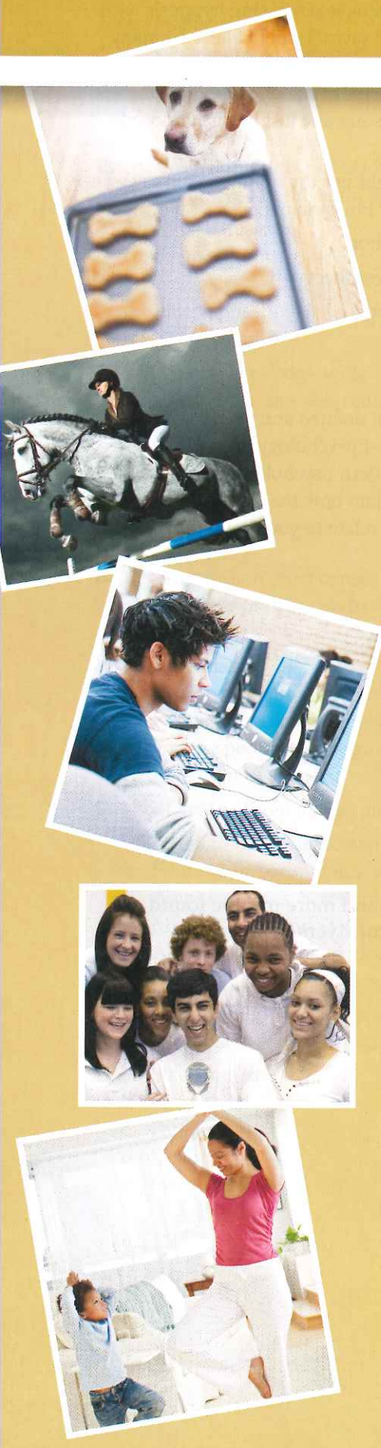
Unit VI



Learning

Modules

When a chinook salmon first emerges from its egg in a stream's gravel bed, its genes provide most of the behavioral instructions it needs for life. It knows instinctively how and where to swim, what to eat, and most spectacularly, where to go and when and how to return to its birthplace. Guided by the scent of its home stream, it pursues an upstream odyssey to its ancestral spawning ground and seeks out the best gravel and water flow for breeding. It then mates and, its life mission accomplished, dies.

Unlike salmon, we are not born with a genetic plan for life. Much of what we do we learn from experience. Although we struggle to find the life direction a salmon is born with, our learning gives us more flexibility. We can learn how to build grass huts or snow shelters, submarines or space stations, and thereby adjust to almost any environment. Indeed, nature's most important gift to us may be our *adaptability*—our capacity to learn new behaviors that help us cope with changing circumstances.

Learning breeds hope. What is learnable we can potentially teach—a fact that encourages parents, teachers, coaches, and animal trainers. What has been learned we can potentially change by new learning—an assumption that underlies counseling, psychotherapy, and rehabilitation programs. No matter how unhappy, unsuccessful, or unloving we are, that need not be the end of our story.

No topic is closer to the heart of psychology than *learning*. In earlier units we considered how we learn to think critically, and the learning of visual perceptions and of a drug's expected effect. In later units we will see how learning shapes our thoughts and language, our motivations and emotions, our personalities and attitudes. In Unit VII, we will see how the brain stores and retrieves learning.

Module 26

How We Learn and Classical Conditioning

Ken Gillespie Photography/Alamy

Module Learning Objectives

26-1 Define learning, and identify some basic forms of learning.

26-2 Describe the basic components of classical conditioning, and explain behaviorism's view of learning.

26-3 Summarize the processes of acquisition, extinction, spontaneous recovery, generalization, and discrimination.

26-4 Explain why Pavlov's work remains so important, and describe some applications of his work to human health and well-being.

How Do We Learn?

26-1 What is learning, and what are some basic forms of learning?

Psychologists define **learning** as the process of acquiring new and relatively enduring information or behaviors. By learning, we humans are able to adapt to our environments. We learn to expect and prepare for significant events such as food or pain *(classical conditioning)*. We typically learn to repeat acts that bring rewards and to avoid acts that bring unwanted results *(operant conditioning)*. We learn new behaviors by observing events and by watching others, and through language we learn things we have neither experienced nor observed *(cognitive learning)*. But *how* do we learn?

learning the process of acquiring new and relatively enduring information or behaviors.

More than 200 years ago, philosophers such as John Locke and David Hume echoed Aristotle's conclusion from 2000 years earlier: We learn by *association*. Our minds naturally

Try This

Most of us would be unable to name the order of the songs on our favorite album or playlist. Yet, hearing the end of one piece cues (by association) an anticipation of the next. Likewise, when singing your national anthem, you associate the end of each line with the beginning of the next. (Pick a line out of the middle and notice how much harder it is to recall the *previous* line.)

connect events that occur in sequence. Suppose you see and smell freshly baked bread, eat some, and find it satisfying. The next time you see and smell fresh bread, you will expect that eating it will again be satisfying. So, too, with sounds. If you associate a sound with a frightening consequence, hearing the sound alone may trigger your fear. As one 4-year-old exclaimed after watching a TV character get mugged, "If I had heard that music, I wouldn't have gone around the corner!" (Wells, 1981).

