR              |
| <u>Unlearned</u> | UCS             | UCR             |

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A loud noise causes someone to jump.

The event we are interested in is: the loud noise

Question 1: Is this a stimulus or a response?

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Question 2: Is this response learned or unlearned?

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Now select the right term:

|                  | <u>Stimulus</u> | <u>Response</u> |
|------------------|-----------------|-----------------|
| <u>Learned</u>   | CS              | CR              |
| <u>Unlearned</u> | UCS             | UCR             |

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*You should have selected the following*

*blinking your eyes is a UCR*

*the piece of cake is a CS*

*your heart speeding up is a CR*

*the loud noise is a UCS*

2. Negative reinforcement and punishment are often confused. In negative reinforcement, something bad is taken away. In punishment by removal, something good or desirable is taken away. Most people would enjoy being negatively reinforced but would be upset about being punished. Work through the following scenarios to determine whether the person is being negatively reinforced or punished. The first one has been completed for you.

| Behavior                                                   | Consequence                               | Is something good or bad taken away? | Is this negative reinforcement or punishment? | Will the behavior increase or decrease? |
|------------------------------------------------------------|-------------------------------------------|--------------------------------------|-----------------------------------------------|-----------------------------------------|
| Taking an aspirin for a headache.                          | Headache goes away.                       | <i>bad</i>                           | <i>negative reinforcement</i>                 | <i>increase</i>                         |
| Running a red light.                                       | Driver's license is taken away.           |                                      |                                               |                                         |
| Cleaning your room so that you are no longer grounded.     | You are no longer grounded.               |                                      |                                               |                                         |
| Drinking coffee in the morning when you are very tired.    | You no longer feel tired.                 |                                      |                                               |                                         |
| Staying out past your curfew.                              | Your parents ground you.                  |                                      |                                               |                                         |
| Getting in a fight with a friend.                          | Your friend will not talk to you anymore. |                                      |                                               |                                         |
| Fastening your seatbelt when the buzzer is making a noise. | The buzzer stops.                         |                                      |                                               |                                         |
| Driving your car until it runs out of gas.                 | You can't drive your car anymore.         |                                      |                                               |                                         |
| Your boyfriend nags you until you take him out to dinner.  | The nagging stops.                        |                                      |                                               |                                         |