Recall a situation in which you taught another person a skill or how to do a task. Write a brief account about it in your journal. Make sure to include a description of how reinforcement, punishment, or modeling were part of your teaching strategy.
Why did the participants choose purple pens over green in the experiment above? This experiment took place in 1982 and was based on a principle that is widely used today in television commercials. Pairing a product with pleasant sensations motivates consumers to make a choice without an awareness of why they made that choice.

The Russian physiologist Ivan Pavlov called what was taking place in similar situations *conditioning*. In **classical conditioning**, a person’s or animal’s old response becomes attached to a new stimulus. This is one example of learning. What is learning? *Learning* is a relatively permanent change in a behavioral tendency that results from experience.

---

**classical conditioning**: a learning procedure in which associations are made between a natural stimulus and a neutral stimulus.
Pavlov’s discovery of this type of learning—the principle of classical conditioning—was accidental. Around the turn of the century, Pavlov had been studying the process of digestion. Pavlov wanted to understand how a dog’s stomach prepares to digest food when something is placed in its mouth. Then he noticed that the mere sight or smell of food was enough to start a hungry dog salivating. Pavlov became fascinated with how the dog anticipated the food and how salivation occurred before the food was presented, and he decided to investigate.

**CLASSICAL CONDITIONING**

Pavlov began his experiments by ringing a tuning fork and then immediately placing some meat powder on the dog’s tongue. He chose the tuning fork because it was a neutral stimulus—that is, one that had nothing to do with the response to meat (salivation) prior to conditioning. After only a few times, the dog started salivating as soon as it heard the sound, even if the food was not placed in its mouth (see Figure 9.1). Pavlov demonstrated that a neutral stimulus (here, tuning fork or bell’s ring) can cause a formerly unrelated response. This occurs if it is presented regularly just before the stimulus (here, food) that normally brings about that response (here, salivation).

Pavlov used the term unconditioned to refer to stimuli and to the automatic, involuntary responses they caused. Such responses include blushing, shivering, being startled, or salivating. In the experiment, food was the unconditioned stimulus (UCS)—an event that leads to a certain, predictable response usually without any previous training. Food normally causes salivation. A dog does not have to be taught to salivate when it smells meat. The salivation is an unconditioned response (UCR)—a reaction that occurs naturally and automatically when the unconditioned stimulus is presented, in other words, a reflex.

Under normal conditions, the sound of a tuning fork would not cause salivation. The dog had to be taught, or conditioned, to associate this sound with food. An ordinarily neutral event that, after training, leads to a response such as salivation is termed a conditioned stimulus (CS). The salivation it causes is a conditioned response (CR). A conditioned response is learned. A wide variety of events may serve as conditioned stimuli for salivation—the sight of food, an experimenter entering the room, the sound of a tone, or a flash of light. A number of different reflex responses that occur automatically following an unconditioned stimulus (UCS) can be conditioned to occur following the correct conditioned stimulus (CS).

**GENERAL PRINCIPLES OF CLASSICAL CONDITIONING**

Classical conditioning helps animals and humans adapt to the environment. It also helps humans and animals avoid danger. Psychologists have investigated why and in what circumstances classical conditioning occurs, leading to a greater understanding of the principles of classical conditioning.
Pavlov's students used this apparatus. The tube leading from the dog's mouth allowed saliva to be measured and recorded on the kymograph. What was the point of this experiment?

**Before Conditioning**
- Neutral stimulus: No salivation
- Some stimuli are neutral (neutral stimulus). The dog shows no salivary response to the bell's ring.

**Before Conditioning**
- Food (UCS): Salivation (UCR)
- Some stimuli are already meaningful (unconditioned stimulus); for example, food causes the dog to salivate.

**During Conditioning**
- Bell (CS) and meat (UCS) are presented in close sequence.

**After Conditioning**
- The bell was neutral before, but now can trigger salivation.

<table>
<thead>
<tr>
<th>Before Conditioning</th>
<th>During Conditioning</th>
<th>After Conditioning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Neutral stimulus</strong></td>
<td><strong>Bell (CS)</strong></td>
<td><strong>The bell (CS)</strong></td>
</tr>
<tr>
<td><strong>No salivation</strong></td>
<td><strong>Salivation (UCR)</strong></td>
<td><strong>Salivation (CR)</strong></td>
</tr>
<tr>
<td><strong>Some stimuli are neutral</strong></td>
<td><strong>Food (UCS)</strong></td>
<td><strong>Neutral stimulus</strong></td>
</tr>
<tr>
<td><strong>No salivation</strong></td>
<td></td>
<td><strong>Before Conditioning</strong></td>
</tr>
<tr>
<td><strong>Some stimuli are already meaningful</strong></td>
<td></td>
<td><strong>After Conditioning</strong></td>
</tr>
<tr>
<td><strong>Salivation (UCR)</strong></td>
<td></td>
<td><strong>Bell (CS)</strong></td>
</tr>
<tr>
<td><strong>The bell (CS) and meat (UCS)</strong></td>
<td></td>
<td><strong>Salivation (CR)</strong></td>
</tr>
<tr>
<td><strong>Are presented in close sequence.</strong></td>
<td></td>
<td><strong>Neutral stimulus</strong></td>
</tr>
</tbody>
</table>

Kymograph records dog's response to stimulus.

Fistula (tube) is implanted to collect saliva.

Harness holds dog in place.
Acquisition

Acquisition of a classically conditioned response generally occurs gradually. With each pairing of the conditioned stimulus (CS) and the unconditioned stimulus (UCS), the conditioned response (CR)—or learned response—is strengthened. In Pavlov’s experiment, the more frequently the tuning fork was paired with the food, the more often the tone brought about salivation—the conditioned response.

The timing of the association between the conditioned stimulus (the tone) and the unconditioned stimulus (food) also influences learning. Pavlov tried several different conditioning procedures in which he varied the time between presenting the conditioned stimulus and the unconditioned stimulus. He found that classical conditioning was most reliable and effective when the conditioned stimulus was presented just before the unconditioned stimulus. He found that presenting the conditioned stimulus (CS) about half a second before the unconditioned stimulus (UCS) would yield the strongest associations between the tuning fork and the meat.

