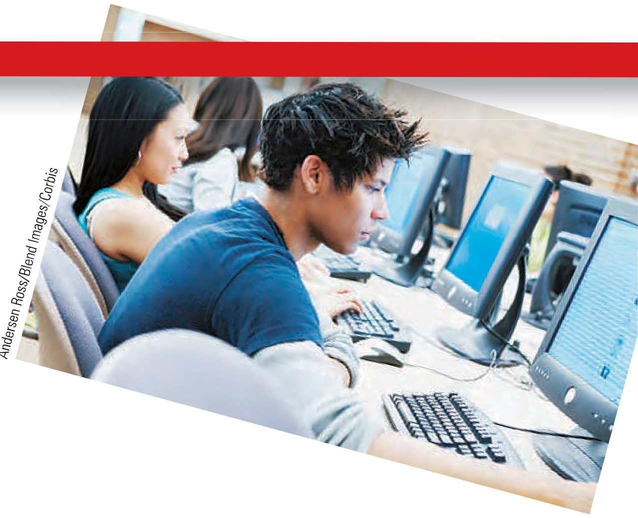
Module 28


Andersen Ross/Blend Images/Corbis

Operant Conditioning's Applications, and Comparison to Classical Conditioning

Module Learning Objectives

28-1 Identify some ways to apply operant conditioning principles at school, in sports, at work, at home, and for self-improvement.

28-2 Identify the characteristics that distinguish operant conditioning from classical conditioning.

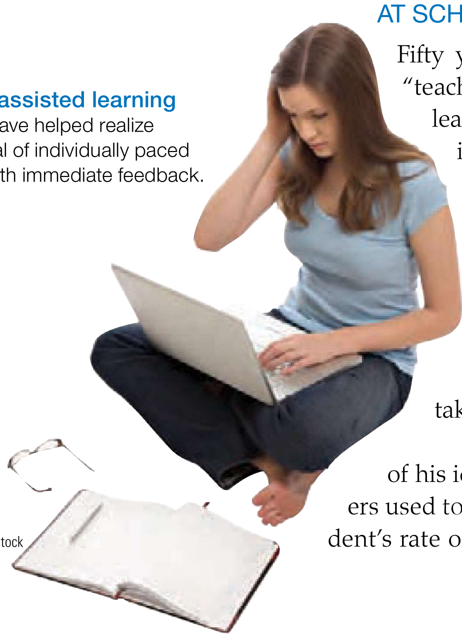
FYI
In later units we will see how psychologists apply operant conditioning principles to help people moderate high blood pressure or gain social skills.

Applications of Operant Conditioning

28-1 How might Skinner's operant conditioning principles be applied at school, in sports, at work, at home, and for self-improvement?

Would you like to apply operant conditioning principles to your own life—to be a healthier person, a more successful student, or a high-achieving athlete? Reinforcement technologies are at work in schools, sports, workplaces, and homes, and these principles can support our self-improvement as well (Flora, 2004).

AT SCHOOL


Christopher Halloran/Shutterstock

Computer-assisted learning Computers have helped realize Skinner's goal of individually paced instruction with immediate feedback.

Fifty years ago, Skinner envisioned a day when "teaching machines and textbooks" would shape learning in small steps, immediately reinforcing correct responses. He believed that such machines and texts would revolutionize education and free teachers to focus on each student's special needs. "Good instruction demands two things," Skinner said. "Students must be told immediately whether what they do is right or wrong and, when right, they must be directed to the step to be taken next."

Skinner might be pleased to know that many of his ideals for education are now possible. Teachers used to find it difficult to pace material to each student's rate of learning, and to provide prompt feedback.

Electronic adaptive quizzing does both. Students move through quizzes at their own pace, according to their own level of understanding. And they get immediate feedback on their efforts.