Learned associations often operate subtly. Give people a red pen (associated with error marking) rather than a black pen and, when correcting essays, they will spot more errors and give lower grades (Rutchick et al., 2010). When voting, people are more likely to support taxes to aid education if their assigned voting place is in a school (Berger et al., 2008).

Learned associations also feed our habitual behaviors (Wood & Neal, 2007). As we repeat behaviors in a given context—sleeping in a certain posture in bed, walking certain routes from class to class, eating popcorn in a movie theater—the behaviors become associated with the contexts. Our next experience of the context then evokes our habitual response. How long does it take to form such habits? To find out, one British research team asked 96 university students to choose some healthy behavior (such as running before dinner or eating fruit with lunch), to do it daily for 84 days, and to record whether the behavior felt automatic (something they did without thinking and would find it hard not to do). On average, behaviors became habitual after about 66 days (Lally et al., 2010). (Is there something you'd like to make a routine part of your life? Just do it every day for two months, or a bit longer for exercise, and you likely will find yourself with a new habit.)

Other animals also learn by association. Disturbed by a squirt of water, the sea slug *Aplysia* protectively withdraws its gill. If the squirts continue, as happens naturally in choppy water, the withdrawal response diminishes. We say the slug **habituates.** But if the sea slug repeatedly receives an electric shock just after being squirted, its response to the squirt instead grows stronger. The animal has associated the squirt with the impending shock.

Complex animals can learn to associate their own behavior with its outcomes. An aquarium seal will repeat behaviors, such as slapping and barking, that prompt people to toss it a herring.

By linking two events that occur close together, both animals are exhibiting **associative learning.** The sea slug associates the squirt with an impending shock; the seal associates slapping and barking with a herring treat. Each animal has learned something important to its survival: predicting the immediate future.

This process of learning associations is *conditioning,* and it takes two main forms:

- In *classical conditioning,* we learn to associate two stimuli and thus to anticipate events. (A **stimulus** is any event or situation that evokes a response.) We learn that a flash of lightning signals an impending crack of thunder; when lightning flashes nearby, we start to brace ourselves (**FIGURE 26.1**).
- In *operant conditioning,* we learn to associate a response (our behavior) and its consequence. Thus we (and other animals) learn to repeat acts followed by good results (**FIGURE 26.2**) and avoid acts followed by bad results.

To simplify, we will explore these two types of associative learning separately. Often, though, they occur together, as on one Japanese cattle ranch, where the clever rancher outfitted his herd with electronic pagers, which he calls from his cell phone. After a week of training, the animals learn to associate two stimuli—the beep on their pager and the arrival of food (classical conditioning). But they also learn to associate their hustling to the food trough with the pleasure of eating (operant conditioning).

AP® Exam Tip

It's easy to confuse habituation with sensory adaptation, a concept from Unit IV. Recall that sensory adaptation occurs when one of your sensory systems stops registering the presence of an unchanging stimulus—when you go swimming in a cool pool, for example, the water no longer feels cool after you've been in for a few minutes. Habituation, like sensory adaptation, involves a diminished response, but in this case it's a form of learning rather than a function of the sensory system. If you're exposed to the same stimulus over and over, your response decreases. A friend might sneak up and startle you by yelling "Boo!" But you'll probably startle less when he tries it again two minutes later. That's habituation.

habituation an organism's decreasing response to a stimulus with repeated exposure to it.

associative learning learning that certain events occur together. The events may be two stimuli (as in classical conditioning) or a response and its consequences (as in operant conditioning).

stimulus any event or situation that evokes a response.