Generalization and Discrimination

In the same set of experiments, Pavlov also explored the processes of generalization and discrimination. Generalization occurs when an animal responds to a second stimulus similar to the original CS without prior training with the second stimulus. When Pavlov conditioned a dog to salivate at the sight of a circle (the CS), he found that the dog would salivate when it saw an oval as well. The dog had generalized its response to include a similar stimulus. Pavlov was later able to do the opposite, teaching the dog to respond only to the circle by always pairing meat powder with the circle but never pairing it with the oval. He thus taught the dog discrimination—the ability to respond differently to different stimuli.

Generalization and discrimination are complementary processes and are part of your everyday life. Both may occur spontaneously in some situations, and both can be taught in others. For example, assume a friend has come to associate the sound of a dentist’s drill (CS) with a fearful reaction (CR). After several exposures to a dentist’s drill, your friend may find that he or she has generalized this uncomfortable feeling to the sound of other, nondental drills. Later, your friend may learn to discriminate between the sound of a dentist’s drill and other drills.
Extinction and Spontaneous Recovery

A classically conditioned response, like any other behavior, is subject to change. Pavlov discovered that if he stopped presenting food after the sound of the tuning fork, the sound gradually lost its effect on the dog. After he repeatedly struck the tuning fork without giving food, the dog no longer associated the sound with the arrival of food—the sound of the tuning fork no longer caused the salivation response. Pavlov called this effect extinction because the CR had gradually died out.

Even though a classically conditioned response may be extinguished, this does not mean that the CR has been completely unlearned. If a rest period is given following extinction, the CR may reappear when the CS is presented again but not followed by a UCS. This spontaneous recovery does not bring the CR back to original strength, however. Pavlov’s dogs produced much less saliva during spontaneous recovery than they did at the end of their original conditioning. Alternating lengthy rest periods and the tone without food caused more rapid loss of salivation each time and less recovery the next time the CS was presented.

A good example of extinction and spontaneous recovery can occur if you are involved in a car accident. Following the accident it may at first be difficult to drive again. You might even find it difficult to open the door and get into the car. As you approach the car, your hands begin to shake and your knees get shaky as well. Your heartbeat even increases as you get nearer. After a few days, opening the door and getting into the car do not bother you as much. Several months go by and the fears of the car and the accident have been extinguished. One day, several months later, as you begin to approach the car, your heart begins to race and your knees and hands begin to shake. You have had a spontaneous recovery of the fear reaction.

Profiles In Psychology

Ivan Petrovich Pavlov
1849–1936

“While you are experimenting, do not remain content with the surface of things. Don’t become a mere recorder of facts, but try to penetrate the mystery of their origin.”

Born in central Russia, Pavlov abandoned his family’s hopes that he would become a priest, and instead pursued science. After receiving his doctoral degree from the University of St. Petersburg in 1897, he began performing his own research into digestion and blood circulation. The work that made Pavlov famous actually began as a study in digestion. Pavlov discovered that salivation and the action of the stomach were closely linked to reflexes in the autonomic nervous system. By studying conditioned reflexes, it became possible to examine human behavior objectively, instead of resorting to subjective methods.

Pavlov distrusted the new science of psychiatry. He did think, though, that conditioned reflexes could explain the behavior of psychotic people. He believed that those who withdrew from the world may associate all stimuli with possible injury or threat.

extinction: the gradual disappearance of a conditioned response when the conditioned stimulus is repeatedly presented without the unconditioned stimulus
CLASSICAL CONDITIONING AND HUMAN BEHAVIOR

John B. Watson and Rosalie Rayner (1920) used conditioning on a human infant in the case of Little Albert (see Case Studies, page 249). Watson questioned the role that conditioning played in the development of emotional responses in children. He and Rayner attempted to condition an 11-month-old infant named Albert to fear laboratory rats. At first Albert happily played with the rats. When Watson struck a steel bar with a hammer to produce a loud sound, Albert began to display a fear response. Eventually Albert showed fear each time he saw the rat even though the loud sound was not repeated. Although this demonstration is now viewed as unethical (because the researchers taught Little Albert to fear things that he previously had no fear of), it provided evidence that emotional responses can be classically conditioned in humans. In this case the UCS is the loud noise, the UCR is fear, the CS is the rat, and the CR is fear.

Using the principle of classical conditioning, O. Hobart and Mollie Mowrer (1938) discovered a practical solution to the problem of bed-wetting. One reason bed-wetting occurs is that children do not wake up during the night to body signals that they have a full bladder. The Mowrers developed a device known as the bell and pad. It consists of two metallic sheets perforated with small holes and wired to a battery-run alarm. The thin, metal sheets—wrapped in insulation or padding—are placed under the child’s bedsheets. When the sleeping child moistens the sheet with the first drops of urine, the circuit closes, causing the alarm to go off and wake the child. The child can then use the bathroom.

The alarm is the unconditioned stimulus that produces the unconditioned response of waking up. The sensation of a full bladder is the conditioned stimulus that, before conditioning, did not produce wakefulness. After several pairings of the full bladder (CS) and the alarm (UCS), the child is able to awaken to the sensation of a full bladder without the help of the alarm. This technique has proven to be a very effective way of treating bed-wetting problems.

Taste Aversions

Suppose you go to a fancy restaurant. You decide to try an expensive appetizer you have never eaten, for instance, snails. Then suppose that, after dinner, you go to a concert and become violently ill. You will probably develop a taste aversion; you may never be able to look at another snail without becoming at least a little nauseated.

Your nausea reaction to snails is another example of classical conditioning. What makes this type of conditioning interesting to learning theorists is that when people or other animals become ill, they seem to decide, “It must have been something I ate,” even if they have not eaten...
for several hours. It is unlikely that the concert hall in which you were sick will become the conditioned stimulus, nor will other stimuli from the restaurant—the wallpaper pattern or the type of china used. What is more, psychologists can even predict which part of your meal will be the CS—you will probably blame a new food. Thus, if you get sick after a meal of salad, steak, and snails, you will probably learn to hate snails, even if they are really not the cause of your illness.

John Garcia and R.A. Koelling (1966) first demonstrated this phenomenon with rats. The animals were placed in a cage with a tube containing flavored water. Whenever a rat took a drink, lights flashed and clicks sounded. Then, some of the rats were given an electric shock after they drank. All these rats showed traditional classical conditioning—the lights and the sounds became conditioned stimuli, and the rats tried to avoid them in order to avoid a shock. The other rats were not shocked but were injected with a drug that made them sick after they drank and the lights and sounds occurred. These rats developed an aversion not to the lights or the sounds but only to the taste of the flavored water.