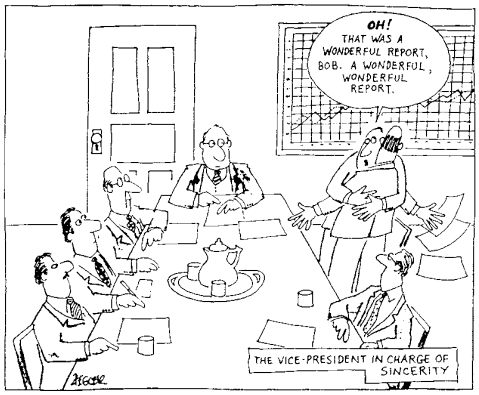
IN SPORTS

The key to shaping behavior in athletic performance, as elsewhere, is first reinforcing small successes and then gradually increasing the challenge. Golf students can learn putting by starting with very short putts, and then, as they build mastery, eventually stepping back farther and farther. Novice batters can begin with half swings at an oversized ball pitched from 10 feet away, giving them the immediate pleasure of smacking the ball. As the hitters' confidence builds with their success and they achieve mastery at each level, the pitcher gradually moves back—to 15, then 22, 30, and 40.5 feet—and eventually introduces a standard baseball. Compared with children taught by conventional methods, those trained by this behavioral method have shown faster skill improvement (Simek & O'Brien, 1981, 1988).

In sports as in the laboratory, the accidental timing of rewards can produce *superstitious behaviors*. If a Skinner box food dispenser gives a pellet of food every 15 minutes, whatever the animal happened to be doing just before the food arrives (perhaps scratching itself) is more likely to be repeated and reinforced, which occasionally can produce a persistent superstitious behavior. Likewise, if a baseball or softball player gets a hit after tapping the plate with the bat, he or she may be more likely to do so again. Over time the player may experience partial reinforcement for what becomes a superstitious behavior.

AT WORK

Knowing that reinforcers influence productivity, many organizations have invited employees to share the risks and rewards of company ownership. Others focus on reinforcing a job well done. Rewards are most likely to increase productivity if the desired performance has been well defined and is achievable. The message for managers? *Reward specific, achievable behaviors, not vaguely defined "merit."*



Operant conditioning also reminds us that reinforcement should be *immediate.* IBM legend Thomas Watson understood. When he observed an achievement, he wrote the employee a check on the spot (Peters & Waterman, 1982). But rewards need not be material or lavish. An effective manager may simply walk the floor and sincerely affirm people for good work, or write notes of appreciation for a completed project. As Skinner said, "How much richer would the whole world be if the reinforcers in daily life were more effectively contingent on productive work?"

AP® Exam Tip

Notice how useful operant conditioning is. People with an understanding of the principles of operant conditioning possess a tremendous tool for changing behavior. If you don't like the way your friends, teachers, coaches, or parents behave, pay attention to the uses of operant conditioning!

AT HOME

As we have seen, parents can learn from operant conditioning practices. Parent-training researchers remind us that by saying, "Get ready for bed" but caving in to protests or defiance, parents reinforce such whining and arguing (Wierson & Forehand, 1994). Exasperated, they may then yell or gesture menacingly. When the child, now frightened, obeys, that reinforces the parents' angry behavior. Over time, a destructive parent-child relationship develops.

"I wrote another five hundred words. Can I have another cookie?"

To disrupt this cycle, parents should remember that basic rule of shaping: *Notice people doing something right and affirm them for it.* Give children attention and other reinforcers when they are behaving *well.* Target a specific behavior, reward it, and watch it increase. When children misbehave or are defiant, don't yell at them or hit them. Simply explain the misbehavior and give them a time-out.