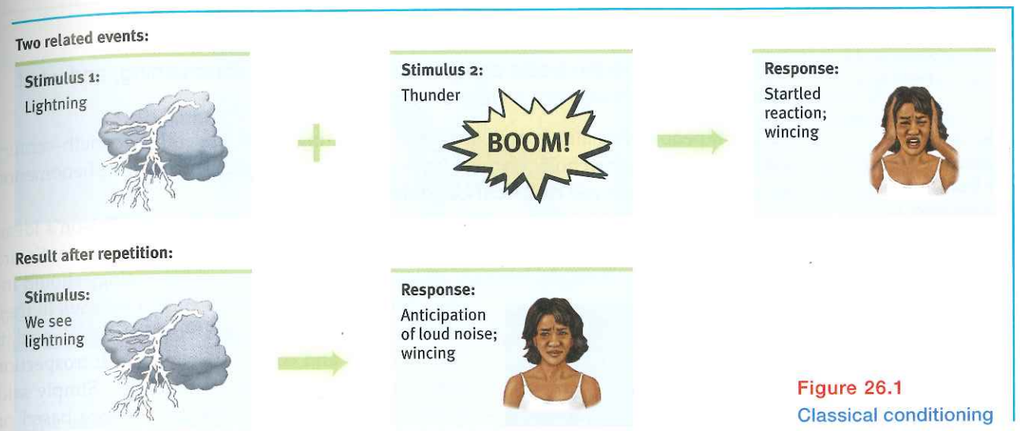


Figure 26.1
Classical conditioning

Conditioning is not the only form of learning. Through **cognitive learning** we acquire mental information that guides our behavior. *Observational learning,* one form of cognitive learning, lets us learn from others' experiences. Chimpanzees, for example, sometimes learn behaviors merely by watching others perform them. If one animal sees another solve a puzzle and gain a food reward, the observer may perform the trick more quickly. So, too, in humans: We look and we learn.

Let's look more closely now at classical conditioning.

(a) Response: Being polite (b) Consequence: Getting a treat (c) Behavior strengthened

Figure 26.2
Operant conditioning

cognitive learning the acquisition of mental information, whether by observing events, by watching others, or through language.

Before You Move On

ASK YOURSELF

Can you remember some example from your childhood of learning through classical conditioning—perhaps salivating at the sound or smell of some delicious food cooking in your family kitchen? Can you remember an example of operant conditioning, when you repeated (or decided not to repeat) a behavior because you liked (or hated) its consequences? Can you recall watching someone else perform some act and later repeating or avoiding that act?

TEST YOURSELF

As we develop, we learn cues that lead us to expect and prepare for good and bad events. We learn to repeat behaviors that bring rewards. And we watch others and learn. What do psychologists call these three types of learning?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

classical conditioning a type of learning in which one learns to link two or more stimuli and anticipate events.

behaviorism the view that psychology (1) should be an objective science that (2) studies behavior without reference to mental processes. Most research psychologists today agree with (1) but not with (2).

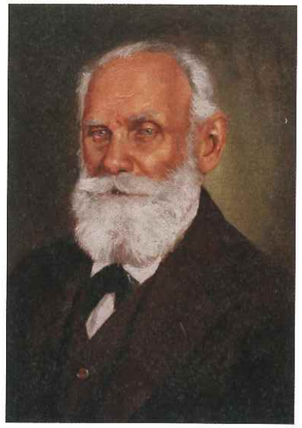
neutral stimulus (NS) in classical conditioning, a stimulus that elicits no response before conditioning.

Classical Conditioning

26-2 What are the basic components of classical conditioning, and what was behaviorism's view of learning?

For many people, the name Ivan Pavlov (1849–1936) rings a bell. His early twentieth-century experiments—now psychology's most famous research—are classics, and the phenomenon he explored we justly call **classical conditioning.**

Pavlov's work laid the foundation for many of psychologist John B. Watson's ideas. In searching for laws underlying learning, Watson (1913) urged his colleagues to discard reference to inner thoughts, feelings, and motives. The science of psychology should instead study how organisms respond to stimuli in their environments, said Watson: "Its theoretical goal is the prediction and control of behavior. Introspection forms no essential part of its methods." Simply said, psychology should be an objective science based on observable behavior.



Ivan Pavlov "Experimental investigation . . . should lay a solid foundation for a future true science of psychology" (1927).

This view, which influenced North American psychology during the first half of the twentieth century, Watson called **behaviorism.** Pavlov and Watson shared both a disdain for "mentalistic" concepts (such as consciousness) and a belief that the basic laws of learning were the same for all animals—whether dogs or humans. Few researchers today propose that psychology should ignore mental processes, but most now agree that classical conditioning is a basic form of learning by which all organisms adapt to their environment.

Pavlov's Experiments

Pavlov was driven by a lifelong passion for research. After setting aside his initial plan to follow his father into the Russian Orthodox priesthood, Pavlov received a medical degree at age 33 and spent the next two decades studying the digestive system. This work earned him Russia's first Nobel Prize in 1904. But his novel experiments on learning, which consumed the last three decades of his life, earned this feisty scientist his place in history.

PEANUTS

Pavlov's new direction came when his creative mind seized on an incidental observation. Without fail, putting food in a dog's mouth caused the animal to salivate. Moreover, the dog began salivating not only at the taste of the food, but also at the mere sight of the food, or at the food dish, or at the person delivering the food, or even at the sound of that person's approaching footsteps. At first, Pavlov considered these "psychic secretions" an annoyance—until he realized they pointed to a simple but important form of learning.