This special relationship between food and illness was used in a study that made coyotes avoid sheep by giving them a drug to make them sick when they ate sheep (Gustavson et al., 1974). This application is important because sheep farmers in the western United States would like to eliminate the coyotes that threaten their flocks, while naturalists are opposed to killing the coyotes. The psychologists realized that coyotes could be trained to eat other kinds of meat and thus learn to coexist peacefully with sheep.

In summary, classical conditioning helps animals and humans predict what is going to happen. It provides information that may be helpful to their survival. Learning associated with classical conditioning may aid animals in finding food or help humans avoid pain or injury. For example, parents may condition an infant to avoid a danger such as electrical outlets by shouting “NO!” and startling the infant each time he approaches an outlet. The infant fears the shouts of the parents, and eventually the infant may fear the outlet even when the parents do not shout.
Classical conditioning is an example of a behaviorist theory. *Behaviorism* is the attempt to understand behavior in terms of relationships between observable stimuli and observable responses. *Behaviorists* are psychologists who study only those behaviors that they can observe and measure. Behaviorists are not concerned with unobservable mental processes. They emphasize actions instead of thoughts. We will discuss another behaviorist learning theory, operant conditioning, in the next section. Classical conditioning is a process by which a stimulus that previously did not elicit a response comes to elicit a response after it is paired with a stimulus that naturally elicits a response. In contrast, operant conditioning is a process by which the consequences of a response affect the likelihood that the response will occur again (see Figure 9.4).

### Classical Conditioning vs. Operant Conditioning

<table>
<thead>
<tr>
<th>Classical Conditioning</th>
<th>Operant Conditioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Always a specific stimulus (UCS) that elicits the desired response</td>
<td>1. No identifiable stimulus; learner must first respond, then behavior is reinforced</td>
</tr>
<tr>
<td>2. UCS does not depend upon learner’s response</td>
<td>2. Reinforcement depends upon learner’s behavior</td>
</tr>
<tr>
<td>3. Learner responds to its environment</td>
<td>3. Learner actively operates on its environment</td>
</tr>
</tbody>
</table>

Classical conditioning is an example of a behaviorist theory. *Behaviorism* is the attempt to understand behavior in terms of relationships between observable stimuli and observable responses. *Behaviorists* are psychologists who study only those behaviors that they can observe and measure. Behaviorists are not concerned with unobservable mental processes. They emphasize actions instead of thoughts. We will discuss another behaviorist learning theory, operant conditioning, in the next section. Classical conditioning is a process by which a stimulus that previously did not elicit a response comes to elicit a response after it is paired with a stimulus that naturally elicits a response. In contrast, operant conditioning is a process by which the consequences of a response affect the likelihood that the response will occur again (see Figure 9.4).

### Assessment

**1. Review the Vocabulary**  
What is the difference between a neutral stimulus and an unconditioned stimulus?

**2. Visualize the Main Idea**  
In a graphic organizer similar to the one below, describe the process of classical conditioning.

**3. Recall Information**  
How are generalization and discrimination related to classical conditioning?

**4. Think Critically**  
Under what conditions might a conditioned response become extinct?

**5. Application Activity**  
You have a friend who inhales noisily when standing next to you and then puffs air into your eye. You find that you now blink when you hear your friend inhale. Identify and describe the neutral stimulus, the UCS, UCR, CS, and CR in your behavior.
was struck, Albert began to whimper. The noise, the unconditioned stimulus, brought about a naturally unconditioned response, fear. After only a few such pairings, the rat became a conditioned stimulus that elicited a conditioned response, fear.

Five days after Watson and Rayner conditioned Albert to fear rats, they presented him with blocks, a rabbit, a rat, and a dog, each alone. They also showed him a number of other stimuli, including a Santa Claus mask. Albert reacted fearfully to all but the blocks. His conditioned fear response generalized to include the rabbit and all of the white furry objects he was shown, but not to any dissimilar toys.

Results: One of the most frequent criticisms of the experiment was that Watson and Rayner taught a well-adjusted child to be fearful. Apparently, the researchers knew at least one month ahead of time that Albert would be leaving the study, and yet they made no attempt to extinguish his conditioned fears (Harris, 1979). Psychologists today are unable to repeat the Little Albert study because of the ethical standards of the APA (see Chapter 2).

One of Watson’s students, Mary Cover Jones (1924, 1974), developed an extinction procedure called counterconditioning to reduce people’s existing fears. Peter was a boy who was extremely fearful of rabbits. Jones helped Peter eliminate his fear by pairing the feared object (the rabbit) with pleasant experiences, such as eating ice cream or receiving special attention.

Analyzing the Case Study
1. Did the results of Watson and Rayner’s experiment support their hypothesis? Explain.
2. How did Albert’s response become generalized?
3. Critical Thinking How were the principles of classical conditioning used to reduce Peter’s fear of rabbits?
Suppose your dog is wandering around the neighborhood, sniffing trees, checking garbage cans, looking for a squirrel to chase. A kind neighbor sees the dog and tosses a bone out the kitchen door to it. The next day, the dog is likely to stop at the same door on its rounds, if not go to it directly. Your neighbor produces another bone, and another the next day. Your dog becomes a regular visitor.

Both stories are examples of **operant conditioning**—that is, learning from the consequences of behavior. The term *operant* is used because operant conditioning: learning in which a certain action is reinforced or punished, resulting in corresponding increases or decreases in occurrence
the subject (the depressed woman and the wandering dog in our examples) operates on or causes some change in the environment. This produces a result that influences whether the subject will operate or respond in the same way in the future. Depending on the effect of the operant behaviors, the learner will repeat or eliminate these behaviors to get rewards or avoid punishment.

How does operant conditioning differ from classical conditioning? One difference lies in how the experimenter conducts the experiment. In classical conditioning, the experimenter presents the CS and UCS independent of the participant’s behavior. The UCR is elicited. Reactions to the CS are then observed. In operant conditioning, the participant must engage in a behavior in order for the programmed outcome to occur. In other words, operant conditioning is the study of how voluntary behavior is affected by its consequences (see Figure 9.5).

**REINFORCEMENT**

Burrhus Frederic (B.F.) Skinner has been the psychologist most closely associated with operant conditioning. He believed that most behavior is influenced by a person’s history of rewards and punishments. Skinner trained (or shaped) rats to respond to lights and sounds in a special enclosure called a Skinner box (see Figure 9.6). To conduct this experiment, a rat is placed inside the box. The rat must learn how to solve the problem of how to get food to appear in the cup. (This can be done by pressing a bar on the cage wall.) The rat first explores the box. When the rat moves toward the bar, the experimenter drops food into the cup. The food is important to the hungry rat. After the rat begins to approach the cup for food consistently, the experimenter begins to drop food into the cup only if the rat presses the bar. Eventually, when the rat is hungry it will press the bar to get food.