FOR SELF-IMPROVEMENT

Finally, we can use operant conditioning in our own lives (see Close-up: Training Our Partners). To build up your *self-control,* you need to reinforce your own desired behaviors (perhaps to exercise more often) and extinguish the undesired ones (to stop texting while studying, for example). Psychologists suggest taking these steps:

1. *State your goal in measurable terms, and announce it.* You might, for example, aim to boost your study time by an hour a day and share that goal with some close friends.
2. *Monitor how often you engage in your desired behavior.* You might log your current study time, noting under what conditions you do and don't study. (When I began writing textbooks, I logged how I spent my time each day and was amazed to discover how much time I was wasting.)
3. *Reinforce the desired behavior.* To increase your study time, give yourself a reward (a snack or some activity you enjoy) only after you finish your extra hour of study. Agree with your friends that you will join them for weekend activities only if you have met your realistic weekly studying goal.

Close-up

Training Our Partners

By Amy Sutherland

For a book I was writing about a school for exotic animal trainers, I started commuting from Maine to California, where I spent my days watching students do the seemingly impossible: teaching hyenas to pirouette on command, cougars to offer their paws for a nail clipping, and baboons to skateboard.

I listened, rapt, as professional trainers explained how they taught dolphins to flip and elephants to paint. Eventually it hit me that the same techniques might work on that stubborn but lovable species, the American husband.

The central lesson I learned from exotic animal trainers is that I should reward behavior I like and ignore behavior I don't. After all, you don't get a sea lion to balance a ball on the end of its nose by nagging. The same goes for the American husband.

Back in Maine, I began thanking Scott if he threw one dirty shirt into the hamper. If he threw in two, I'd kiss him. Meanwhile, I would step over any soiled clothes on the floor without one sharp word, though I did sometimes kick them under the bed. But as he basked in my appreciation, the piles became smaller.

I was using what trainers call "approximations," rewarding the small steps toward learning a whole new behavior. . . . Once I started thinking this way, I couldn't stop. At the school in California, I'd be scribbling notes on how to walk an emu or have a wolf accept you as a pack member, but I'd be thinking, "I can't wait to try this on Scott. . . ."

After two years of exotic animal training, my marriage is far smoother, my husband much easier to love. I used to take his faults personally; his dirty clothes on the floor were an affront, a symbol of how he didn't care enough about me. But thinking of my husband as an exotic species gave me the distance I needed to consider our differences more objectively.

Excerpted with permission from Sutherland, A., (2006, June 25). What Shamu taught me about a happy marriage, *New York Times.*

4. *Reduce the rewards gradually.* As your new behaviors become more habitual, give yourself a mental pat on the back instead of a cookie.

In addition, we can literally learn from ourselves. There is some evidence that when we have feedback about our bodily responses, we can sometimes change those responses. (See Close-up: Biofeedback.)

Close-up

Biofeedback

Knowing the damaging effects of stress, could we train people to counteract stress, bringing their heart rate and blood pressure under conscious control? When a few psychologists started experimenting with this idea, many of their colleagues thought them foolish. After all, these functions are controlled by the autonomic ("involuntary") nervous system. Then, in the late 1960s, experiments by respected psychologists made the skeptics wonder. Neal Miller, for one, found that rats could modify their heartbeat if given pleasurable brain stimulation when their heartbeat increased or decreased. Later research revealed that some paralyzed humans could also learn to control their blood pressure (Miller & Brucker, 1979).

Miller was experimenting with **biofeedback,** a system of recording, amplifying, and feeding back information about subtle physiological responses. Biofeedback instruments mirror the results of a person's own efforts, thereby allowing the person to learn techniques for controlling a particular physiological response (**FIGURE 28.1**). After a decade of study, however, researchers decided the initial claims for biofeedback were overblown and oversold (Miller, 1985). A 1995 National Institutes of Health panel declared that biofeedback works best on tension headaches.

biofeedback a system for electronically recording, amplifying, and feeding back information regarding a subtle physiological state, such as blood pressure or muscle tension.