Pavlov and his assistants tried to imagine what the dog was thinking and feeling as it drooled in anticipation of the food. This only led them into fruitless debates. So, to explore the phenomenon more objectively, they experimented. To eliminate other possible influences, they isolated the dog in a small room, secured it in a harness, and attached a device to divert its saliva to a measuring instrument (**FIGURE 26.3**). From the next room, they presented food—first by sliding in a food bowl, later by blowing meat powder into the dog's mouth at a precise moment. They then paired various **neutral stimuli (NS)**—events the dog could see or hear but didn't associate with food—with food in the dog's mouth. If a sight or sound regularly signaled the arrival of food, would the dog learn the link? If so, would it begin salivating in anticipation of the food?

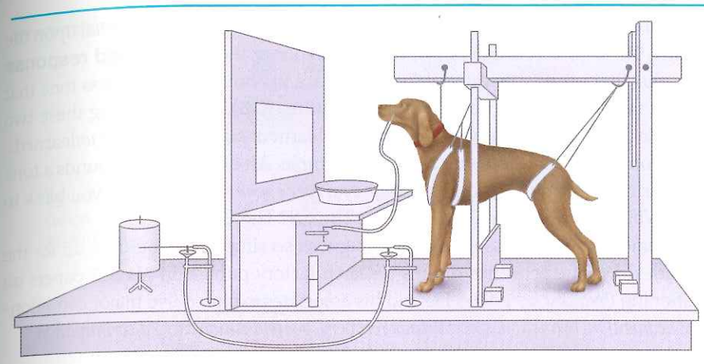


Figure 26.3
Pavlov's device for recording salivation A tube in the dog's cheek collects saliva, which is measured in a cylinder outside the chamber.

The answers proved to be *Yes* and *Yes.* Just before placing food in the dog's mouth to produce salivation, Pavlov sounded a tone. After several pairings of tone and food, the dog, now anticipating the meat powder, began salivating to the tone alone. In later experiments, a buzzer,[1] a light, a touch on the leg, even the sight of a circle set off the drooling. (This procedure works with people, too. When hungry young Londoners viewed abstract figures before smelling peanut butter or vanilla, their brain soon responded in anticipation to the abstract images alone [Gottfried et al., 2003].)

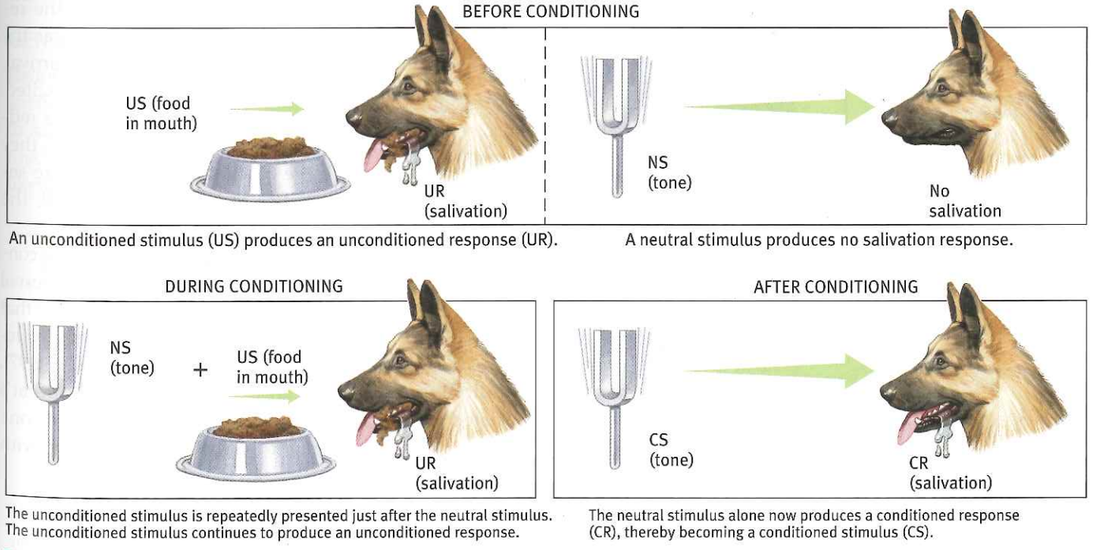
A dog doesn't learn to salivate in response to food in its mouth. Food in the mouth automatically, *unconditionally,* triggers a dog's salivary reflex (**FIGURE 26.4**). Thus, Pavlov called the drooling an **unconditioned response (UR).** And he called the food an **unconditioned stimulus (US).**

unconditioned response (UR) in classical conditioning, an unlearned, naturally occurring response (such as salivation) to an unconditioned stimulus (US) (such as food in the mouth).

unconditioned stimulus (US) in classical conditioning, a stimulus that unconditionally—naturally and automatically—triggers a response (UR).

[1] The "buzzer" (English translation) was perhaps Pavlov's supposed bell—a small electric bell (Tully, 2003).