The food that appears in the cup is a reinforcer in this experiment. Reinforcement can be defined as a stimulus or event that increases the likelihood that behavior will be repeated. Whether or not a particular stimulus is a reinforcement depends on the effect the stimulus has on the learner. Examples of reinforcers that people usually respond to are social approval, money, and extra privileges.

Suppose you want to teach a dog to shake hands. One way would be to give the animal a treat every time it lifts its paw up to you. The treat is called a positive reinforcer. In this example, the dog will eventually learn to shake hands to get a reward.

Your dog will stop shaking hands when you forget to reward it for the trick. Extinction will occur because the reinforcement is withheld, but

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**Reading Check**

How is operant conditioning different from classical conditioning?

**reinforcement**: stimulus or event that follows a response and increases the likelihood that the response will be repeated

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**Figure 9.5**  
Operant Conditioning

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Positive reinforcer</th>
<th>Negative reinforcer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changed behavior</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

We do not just react to our environment, we behave in ways that seem designed to produce certain environmental changes. For example, I flip the light switch to illuminate a room. I say, “Please, pass the salt,” to get the salt shaker. **According to the diagram, what must happen for behavior to change?**
it will take a period of time. (Remember, in classical conditioning, extinction is the disappearance of a conditioned response when an unconditioned stimulus no longer follows a conditioned stimulus.) In fact, for a while after you stop rewarding the dog, it will probably become impatient, bark, and paw even more insistently than it did before, until it gives up shaking hands. Eventually the dog will try to shake hands again, indicating that spontaneous recovery has occurred.

Whereas positive reinforcement occurs when something the animal wants (a treat for the dog) is added after an action, negative reinforcement occurs when something unpleasant is taken away if the animal performs an action.

Primary and Secondary Reinforcers

Reinforcers come in many varieties. Some reinforcers are primary and some are secondary. A primary reinforcer is one that satisfies a biological need such as hunger, thirst, or sleep. A secondary reinforcer is one that has been paired with a primary reinforcer and through classical conditioning has acquired value and reinforcement. With conditioning, almost any stimulus can acquire value and become a secondary reinforcer.

One experimenter (Wolfe, 1936) demonstrated this with chimpanzees. Poker chips have no value for chimps—they are not edible and they are not very much fun to play with. This experimenter, however, used operant and classical conditioning to teach chimps to value poker chips as much as humans value money. He provided the animals with a “Chimp-O-Mat” that dispensed peanuts or bananas, which are primary reinforcers. To obtain food, the chimps had to pull down on a heavily weighted bar to obtain poker chips, then insert the chips in a slot in the machine. With repetition, the poker chips became conditioned reinforcers. Their value was evident from the fact that the chimpanzees would work for them, save them, and sometimes try to steal them from one another.

Money is the best example of a secondary reinforcer in human society. You have learned that getting money is associated with buying food or material things. Other examples of secondary reinforcers would include praise, status, and prestige. All of these items are associated with a primary reinforcer and have acquired value, so they reinforce certain types of behavior when used.
SCHEDULES OF REINFORCEMENT

One important factor in operant conditioning is the timing and frequency of reinforcement. Behavior that is reinforced every time it occurs is said to be on a **continuous schedule** of reinforcement. You might suppose that behavior would best be maintained by reinforcing every response. However, when positive reinforcement occurs only intermittently, or on a **partial schedule**, the responses are generally more stable and last longer once they are learned. A person or animal that is continuously reinforced for a behavior tends to maintain that behavior only when the reinforcement is given. If the reinforcement stops, the behavior quickly undergoes extinction. For example, a rat learns to press a bar most rapidly when it receives food each time it does so. When the rat stops receiving food each time it presses the bar, however, it quickly stops its bar-pressing. Behaviors that are acquired on partial schedules of reinforcement are established more slowly but are more persistent. For example, a rat that is only sometimes rewarded with food for pressing a bar will continue to press even though no food appears. Rats and humans that are reinforced on partial schedules of reinforcement cannot always predict when the next reinforcement will occur, so they learn to be persistent.

Skinner discovered the strength of partial reinforcement when his apparatus kept breaking down. Skinner found that the rats kept responding even though they were reinforced randomly. In fact, the rats responded with even greater endurance.

Although intermittent reinforcement may be arranged in a number of ways, four basic methods, or schedules, have been studied in the laboratory (see Figure 9.7). Schedules of partial reinforcement may be based either on the number of correct responses that the animal makes between reinforcements (ratio schedule) or on the amount of time that elapses before reinforcement is given (interval schedule). In either case, reinforcement may appear on a **fixed**, or predictable, schedule or on a **variable**, or unpredictable, schedule. The four basic schedules result from the combination of these four possibilities. People and animals respond differently to each type.

- In a **fixed-ratio schedule**, reinforcement depends on a specified quantity of responses, such as rewarding every fourth response. The student who receives a good grade after completing a specified amount of work and the typist who is paid by the number of pages

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**Quick Lab**

What reinforcement schedules operate in your classroom?

Do you think that students would do schoolwork if there were no grading system? What reinforcements would operate if grades were abolished?

**Procedure**

1. Identify the types of reinforcers that operate in your classroom.
2. Make a chart that lists the type of reinforcer (primary, secondary, positive, negative) and the classroom behavior it usually elicits.
3. Devise a system for your classroom that could replace the existing reinforcers with new ones (and achieve the same results).

**Analysis**

1. Describe how the new reinforcers operate.
2. Indicate what responses the new reinforcers are supposed to elicit.

See the Skills Handbook, page 622, for an explanation of designing an experiment.

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**fixed-ratio schedule:** a pattern of reinforcement in which a specific number of correct responses is required before reinforcement can be obtained.
completed are on fixed-ratio schedules. People tend to work hard on fixed-ratio schedules. Another example would be dentists who get paid $75 for each cavity repaired or filled.

- A **variable-ratio schedule** does not require that a fixed or set number of responses be made for each reinforcement, as in the fixed-ratio schedule. Rather, the number of responses needed for a reinforcement changes from one time to the next. Slot machines are a good example of a variable-ratio schedule. They are set to pay off after a varying number of attempts at pulling the handle. Generally, animals on variable-ratio schedules of reinforcement tend to work or respond at a steady, high rate. Since the reinforcement is unpredictable, there is typically no pause after a reward because it is possible that a reward will occur on the very next response. Door-to-door salespeople and individuals who do telephone surveys are also operating on variable-ratio schedules since they never know how many doorbells they will have to ring or how many calls they will have to make before they make a sale or find someone who will answer the survey.