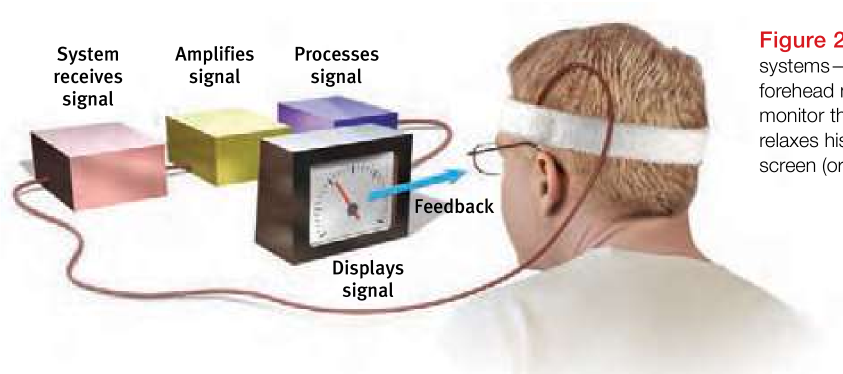


Figure 28.1 Biofeedback systems Biofeedback systems—such as this one, which records tension in the forehead muscle of a headache sufferer—allow people to monitor their subtle physiological responses. As this man relaxes his forehead muscle, the pointer on the display screen (or a tone) may go lower.

Contrasting Classical and Operant Conditioning

28-2 How does operant conditioning differ from classical conditioning?

Both classical and operant conditioning are forms of *associative learning*. Both involve *acquisition, extinction, spontaneous recovery, generalization,* and *discrimination*. But these two forms of learning also differ. Through classical (Pavlovian) conditioning, we associate different stimuli we do not control, and we respond automatically **(respondent behaviors)** (**TABLE 28.1** on the next page). Through operant conditioning, we associate our own behaviors that act on our environment to produce rewarding or punishing stimuli **(operant behaviors)** with their consequences.

As we will see next, our biology and cognitive processes influence both classical and operant conditioning.

respondent behavior behavior that occurs as an automatic response to some stimulus.

operant behavior behavior that operates on the environment, producing consequences.

"O! This learning, what a thing it is." -William Shakespeare, *The Taming of the Shrew*, 1597

Table 28.1 Comparison of Classical and Operant Conditioning

	Classical Conditioning	Operant Conditioning
Basic idea	Organism associates events.	Organism associates behavior and resulting events.
Response	Involuntary, automatic.	Voluntary, operates on environment.
Acquisition	Associating events; NS is paired with US and becomes CS.	Associating response with a consequence (reinforcer or punisher).
Extinction	CR decreases when CS is repeatedly presented alone.	Responding decreases when reinforcement stops.
Spontaneous recovery	The reappearance, after a rest period, of an extinguished CR.	The reappearance, after a rest period, of an extinguished response.
Generalization	The tendency to respond to stimuli similar to the CS.	Organism's response to similar stimuli is also reinforced.
Discrimination	The learned ability to distinguish between a CS and other stimuli that do not signal a US.	Organism learns that certain responses, but not others, will be reinforced.

Before You Move On

▶ **ASK YOURSELF**

Can you recall a time when a teacher, coach, family member, or employer helped you learn something by shaping your behavior in little steps until you achieved your goal?

▶ **TEST YOURSELF**

Salivating in response to a tone paired with food is a(n) __________ behavior; pressing a bar to obtain food is a(n) __________ behavior.

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

Module 28 Review

28-1 How might Skinner's operant conditioning principles be applied at school, in sports, at work, at home, and for self-improvement?

- At school, teachers can use shaping techniques to guide students' behaviors, and they can use electronic adaptive quizzing to provide immediate feedback.
- In sports, coaches can build players' skills and self-confidence by rewarding small improvements.
- At work, managers can boost productivity and morale by rewarding well-defined and achievable behaviors.
- At home, parents can reward desired behaviors but not undesirable ones.
- We can shape our own behaviors by stating our goals, monitoring the frequency of desired behaviors, reinforcing desired behaviors, and gradually reducing rewards as behaviors become habitual.