Figure 26.4
Pavlov's classic experiment Pavlov presented a neutral stimulus (a tone) just before an unconditioned stimulus (food in mouth). The neutral stimulus then became a conditioned stimulus, producing a conditioned response.



conditioned response (CR) in classical conditioning, a learned response to a previously neutral (but now conditioned) stimulus (CS).

conditioned stimulus (CS) in classical conditioning, an originally irrelevant stimulus that, after association with an unconditioned stimulus (US), comes to trigger a conditioned response (CR).

acquisition in classical conditioning, the initial stage, when one links a neutral stimulus and an unconditioned stimulus so that the neutral stimulus begins triggering the conditioned response. In operant conditioning, the strengthening of a reinforced response.

higher-order conditioning a procedure in which the conditioned stimulus in one conditioning experience is paired with a new neutral stimulus, creating a second (often weaker) conditioned stimulus. For example, an animal that has learned that a tone predicts food might then learn that a light predicts the tone and begin responding to the light alone. (Also called *second-order conditioning*.)

Salivation in response to the tone, however, is learned. Because it is *conditional* upon the dog's associating the tone and the food, we call this response the **conditioned response (CR).** The stimulus that used to be neutral (in this case, a previously meaningless tone that now triggers the salivation) is the **conditioned stimulus (CS).** Distinguishing these two kinds of stimuli and responses is easy: Conditioned = learned; *un*conditioned = *un*learned.

Let's check your understanding with a second example. An experimenter sounds a tone just before delivering an air puff to your blinking eye. After several repetitions, you blink to the tone alone. What is the NS? The US? The UR? The CS? The CR?[2]

If Pavlov's demonstration of associative learning was so simple, what did he do for the next three decades? What discoveries did his research factory publish in his 532 papers on salivary conditioning (Windholz, 1997)? He and his associates explored five major conditioning processes: *acquisition, extinction, spontaneous recovery, generalization,* and *discrimination.*

ACQUISITION

26-3 In classical conditioning, what are the processes of acquisition, extinction, spontaneous recovery, generalization, and discrimination?

To understand the **acquisition,** or initial learning, of the stimulus-response relationship, Pavlov and his associates had to confront the question of timing: How much time should elapse between presenting the NS (the tone, the light, the touch) and the US (the food)? In most cases, not much—half a second usually works well.

What do you suppose would happen if the food (US) appeared before the tone (NS) rather than after? Would conditioning occur? Not likely. With but a few exceptions, conditioning doesn't happen when the NS follows the US. *Remember, classical conditioning is biologically adaptive because it helps humans and other animals prepare for good or bad events.* To Pavlov's dogs, the originally neutral tone became a (CS) after signaling an important biological event—the arrival of food (US). To deer in the forest, the snapping of a twig (CS) may signal a predator's approach (US). If the good or bad event has already occurred, the tone or the sound won't help the animal prepare.

Eric Isselée/Shutterstock

More recent research on male Japanese quail shows how a CS can signal another important biological event (Domjan, 1992, 1994, 2005). Just before presenting an approachable female quail, the researchers turned on a red light. Over time, as the red light continued to herald the female's arrival, the light caused the male quail to become excited. They developed a preference for their cage's red-light district, and when a female appeared, they mated with her more quickly and released more semen and sperm (Matthews et al., 2007). All in all, the quail's capacity for classical conditioning gives it a reproductive edge.

In humans, too, objects, smells, and sights associated with sexual pleasure can become conditioned stimuli for sexual arousal (Byrne, 1982). Onion breath does not usually produce sexual arousal. But when repeatedly paired with a passionate kiss, it can become a CS and do just that (**FIGURE 26.5**). The larger lesson: *Conditioning helps an animal survive and reproduce—by responding to cues that help it gain food, avoid dangers, locate mates, and produce offspring* (Hollis, 1997).

Through **higher-order conditioning,** a new NS can become a new CS. All that's required is for it to become associated with a previously conditioned stimulus. If a tone regularly signals food and produces salivation, then a light that becomes associated with the tone may also begin to trigger salivation. Although this higher-order conditioning (also called *second-order conditioning*) tends to be weaker than first-order conditioning, it influences our everyday lives. Imagine that something makes us very afraid (perhaps a guard dog associated with a previous dog bite). If something else, such as the sound of a barking dog, brings to mind that guard dog, the bark alone may make us feel a little afraid.