- On a **fixed-interval schedule**, the first correct response after a specified amount of time is reinforced. The time interval is always the same. Once animals gain experience with a fixed-interval reinforcement schedule, they adjust their response rates. Since no reinforcement occurs for a period of time no matter what their behavior, they learn to stop responding immediately after reinforcement is given and then begin to respond again toward the end of the interval. The result is regular, recurring periods of inactivity followed by short bursts of responding. Your teachers, for example, often give quizzes or tests on a fixed-interval schedule. It is likely that you will study feverishly the day before a test but study much less immediately afterwards.

<table>
<thead>
<tr>
<th>Ratio</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixed Ratio</strong> (reinforcement after a fixed number of responses)</td>
<td><strong>Fixed Interval</strong> (reinforcement of first response after a fixed amount of time has passed)</td>
</tr>
<tr>
<td>• being paid for every 10 pizzas made</td>
<td>• cramming for an exam</td>
</tr>
<tr>
<td>• being ejected from a basketball game after five fouls</td>
<td>• picking up your check from your part-time job</td>
</tr>
<tr>
<td><strong>Variable Ratio</strong> (reinforcement after varying number of responses)</td>
<td><strong>Variable Interval</strong> (reinforcement of first response after varying amounts of time)</td>
</tr>
<tr>
<td>• playing a slot machine</td>
<td>• surprise (pop) quizzes in class</td>
</tr>
<tr>
<td>• sales commissions</td>
<td>• dialing a friend on the phone and getting a busy signal</td>
</tr>
</tbody>
</table>

**Figure 9.7** Partial Schedules of Reinforcement

B.F. Skinner pointed out many examples of how schedules of reinforcement maintain and control different behaviors. The different schedules produce different response rates. How does a fixed-ratio schedule differ from a fixed-interval schedule of reinforcement?
• On a **variable-interval schedule**, the time at which the reinforcement is given changes. If you are trying to call a friend, but the line is busy, what do you do? You keep trying. The reinforcer will be gained the first time you dial after your friend has hung up, but you do not know when that is going to occur. The usual response rate on a variable-interval schedule is slow, but steady—slower than on any other schedule of partial reinforcement. In fact, your eagerness to reach your friend probably will determine roughly how often you try the phone again . . . and again.

In summary, ratio schedules are based on numbers of responses, while interval schedules are based on time. Responses are more resistant to extinction when reinforced on a variable rather than on a fixed schedule. To be most effective, however, the reinforcement must be consistent for the same type of behavior, although it may not occur each time the behavior does. The complexity of our behavior means that most reinforcers in human relationships are on a variable schedule. How people will react cannot always be predicted.

**SHAPING AND CHAINING**

Operant conditioning is not limited to simple behaviors. When you acquire a skill such as knitting, photography, playing basketball, or talking persuasively, you learn more than just a single new stimulus-response relationship. You learn a large number of them, and you learn how to put them together into a large, smooth-flowing unit.

**Shaping** is a process in which reinforcement is used to sculpt new responses out of old ones. An experimenter can use this method to teach a rat to do something it has never done before and would never do if left to itself. He or she can shape it, for example, to raise a miniature flag. The rat is physically capable of standing on its hind legs and using its mouth to pull a miniature flag-raising cord, but at present it does not do so. The rat probably will not perform this unusual action by accident, so the experimenter begins by rewarding the rat for any action similar to the wanted responses, using reinforcement to produce closer and closer approximations of the desired behavior.

Imagine the rat roaming around on a table with the flag apparatus in the middle. The rat inspects everything and finally sniffs at the flagpole. The experimenter immediately reinforces this response by giving the rat a food pellet. Now the rat frequently sniffs the flagpole, hoping to get another pellet, but the experimenter waits until the rat lifts a paw before he gives it another reward. This process continues with the experimenter reinforcing close responses and then waiting for even closer ones. Eventually, the experimenter has the rat on its hind legs nibbling at the cord. Suddenly the rat seizes the cord in its teeth and yanks it.

**variable-interval schedule:** a pattern of reinforcement in which changing amounts of time must elapse before a response will obtain reinforcement

**shaping:** technique in which the desired behavior is “molded” by first rewarding any act similar to that behavior and then requiring ever-closer approximations to the desired behavior before giving the reward

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Clicker Training

Clicker training is a form of shaping. The trainer waits for the dog to sit on its own. The instant its rear goes down, the trainer hits the clicker (an audio signal) and the dog gets the treat. The clicker acts as an acoustical marker to tell the dog, “That’s what I’m reinforcing.” How might you use shaping to teach a dog to shake?
Immediately the rat is rewarded, and it begins pulling rapidly on the cord. A new response has been shaped. Shaping has been used to teach animals tricks. For example, if a television character points her finger to the ground and her dog immediately lies down, we need to remember that shaping was involved in the dog’s behavior. If shaping is done properly, almost any animal can learn some unusual tricks.

**Combining Responses: Chaining**

In order to learn a skill, a person must be able to put various new responses together. Responses that follow one another in a sequence are combined into **response chains**. Each response produces the signal for the next one.

In learning, chains of responses are organized into larger **response patterns**. For example, the complex skill of swimming has three major chains that are combined to make up the whole swimming pattern—an arm-stroking chain, a breathing chain, and a leg-kicking chain (see Figure 9.9). After much practice, you no longer have to think about the different steps involved. The behavior takes on a rhythm of its own: the chains of responses flow naturally as soon as you dive into the water.

It is often necessary to learn simple responses before mastering the complex pattern. If you cannot hit a nail with a hammer, you certainly cannot build a house. Therefore, before a person can learn to perform a particular skill, he or she must learn all the lower skills that make the larger skill possible.

**AVERSIVE CONTROL**

Reinforcement refers to anything that increases the frequency of an immediately preceding behavior. Aversive, or unpleasant, consequences influence much of our everyday behavior. **Aversive control** refers to this type of conditioning or learning. There are two ways in which unpleasant events can affect our behavior—as negative reinforcers or as punishers.