28-2 How does operant conditioning differ from classical conditioning?

- In operant conditioning, an organism learns associations between its own behavior and resulting events; this form of conditioning involves *operant behavior* (behavior that operates on the environment, producing rewarding or punishing consequences).
- In classical conditioning, the organism forms associations between stimuli—events it does not control; this form of conditioning involves *respondent behavior* (automatic responses to some stimulus).

Multiple-Choice Questions

1. What do we call it when the CR decreases as the CS is repeatedly presented alone?

a. Generalization
b. Discrimination
c. Spontaneous recovery
d. Extinction
e. Acquisition

2. The basic idea behind classical conditioning is that the organism

a. associates events.
b. associates behavior and resulting events.
c. voluntarily operates on the environment.
d. associates response with a consequence.
e. quits responding when reward stops.

3. What do we call the reappearance, after a rest period, of an extinguished response?

a. Acquisition
b. Spontaneous recovery
c. Discrimination
d. Operant conditioning
e. Classical conditioning

4. What do we call behavior that occurs as an automatic response to some stimulus?

a. Respondent behavior
b. Operant behavior
c. Extinguished behavior
d. Biofeedback conditioning
e. Skinnerian conditioning

5. Superstitious behavior can be produced by

a. careful manipulation of a classical conditioning experiment.
b. the accidental timing of rewards.
c. possession of a large number of traditionally lucky items.
d. cognitive awareness of superstitious behavior in others.
e. the change in a reinforcement schedule from ratio to interval.

Practice FRQs

1. Explain two differences between classical and operant conditioning.

Answer

Any two differences described in Table 28.1 can be used to answer. Examples include:

1 point: Classical conditioning involves involuntary responses, but operant conditioning involves voluntary responses.

1 point: In classical conditioning, the learner associates two events (a conditioned stimulus with an unconditioned stimulus). In operant conditioning, the learner associates a behavior with a consequence.

2. Raud is planning to use operant conditioning to help him reach his self-improvement goal of running in his community's 10-kilometer race in July. Explain four things Raud should include in his self-improvement plan.

(4 points)

Module 29

Biology, Cognition, and Learning

Chris Schmidt/Getty Images

Module Learning Objectives

29-1 Explain how biological constraints affect classical and operant conditioning.

29-2 Explain how cognitive processes affect classical and operant conditioning.

29-3 Identify the two ways that people learn to cope with personal problems.

29-4 Describe how a perceived lack of control can affect people's behavior and health.

AP® Exam Tip

In the middle of the twentieth century, behaviorism was the dominant perspective in psychology, with little attention paid to the influence of biology and cognition in learning. Now we know better. As you read through this module, notice how important biological and cognitive factors are for understanding learning.

From drooling dogs, running rats, and pecking pigeons we have learned much about the basic processes of learning. But conditioning principles don't tell us the whole story. Today's learning theorists recognize that learning is the product of the interaction of biological, psychological, and social-cultural influences (**FIGURE 29.1**).

Biological Constraints on Conditioning

29-1 How do biological constraints affect classical and operant conditioning?

Ever since Charles Darwin, scientists have assumed that all animals share a common evolutionary history and thus share commonalities in their makeup and functioning. Pavlov and Watson, for example, believed the basic laws of learning were essentially similar in all animals. So it should make little difference whether one studied pigeons or people. Moreover, it seemed that any natural response could be conditioned to any neutral stimulus.

Limits on Classical Conditioning

In 1956, learning researcher Gregory Kimble proclaimed, "Just about any activity of which the organism is capable can be conditioned and . . . these responses can be conditioned to any stimulus that the organism can perceive" (p. 195). Twenty-five years later, he humbly acknowledged that "half a thousand" scientific reports had proven him wrong (Kimble, 1981). More than the early behaviorists realized, an animal's capacity for conditioning is constrained by its biology. Each species' predispositions prepare it to learn the associations that enhance its survival. Environments are not the whole story.