FYI

Remember:
NS = **N**eutral **S**timulus
US = **U**nconditioned **S**timulus
UR = **U**nconditioned **R**esponse
CS = **C**onditioned **S**timulus
CR = **C**onditioned **R**esponse

[2] NS = tone before procedure; US = air puff; UR = blink to air puff; CS = tone after procedure; CR = blink to tone

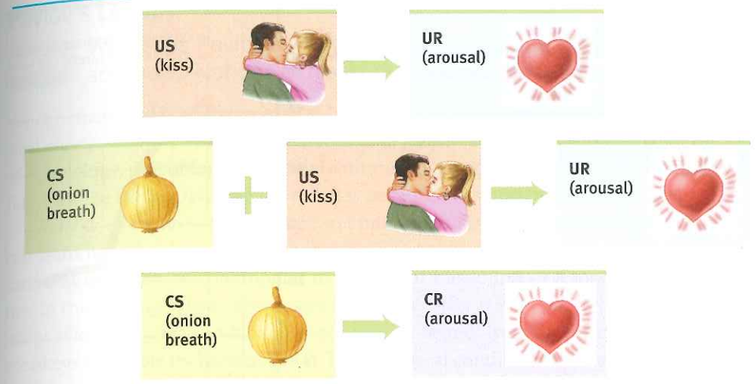


Figure 26.5
An unexpected CS Psychologist Michael Tirrell (1990) recalled: "My first girlfriend loved onions, so I came to associate onion breath with kissing. Before long, onion breath sent tingles up and down my spine. Oh what a feeling!"

EXTINCTION AND SPONTANEOUS RECOVERY

What would happen, Pavlov wondered, if after conditioning, the CS occurred repeatedly without the US? If the tone sounded again and again, but no food appeared, would the tone still trigger salivation? The answer was mixed. The dogs salivated less and less, a reaction known as **extinction,** the diminished responding that occurs when the CS (tone) no longer signals an impending US (food). But a different picture emerged when Pavlov allowed several hours to elapse before sounding the tone again. After the delay, the dogs would again begin salivating to the tone (**FIGURE 26.6**). This **spontaneous recovery**—the reappearance of a (weakened) CR after a pause—suggested to Pavlov that extinction was *suppressing* the CR rather than eliminating it.

GENERALIZATION

Pavlov and his students noticed that a dog conditioned to the sound of one tone also responded somewhat to the sound of a new and different tone. Likewise, a dog conditioned to salivate when rubbed would also drool a bit when scratched (Windholz, 1989) or when touched on a different body part (**FIGURE 26.7** on the next page). This tendency to respond likewise to stimuli similar to the CS is called **generalization.**

extinction the diminishing of a conditioned response; occurs in classical conditioning when an unconditioned stimulus (US) does not follow a conditioned stimulus (CS); occurs in operant conditioning when a response is no longer reinforced.

spontaneous recovery the reappearance, after a pause, of an extinguished conditioned response.

generalization the tendency, once a response has been conditioned, for stimuli similar to the conditioned stimulus to elicit similar responses.

AP® Exam Tip

Spontaneous recovery is, in fact, spontaneous. Notice that the extinguished conditioned response returns without any additional pairing with the unconditioned stimulus. It is not a form of acquisition.

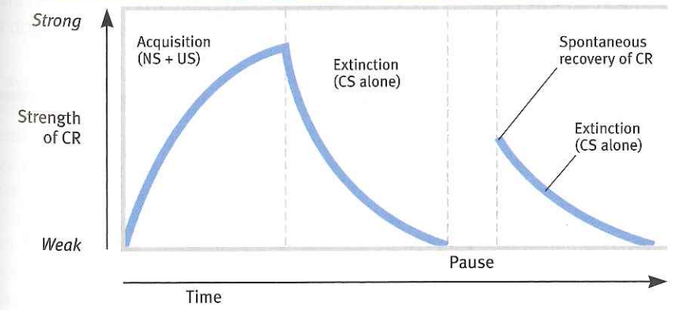
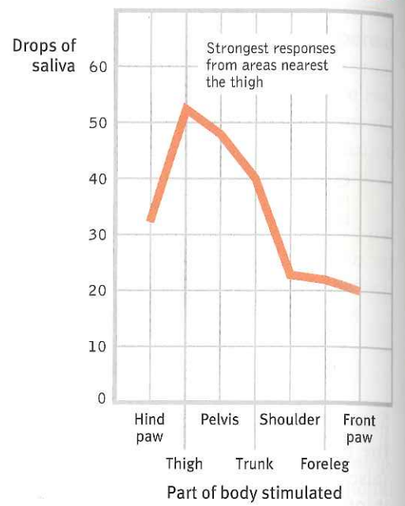
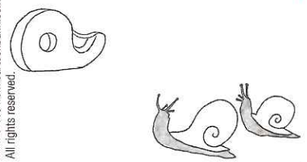


Figure 26.6
Idealized curve of acquisition, extinction, and spontaneous recovery The rising curve shows that the CR rapidly grows stronger as the NS becomes a CS as it is repeatedly paired with the US *(acquisition)*, then weakens as the CS is presented alone *(extinction)*. After a pause, the CR reappears *(spontaneous recovery)*.

Figure 26.7

Generalization Pavlov demonstrated generalization by attaching miniature vibrators to various parts of a dog's body. After conditioning salivation to stimulation of the thigh, he stimulated other areas. The closer a stimulated spot was to the dog's thigh, the stronger the conditioned response. (From Pavlov, 1927.)