**Negative Reinforcement**

In **negative reinforcement**, a painful or unpleasant stimulus is removed. The removal of unpleasant consequences increases the frequency of a behavior. It may help you to understand negative reinforcement if you remember that it **follows and negates**, or takes away, an aversive stimulus. B.F. Skinner provided this example:
If walking with a stone in your shoe causes you to limp, removing the stone (negating it) allows you to walk without pain. Other examples of negative reinforcers are fear and experiencing disapproval of unwelcome behavior.

Two uses of negative reinforcement that psychologists have studied in detail are escape conditioning and avoidance conditioning. In escape conditioning, a person’s behavior causes an unpleasant event to stop. Consider the case of a child who hates liver and is served it for dinner. She whines about the food and gags while eating it. At this point, her father removes the liver. The whining and gagging behavior has been thus negatively reinforced, and the child is likely to whine and gag in the future when given an unpleasant meal. This kind of learning is called escape conditioning because the behavior of the child allowed her to escape the liver meal.

In avoidance conditioning, the person’s behavior has the effect of preventing an unpleasant situation from happening. In our example, if the child starts whining and gagging when the father removes the liver from the refrigerator to cook it, we would identify the situation as avoidance conditioning; the child avoided the unpleasant consequences by whining early enough. The reinforcer here is the reduction of the child’s disgust—not having to eat liver.

**Punishment**

The most obvious form of aversive control is punishment. In punishment, an unpleasant consequence occurs and decreases the frequency of the behavior that produced it. Negative reinforcement and punishment operate in opposite ways. In negative reinforcement, escape or avoidance behavior is repeated and increases in frequency. In punishment, behavior that is punished decreases or is not repeated. If you want to stop a dog from pawing at you when it wants attention, you should loudly say, “NO!” and reprimand it when it paws at you. Such actions are called punishers (see Figure 9.10).

As with reinforcers, the events or actions that serve as punishers depend on their effect on the learner. For example, if a young child in a large family seeks extra attention from her parents, that child may misbehave. In response the parents punish the child by reprimanding her. The reprimands are meant to be punishers. The reprimands, however, may actually serve as reinforcers for a child who wants attention. Perhaps sending her to her room every time she misbehaved would have been an appropriate punisher; this unpleasant stimulus would have discouraged her from repeating the behavior.

**Disadvantages of Punishment**

Psychologists have found several disadvantages in using aversive stimuli (punishment) to change behavior. For one thing, aversive stimuli can produce unwanted side effects such as rage, aggression, and fear. Then, instead of having to change only one problem behavior, there may be two
Punishment occurs when an unpleasant consequence following a behavior decreases the chances that the behavior will recur. *How might Calvin’s tumbles act as punishers?* 

or more. For example, children whose parents rely on spanking to control disobedience may also have to deal with the problem of their children’s increased aggressiveness toward other children.

A second problem with punishment is that people learn to avoid the person delivering the aversive consequences. Children learn to stay away from parents or teachers who often punish them. One consequence of this is that such parents and teachers have less opportunity to correct the children’s inappropriate behavior. Also, punishment is likely to merely suppress, but not eliminate, such behavior. The punished behavior is likely to occur at some other time or in some other place.

Punishment alone does not teach appropriate and acceptable behavior. Without positive coaching and modeling, the child may never learn the correct behavior or understand what the parents think is the acceptable behavior in a given situation.

### Assessment

1. **Review the Vocabulary**  
   Explain how the four schedules of partial reinforcement work.

2. **Visualize the Main Idea**  
   In a chart similar to the one below, list four types of reinforcers and give an example of each.

<table>
<thead>
<tr>
<th>Types of Reinforcers</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aversive Stimuli</td>
<td></td>
</tr>
<tr>
<td>Positive Reinforcement</td>
<td></td>
</tr>
<tr>
<td>Negative Reinforcement</td>
<td></td>
</tr>
<tr>
<td>Punishment</td>
<td></td>
</tr>
</tbody>
</table>

3. **Recall Information**  
   What is the difference between escape conditioning and avoidance conditioning?

4. **Think Critically**  
   How do positive and negative reinforcement affect a teenager’s choice and purchase of clothes? Provide examples in your answer.

5. **Application Activity**  
   Using principles of operant conditioning, design a plan to teach a puppy a new trick.
Why did the children display such aggressive behavior? Albert Bandura performed the study above in 1961 to demonstrate that the children learned aggressive behaviors simply by watching a model perform these behaviors. The study illustrated the third type of learning, called social learning. Social learning theorists view learning as purposeful—going beyond mechanical responses to stimuli or reinforcement. The two types of social learning are cognitive learning and modeling.
COGNITIVE LEARNING

Cognitive learning focuses on how information is obtained, processed, and organized. Such learning is concerned with the mental processes involved in learning. Latent learning and learned helplessness are examples of cognitive learning.

Latent Learning and Cognitive Maps

In the 1930s, Edward Tolman argued that learning involved more than mechanical responses to stimuli; it involved mental processes. Tolman would place a rat in a maze and allow it to explore the maze without giving the rat any reinforcement, such as food. Then he would place food at the end of the maze and record which path the rat took to reach the food. The rat quickly learned to take the shortest route to the food. Next, Tolman blocked the shortest path to the food. The rat then followed the next shortest path to the food. Tolman believed that the rat had developed a cognitive map of the maze. A cognitive map is a mental picture of a place, such as the maze. The rats had developed a cognitive map of the maze when allowed to explore the maze on their own.

Tolman called the type of learning demonstrated by the rat latent learning. Latent learning is not demonstrated by an immediately observable change in behavior at the time of the learning. Although the learning typically occurs in the absence of a reinforcer, it may not be demonstrated until a reinforcer appears. For example, have you ever had to locate a building or street in a section of your city or town that you were unfamiliar with? You may have been through that section of town before and remembered details such as an unusual sign or large parking lot. Remembering these details may have helped you find the building or street you were looking for. You had learned some details without intending to do so.

Learned Helplessness

Psychologists have shown that general learning strategies can affect a person’s relationship to the environment. For example, if a person has numerous experiences in which his or her actions have no effect, he or she may learn a general strategy of helplessness or laziness.

In the first stage of one study (Hiroto, 1974), one group of college students were able to turn off an unpleasant loud noise, while another group
had no control over the noise. Later, all were placed in a situation in which they merely had to move a lever to stop a similar noise. Only the ones who had control over the noise in the first place learned to turn it off. The others did not even try!