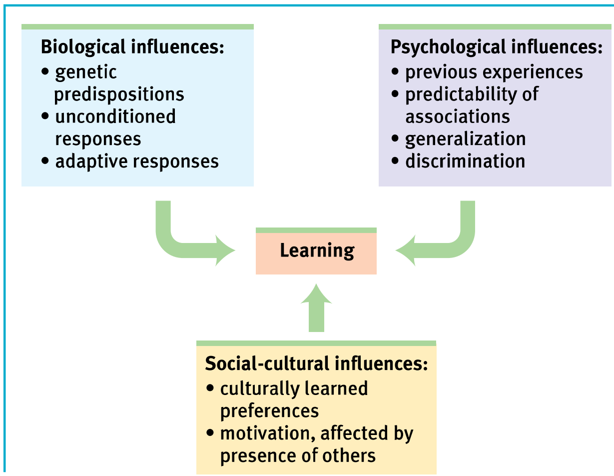


Figure 29.1
Biopsychosocial influences on learning Our learning results not only from environmental experiences, but also from cognitive and biological influences.

John Garcia As the laboring son of California farmworkers, Garcia attended school only in the off-season during his early childhood years. After entering junior college in his late twenties, and earning his Ph.D. in his late forties, he received the American Psychological Association's Distinguished Scientific Contribution Award "for his highly original, pioneering research in conditioning and learning." He was also elected to the National Academy of Sciences.

John Garcia was among those who challenged the prevailing idea that all associations can be learned equally well. While researching the effects of radiation on laboratory animals, Garcia and Robert Koelling (1966) noticed that rats began to avoid drinking water from the plastic bottles in radiation chambers. Could classical conditioning be the culprit? Might the rats have linked the plastic-tasting water (a CS) to the sickness (UR) triggered by the radiation (US)?

To test their hunch, Garcia and Koelling exposed the rats to a particular taste, sight, or sound (CS) and later also to radiation or drugs (US) that led to nausea and vomiting (UR). Two startling findings emerged: First, even if sickened as late as several hours after tasting a particular novel flavor, the rats thereafter avoided that flavor. This appeared to violate the notion that for conditioning to occur, the US must immediately follow the CS.

Second, the sickened rats developed aversions to tastes but not to sights or sounds. This contradicted the behaviorists' idea that any perceivable stimulus could serve as a CS. But it made adaptive sense. For rats, the easiest way to identify tainted food is to taste it; if sickened after sampling a new food, they thereafter avoid it. This response, called *taste aversion,* makes it difficult to eradicate a population of "bait-shy" rats by poisoning.

Humans, too, seem biologically prepared to learn some associations rather than others. If you become violently ill four hours after eating contaminated seafood, you will probably develop an aversion to the taste of seafood but usually not to the sight of the associated restaurant, its plates, the people you were with, or the music you heard there. (In contrast, birds, which hunt by sight, appear biologically primed to develop aversions to the *sight* of tainted food [Nicolaus et al., 1983].)

Garcia's early findings on taste aversion were met with an onslaught of criticism. As the German philosopher Arthur Schopenhauer (1788–1860) once said, important ideas are first ridiculed, then attacked, and finally taken for granted. Leading journals refused to publish Garcia's work: The findings are impossible, said some critics. But, as often happens in science, Garcia and Koelling's taste-aversion research is now basic textbook material.

BSIP SA / Alamy

Taste aversion If you became violently ill after eating oysters, you probably would have a hard time eating them again. Their smell and taste would have become a CS for nausea. This learning occurs readily because our biology prepares us to learn taste aversions to toxic foods.