"I don't care if she's a tape dispenser. I love her."

Generalization can be adaptive, as when toddlers taught to fear moving cars also become afraid of moving trucks and motorcycles. And generalized fears can linger. One Argentine writer who underwent torture still recoils with fear when he sees black shoes—his first glimpse of his torturers as they approached his cell. Generalized anxiety reactions have been demonstrated in laboratory studies comparing abused with nonabused children. When an angry face appears on a computer screen, abused children's brain-wave responses are dramatically stronger and longer lasting (Pollak et al., 1998).

Stimuli similar to naturally disgusting objects will, by association, also evoke some disgust, as otherwise desirable fudge does when shaped to resemble dog feces (Rozin et al., 1986). Researchers have also found that we like unfamiliar people more if they look somewhat like someone we've learned to like rather than dislike (Verosky & Todorov, 2010). (They find this by subtly morphing the facial features of someone we've learned to like or dislike onto a novel face.) In each of these human examples, people's emotional reactions to one stimulus have generalized to similar stimuli.

AP® Exam Tip

Generalization and discrimination are introduced in this module, but they don't just apply to classical conditioning. These two concepts will show up in other types of learning as well.

DISCRIMINATION

Pavlov's dogs also learned to respond to the sound of a particular tone and *not* to other tones. This learned ability to *distinguish* between a conditioned stimulus (which predicts the US) and other irrelevant stimuli is called **discrimination.** Being able to recognize differences is adaptive. Slightly different stimuli can be followed by vastly different consequences. Confronted by a guard dog, your heart may race; confronted by a guide dog, it probably will not.

discrimination in classical conditioning, the learned ability to distinguish between a conditioned stimulus and stimuli that do not signal an unconditioned stimulus.

Before You Move On

► ASK YOURSELF

How have your emotions or behaviors been classically conditioned?

► TEST YOURSELF

In slasher movies, sexually arousing images of women are sometimes paired with violence against women. Based on classical conditioning principles, what might be an effect of this pairing?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Pavlov's Legacy

26-4 Why does Pavlov's work remain so important, and what have been some applications of his work to human health and well-being?

What remains today of Pavlov's ideas? A great deal. Most psychologists now agree that classical conditioning is a basic form of learning. Judged by today's knowledge of the interplay of our biology, psychology, and social-cultural environment, Pavlov's ideas were incomplete. But if we see further than Pavlov did, it is because we stand on his shoulders.

Why does Pavlov's work remain so important? If he had merely taught us that old dogs can learn new tricks, his experiments would long ago have been forgotten. Why should we care that dogs can be conditioned to salivate at the sound of a tone? The importance lies first in this finding: *Many other responses to many other stimuli can be classically conditioned in many other organisms*—in fact, in every species tested, from earthworms to fish to dogs to monkeys to people (Schwartz, 1984). Thus, classical conditioning is one way that virtually all organisms learn to adapt to their environment.

Second, *Pavlov showed us how a process such as learning can be studied objectively.* He was proud that his methods involved virtually no subjective judgments or guesses about what went on in a dog's mind. The salivary response is a behavior measurable in cubic centimeters of saliva. Pavlov's success therefore suggested a scientific model for how the young discipline of psychology might proceed—by isolating the basic building blocks of complex behaviors and studying them with objective laboratory procedures.

APPLICATIONS OF CLASSICAL CONDITIONING

Other units in this text—on consciousness, motivation, emotion, health, psychological disorders, and therapy—show how Pavlov's principles can influence human health and well-being. Two examples:

- Former drug users often feel a craving when they are again in the drug-using context—with people or in places they associate with previous highs. Thus, drug counselors advise addicts to steer clear of people and settings that may trigger these cravings (Siegel, 2005).
- Classical conditioning even works on the body's disease-fighting immune system. When a particular taste accompanies a drug that influences immune responses, the taste by itself may come to produce an immune response (Ader & Cohen, 1985).

Pavlov's work also provided a basis for Watson's (1913) idea that human emotions and behaviors, though biologically influenced, are mainly a bundle of conditioned responses. Working with an 11-month-old, Watson and Rosalie Rayner (1920; Harris, 1979) showed how specific fears might be conditioned. Like most infants, "Little Albert" feared loud noises but not white rats. Watson and Rayner presented a white rat and, as Little Albert reached to touch it, struck a hammer against a steel bar just behind his head. After seven repeats of seeing the rat and hearing the frightening noise, Albert burst into tears at the mere sight of the rat. Five days later, he had generalized this startled fear reaction to the sight of a rabbit, a dog, and a sealskin coat, but not to dissimilar objects, such as toys.