It is not hard to see how these results can apply to everyday situations. In order to be able to try hard and to be full of energy, people must learn that their actions do make a difference. If rewards come without effort, a person never learns to work (learned laziness). If pain comes no matter how hard one tries, a person gives up. This occurrence is called **learned helplessness**.

Martin Seligman believes that learned helplessness is one major cause of depression. He reasons that when people are unable to control events in their lives, they generally respond in one of the following ways: (1) they may be less motivated to act and thus stop trying; (2) they may experience a lowered sense of self-esteem and think negatively about themselves; or (3) they may feel depressed (see Figure 9.12).

Seligman identified three important elements of learned helplessness: **stability**, **globality**, and **internality**. Stability refers to the person’s belief that the state of helplessness results from a permanent characteristic. For example, a student who fails a math test can decide that the problem is either temporary (“I did poorly on this math test because I was sick”) or **stable** (“I never have done well on math tests and never will”). Similarly, the person can decide that the problem is either specific (“I’m no good at math tests”) or **global** (“I’m just dumb”). Both stability and globality focus on the student—on internal reasons for failure. The student could have decided that the problem was external (“This was a bad math test”) instead of internal. People who attribute an undesirable outcome to their own inadequacies will probably experience depression along with guilt and self-blame.

**Figure 9.12** Learned Helplessness

### Examples of How Learned Helplessness Develops

- Parents punish children constantly for any and all offenses.
- You are overly critical of all your friend’s actions.
- A student is placed in an advanced math course without proper preparation (taking and passing the basic math course first).

### Common Factors of Learned Helplessness Situations

- Subjects believe they have no control over their own environment.
- Success seems a matter of luck, rather than skill.

What happens when it is impossible for a learner to have an effect on the environment? What happens when a learner is punished and cannot escape the punishment? The learner may give up trying to learn. **How can learned helplessness cause depression?**
MODELING

The second type of social learning is **modeling**. When you go to a concert for the first time, you may be very hesitant about where to go, when to enter (especially if you are late), when to clap, how to get a better seat after the first intermission, and so on. So you observe others, follow them, and soon you are an “old hand.” This illustrates a third type of learning—observation and imitation.

The general term for this kind of learning is **modeling**. It includes three different types of effects. In the simplest case—the first type of modeling—the behavior of others simply increases the chances that we will do the same thing. We clap when others do, look up at a building if everyone else is looking there, and copy the styles and verbal expressions of our peers. No learning occurs in this case, in the sense of acquiring new responses. We simply perform old responses that we otherwise might not be using at the time.

The second type of modeling is usually called **observational learning**, or imitation. In this sort of learning an observer watches someone perform a behavior and is later able to reproduce it closely, though the observer was unable to do this before observing the model. An example is watching someone else do an unfamiliar dance step and afterward being able to do the dance step yourself.

Have you ever noticed that some children seem to behave in a manner similar to their parents? Albert Bandura suggested that we watch models perform and then imitate the models’ behavior. Bandura and his colleagues demonstrated observational learning by using a Bobo doll (see Exploring Psychology on page 259). The experimenters found that children were more likely to act aggressively after they had observed aggressive behavior.

Individual differences in personality may help to explain why people act differently when shown the same movie containing violent material. The American Psychological Association (APA) Commission on Violence and Youth (1993) reported that personal qualities do play a role. One child may learn that violence is right and another child may view violence as pitiful. Others have found that more aggressive children seek out violent television and are also more affected by it.

A third type of modeling involves **disinhibition**. When an observer watches someone else engage in a threatening activity without being punished, the observer may find it easier to engage in that behavior later. For example, someone with a snake phobia may watch another person handling snakes. Such observation may help alleviate the phobia. This procedure is used in clinical work as we will see in the chapter on therapies (Chapter 17).
The term *behavior modification* often appears in magazine articles describing research on changing people’s behavior through drugs, “mind control,” or even brain surgery. In fact, it is none of these things. **Behavior modification** refers to the systematic application of learning principles (classical conditioning, operant conditioning, and social learning) to change people’s actions and feelings. When you give your little brother a quarter to leave you alone, that is very much like behavior modification. Behavior modification involves a series of well-defined steps to change behavior. The success of each step is carefully evaluated to find the best solution for a given situation.

The behavior modifier usually begins by defining a problem in concrete terms. For example, Johnnie’s mother might complain that her son is messy. If she used behavior modification to reform the child, she would first have to define “messy” in objective terms. For example, he does not make his bed in the morning, he drops his coat on the couch when he comes inside, and so on. She would not worry about where his bad habits come from. Rather, she would work out a system of rewards and punishments aimed at getting Johnnie to make his bed, hang up his coat, and do other straightening-up tasks.

Modeling, operant conditioning, and classical conditioning principles have been used in behavior modification. Classical conditioning principles are particularly useful in helping people to overcome fears, and we shall discuss them when we consider the problem of treating psychological disorders (Chapter 17). Modeling is often used to teach desired behaviors. In addition, as you will see in the following examples, operant conditioning principles have also been applied to everyday problems.

**Computer-Assisted Instruction**

Some instructors teach their students by a conversational method very similar to what computer-assisted instruction (CAI) is using today. CAI is a refinement of the concept of programmed instruction that was
introduced by S.L. Pressey (1933) and refined by B.F. Skinner in the 1950s. The essential concept of programmed instruction is based on operant conditioning. The material to be learned is broken down into simpler units called frames. Each time the student shows that she or he has learned the information in a frame, the student is given positive reinforcement in the form of new information, choices, or point rewards similar to those used in video games. Each question, or prompt, builds on information already mastered. The computer retains (as does the student) exactly what the learner understands on the basis of the student’s answers to questions.

Several principles of learning are being applied in CAI. The student is learning complex material through a response chain. She or he is reinforced constantly. Knowledge is being shaped in a systematic and predictable way. The student is able to have a dialogue with the instructor on every point, which is often impossible for a class of students in a conventional setting.

Token Economies

Psychologists tried an experiment with a group of extremely troubled boys in Washington, D.C. In fact, the boys had been labeled “uneducable” and placed in the National Training School. The experimenters used what is known as a token economy to motivate the boys. The youngsters received points—or secondary reinforcers—for good grades on tests. They could cash in these points for such rewards as snacks, lounge privileges, or items in a mail-order catalog. Within a few months, a majority of the students showed a significant increase in IQ scores (an average gain of twelve-and-a-half points). The boys continued to improve in the months that followed, showing that they were, indeed, educable (Cohen & Filipczak, 1971).