It is also a good example of experiments that begin with the discomfort of some laboratory animals and end by enhancing the welfare of many others. In one conditioned taste-aversion study, coyotes and wolves were tempted into eating sheep carcasses laced with a sickening poison. Thereafter, they developed an aversion to sheep meat; two wolves later penned with a live sheep seemed actually to fear it (Gustavson et al., 1974, 1976). These studies not only saved the sheep from their predators, but also saved the sheep-shunning coyotes and wolves from angry ranchers and farmers who had wanted to destroy them. Similar applications have prevented baboons from raiding African gardens, raccoons from attacking chickens, and ravens and crows from feeding on crane eggs. In all these cases, research helped preserve both the prey and their predators, who occupy an important ecological niche (Dingfelder, 2010; Garcia & Gustavson, 1997).

"All animals are on a voyage through time, navigating toward futures that promote their survival and away from futures that threaten it. Pleasure and pain are the stars by which they steer." -Psychologists Daniel T. Gilbert and Timothy D. Wilson, "Prospection: Experiencing the Future," 2007

Such research supports Darwin's principle that natural selection favors traits that aid survival. Our ancestors who readily learned taste aversions were unlikely to eat the same toxic food again and were more likely to survive and leave descendants. Nausea, like anxiety, pain, and other bad feelings, serves a good purpose. Like a low-oil warning on a car dashboard, each alerts the body to a threat (Neese, 1991).

blickwinkel/Alamy

Animal taste aversion As an alternative to killing wolves and coyotes that preyed on sheep, some ranchers have sickened the animals with lamb laced with a drug.

And remember those Japanese quail that were conditioned to get excited by a red light that signaled a receptive female's arrival? Michael Domjan and his colleagues (2004) report that such conditioning is even speedier, stronger, and more durable when the CS is *ecologically relevant*—something similar to stimuli associated with sexual activity in the natural environment, such as the stuffed head of a female quail. In the real world, observes Domjan (2005), conditioned stimuli have a natural association with the unconditioned stimuli they predict.

The tendency to learn behaviors favored by natural selection may help explain why we humans seem to be naturally disposed to learn associations between the color red and sexuality. Female primates display red when nearing ovulation. In human females, enhanced bloodflow produces the red blush of flirtation and sexual excitation. Does the frequent pairing of red and sex—with Valentine's hearts, red-light districts, and red lipstick—naturally enhance men's attraction to women? Experiments (**FIGURE 29.2**) suggest that, without men's awareness, it does (Elliot & Niesta, 2008). In follow-up studies, men who viewed a supposed female conversation partner in a red rather than green shirt chose to sit closer to where they expected her to sit and to ask her more intimate questions (Kayser et al., 2010). And it's not just men: Women tend to perceive men as more attractive when seen on a red background or in red clothing (Elliot et al., 2010).

Figure 29.2

Romantic red In a series of experiments that controlled for other factors (such as the brightness of the image), men found women more attractive and sexually desirable when framed in red (Elliot & Niesta, 2008).

Both images Kathryn Brownson, Hope College

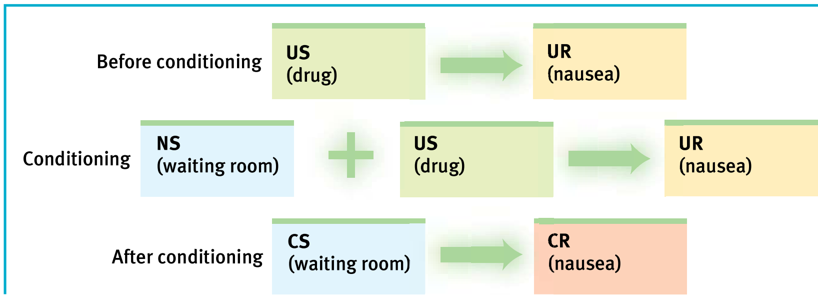


Figure 29.3
Nausea conditioning in cancer patients

A genetic predisposition to associate a CS with a US that follows predictably and immediately is adaptive: Causes often immediately precede effects. Often, but not always, as we saw in the taste-aversion findings. At such times, our predispositions can trick us. When chemotherapy triggers nausea and vomiting more than an hour following treatment, cancer patients may over time develop classically conditioned nausea (and sometimes anxiety) to the sights, sounds, and smells associated with the clinic (**FIGURE 29.3**) (Hall, 1997). Merely returning to the clinic's waiting room or seeing the nurses can provoke these conditioned feelings (Burish & Carey, 1986; Davey, 1992). Under normal circumstances, such revulsion to sickening stimuli would be adaptive.