For years, people wondered what became of Little Albert. Not until 2009 did some psychologist-sleuths identify him as Douglas Merritte, the son of a campus hospital wet nurse who received $1 for her tot's participation. Sadly, Albert died at age 6, apparently having suffered all his short life from congenital hydrocephalus, complicated later by meningitis. This brain damage probably influenced his behavior during Watson and Rayner's experiment (Beck et al., 2009, 2010; Fridlund et al., 2012a,b). People also wondered what became of Watson. After losing his Johns Hopkins professorship over an affair with Rayner (whom he later married), he joined an advertising agency as the company's resident psychologist. There he used his knowledge of associative learning to conceive many successful advertising campaigns, including one for Maxwell House that helped make the "coffee break" an American custom (Hunt, 1993).

John B. Watson Watson (1924) admitted to "going beyond my facts" when offering his famous boast: "Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select—doctor, lawyer, artist, merchant-chief, and, yes, even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors."

Little Albert In Watson and Rayner's experiments, "Little Albert" learned to fear a white rat after repeatedly experiencing a loud noise as the rat was presented. In this experiment, what was the US? The UR? The NS? The CS? The CR?

ANSWERS: The US was the loud noise; the UR was the fear response; the NS was the rat before it was paired with the noise; the CS was the rat after pairing; the CR was fear.

Both images Archives of the History of American Psychology, The University of Akron

The treatment of Little Albert would be unacceptable by today's ethical standards. Also, some psychologists, noting that the infant's fear wasn't learned quickly, had difficulty repeating Watson and Rayner's findings with other children. Nevertheless, Little Albert's learned fears led many psychologists to wonder whether each of us might be a walking repository of conditioned emotions. If so, might extinction procedures or even new conditioning help us change our unwanted responses to emotion-arousing stimuli? One patient, who for 30 years had feared going into an elevator alone, did just that. Following his therapist's advice, he forced himself to enter 20 elevators a day. Within 10 days, his fear had nearly vanished (Ellis & Becker, 1982). With support from AirTran, comedian-writer Mark Malkoff likewise extinguished his fear of flying. He lived on an airplane for 30 days, taking 135 flights that had him in the air 14 hours a day (NPR, 2009). After a week and a half, his fears had faded and he began playing games with fellow passengers. (His favorite antic was the "toilet paper experiment": He'd put one end of a roll in the toilet, unroll the rest down the aisle, and flush. The entire roll would be sucked down in three seconds.) In Units XII and XIII we will see more examples of how psychologists use behavioral techniques to treat emotional disorders and promote personal growth.

Module 26 Review

26-1 What is learning, and what are some basic forms of learning?

- *Learning* is the process of acquiring new and relatively enduring information or behaviors.
- In *associative learning,* we learn that certain events occur together.
- In classical conditioning, we learn to associate two or more stimuli (a *stimulus* is any event or situation that evokes a response).
- In operant conditioning, we learn to associate a response and its consequences.
- Through *cognitive learning,* we acquire mental information that guides our behavior. For example, in observational learning, we learn new behaviors by observing events and watching others.

26-2 What are the basic components of classical conditioning, and what was behaviorism's view of learning?

- *Classical conditioning* is a type of learning in which an organism comes to associate stimuli.
- In classical conditioning, an *NS* is a stimulus that elicits no response before conditioning.
- A *UR* is an event that occurs naturally (such as salivation), in response to some stimulus.
- A *US* is something that naturally and automatically (without learning) triggers the unlearned response (as food in the mouth triggers salivation).
- A *CS* is a previously neutral stimulus (such as a tone) that, after association with a US (such as food) comes to trigger a CR.
- A *CR* is the learned response (salivating) to the originally neutral (but now conditioned) stimulus.
- Ivan Pavlov's work on classical conditioning laid the foundation for *behaviorism,* the view that psychology should be an objective science that studies behavior without reference to mental processes.
- The behaviorists believed that the basic laws of learning are the same for all species, including humans.

26-3 In classical conditioning, what are the processes of acquisition, extinction, spontaneous recovery, generalization, and discrimination?

- In classical conditioning, *acquisition* is associating an NS with the US so that the NS begins triggering the CR.
- Acquisition occurs most readily when the NS is presented just before (ideally, about a half-second before) a US, preparing the organism for the upcoming event. This finding supports the view that classical conditioning is biologically adaptive. Through *higher-order conditioning,* a new NS can become a new CS.
- *Extinction* is diminished responding when the CS no longer signals an impending US.
- *Spontaneous recovery* is the appearance of a formerly extinguished response, following a rest period.
- *Generalization* is the tendency to respond to stimuli that are similar to a CS.
- *Discrimination* is the learned ability to distinguish between a CS and other irrelevant stimuli.

26-4 Why does Pavlov's work remain so important, and what have been some applications of his work to human health and well-being?

- Pavlov taught us that significant psychological phenomena can be studied objectively, and that classical conditioning is a basic form of learning that applies to all species.
- Classical conditioning techniques are used to improve human health and well-being in many areas, including therapy for those recovering from drug addiction and for those overcoming fears. The body's immune system may also respond to classical conditioning.