In token economies, people are systematically paid to act appropriately. In the real world, behaviorists argue, the rewards are just as real; they are simply less systematic. In overcrowded mental hospitals, for example, the only way some patients can get attention is by acting out. Overworked staff members

**token economy**: conditioning in which desirable behavior is reinforced with valueless objects, which can be accumulated and exchanged for valued rewards

**Figure 9.14 How Social Learning Works**

Social learning theorists argue that much learning results from observing the behavior of others and from imagining the consequences of our own behavior. **What role does the environment play in social learning?**
simply do not have time to bother with people who are not causing trouble. Since attention from the staff is reinforcing for these patients, people are rewarded for undesirable behavior. By systematically rewarding only desirable behavior, token economies have improved conditions in prisons, mental hospitals, halfway houses, and classrooms.

**Self-Control**

One of the most important features in behavior modification is an emphasis on asking people to set up personal systems of rewards and punishments to shape their own thoughts and actions—this is a self-control program. As in any application of behavior modification, the first step in self-control is to define the problem. People who smoke too much would be encouraged to actually count how many cigarettes they smoked every hour of the day and note what kinds of situations led them to smoke. (After a meal? When talking to friends? Driving to work?) Similarly, people who have a very poor opinion of themselves would have to define the problem more concretely. They might begin by counting the number of self-deprecating remarks they make and thoughts they have. Researchers have found that just keeping track of behavior in this way often leads a person to start changing it.

The next step may be to set up a behavioral contract. A behavioral contract simply involves choosing a reinforcer (buying a new shirt, watching a favorite TV program) and making it depend on some less desirable but necessary act such as getting to work on time or washing the kitchen floor. One soda lover who had trouble studying decided to set up a behavioral contract. She decided to purchase a favorite TV program once she had completed her studying. The result was that she studied much more effectively.
that she would allow herself a soda only after she studied for half an hour. Her soda addiction remained strong, but her study time increased dramatically under this system.

**Improving Your Study Habits**

One psychologist designed a program to help students improve their study habits. A group of student volunteers were told to set a time when they would go to a small room in the library they had not used before. They were then to work only as long as they remained interested. As soon as they found themselves fidgeting, daydreaming, or becoming bored, they were to read one more page before they left.

The next day they were asked to repeat the same procedure, adding a second page to the amount they read between the time they decided to leave and the time they actually left the library. The third day they added a third page, and so on. Students who followed this procedure found that in time they were able to study more efficiently and for longer periods.

Why did this procedure work? Requiring students to leave as soon as they felt distracted helped to reduce the negative emotions associated with studying. Studying in a new place removed the conditioned aversive stimulus. Thus, aversive responses were not conditioned to the subject matter or the room, as they are when students force themselves to work. The procedure also made use of successive approximations. The students began by reading just one more page after they became bored and only gradually increased the assignment. In conclusion, it is important to note that classical and operant conditioning and social learning do not operate independently in our lives. All three forms of learning interact in a complex way to determine what and how we learn.

**Assessment**

1. **Review the Vocabulary** How is a token economy an example of behavior modification?

2. **Visualize the Main Idea** In a diagram similar to the one below, identify three important elements of learned helplessness.

3. **Recall Information** How can you improve your study habits through conditioning?

4. **Think Critically** What principles of modeling should parents consider when rewarding and punishing their children? Provide reasons for your answer.

5. **Application Activity** Devise a plan of behavior modification (such as teaching your dog not to bark indoors or stopping your friend from knuckle cracking) by applying learning principles.
Summary and Vocabulary

Learning is a relatively permanent change in a behavioral tendency that results from experience. Not all behaviors are acquired in the same way. Psychologists have studied three basic types of learning: classical conditioning, operant conditioning, and social learning.

**Classical Conditioning**

Main Idea: People acquire certain behaviors through classical conditioning, a learning procedure in which associations are made between a neutral stimulus and a conditioned response.

- Ivan Pavlov discovered the principles of classical conditioning.
- The four elements involved in classical conditioning are UCS, UCR, CS, and CR.
- Generalization and discrimination are complementary processes in which the participant responds to similar stimuli in the same manner or responds differently to dissimilar stimuli.
- A CR will sometimes reappear spontaneously after extinction in a process called spontaneous recovery.
- Classical conditioning may be used to affect human behavior, such as taste aversions and fears.

**Operant Conditioning**

Main Idea: Operant conditioning occurs when the consequences that follow a behavior increase or decrease the likelihood of that behavior occurring again.

- Operant conditioning, as explained by B.F. Skinner, means that human behavior is influenced by one’s history of rewards and punishments.
- Reinforcers (positive and negative, and primary and secondary) are stimuli that increase the likelihood that certain behaviors will be repeated.
- Behavior is reinforced according to continuous or partial reinforcement schedules that are based on numbers of responses or times of responses.
- Reinforcing responses that are increasingly similar to the desired behavior is a process called shaping.
- Punishments are stimuli that decrease the likelihood that certain behaviors will be repeated.

**Social Learning**

Main Idea: Social learning, consisting of cognitive learning and modeling, involves how people make decisions and act upon the information available to them.

- Latent learning is not demonstrated by an immediately observable change in behavior at the time of learning.
- If people have numerous experiences in which their actions have no effect, they may learn a general strategy of learned helplessness.
- Modeling is a type of learning that occurs as the result of observation and imitation.
- Behavior modification uses learning principles to change people’s actions or feelings.

Chapter Vocabulary

- classical conditioning (p. 241)
- neutral stimulus (p. 242)
- unconditioned stimulus (UCS) (p. 242)
- unconditioned response (UCR) (p. 242)
- conditioned stimulus (CS) (p. 242)
- conditioned response (CR) (p. 242)
- generalization (p. 244)
- discrimination (p. 244)
- extinction (p. 245)
- operant conditioning (p. 250)
- reinforcement (p. 251)
- primary reinforcer (p. 252)
- secondary reinforcer (p. 252)
- fixed-ratio schedule (p. 253)
- variable-ratio schedule (p. 254)
- fixed-interval schedule (p. 254)
- variable-interval schedule (p. 255)
- shaping (p. 255)
- response chain (p. 256)
- aversive control (p. 256)
- negative reinforcement (p. 256)
- escape conditioning (p. 257)
- avoidance conditioning (p. 257)
- social learning (p. 259)
- cognitive learning (p. 260)
- cognitive map (p. 260)
- latent learning (p. 260)
- learned helplessness (p. 261)
- modeling (p. 262)
- behavior modification (p. 263)
- token economy (p. 264)