"Once bitten, twice shy." -G. F. Northall, *Folk-Phrases*, 1894

Limits on Operant Conditioning

As with classical conditioning, nature sets limits on each species' capacity for operant conditioning. Mark Twain (1835–1910) said it well: "Never try to teach a pig to sing. It wastes your time and annoys the pig."

We most easily learn and retain behaviors that reflect our biological predispositions. Thus, using food as a reinforcer, you could easily condition a hamster to dig or to rear up, because these are among the animal's natural food-searching behaviors. But you won't be so successful if you use food as a reinforcer to shape face washing and other hamster behaviors that aren't normally associated with food or hunger (Shettleworth, 1973). Similarly, you could easily teach pigeons to flap their wings to avoid being shocked, and to peck to obtain food: Fleeing with their wings and eating with their beaks are natural pigeon behaviors. However, pigeons would have a hard time learning to peck to avoid a shock, or to flap their wings to obtain food (Foree & LoLordo, 1973). The principle: *Biological constraints predispose organisms to learn associations that are naturally adaptive.*

Natural athletes Animals can most easily learn and retain behaviors that draw on their biological predispositions, such as horses' inborn ability to move around obstacles with speed and agility.

AP Photo/The Gallup Independent, Jeffery Jones

In the early 1940s, University of Minnesota graduate students Marian Breland and Keller Breland witnessed the power of operant conditioning (1961; Bailey & Gillaspy, 2005). Their mentor was B. F. Skinner. Impressed with his results, they began training dogs, cats, chickens, parakeets, turkeys, pigs, ducks, and hamsters. The rest is history. The company they formed spent the next half-century training more than 15,000 animals from 140 species for movies, traveling shows, amusement parks, corporations, and the government. And along the way, the Brelands themselves mentored others, including Sea World's first director of training.

In their early training days, the Brelands presumed that operant principles would work on almost any response an animal could make. But along the way, they too learned about biological constraints. In one act, pigs trained to pick up large wooden "dollars" and deposit them in a piggy bank began to drift back

FYI

For more information on animal behavior, see books by (I am not making this up) Robin Fox and Lionel Tiger.

to their natural ways. They dropped the coin, pushed it with their snouts as pigs are prone to do, picked it up again, and then repeated the sequence—delaying their food reinforcer. This *instinctive drift* occurred as the animals reverted to their biologically predisposed patterns.

Cognition's Influence on Conditioning

29-2 How do cognitive processes affect classical and operant conditioning?

Cognitive Processes and Classical Conditioning

In their dismissal of "mentalistic" concepts such as consciousness, Pavlov and Watson underestimated the importance not only of biological constraints on an organism's learning capacity, but also the effects of cognitive processes (thoughts, perceptions, expectations). The early behaviorists believed that rats' and dogs' learned behaviors could be reduced to mindless mechanisms, so there was no need to consider cognition. But Robert Rescorla and Allan Wagner (1972) showed that an animal can learn the *predictability* of an event. If a shock always is preceded by a tone, and then may also be preceded by a light that accompanies the tone, a rat will react with fear to the tone but not to the light. Although the light is always followed by the shock, it adds no new information; the tone is a better predictor. The more predictable the association, the stronger the conditioned response. It's as if the animal learns an *expectancy,* an awareness of how likely it is that the US will occur.

"All brains are, in essence, anticipation machines." -Daniel C. Dennett, *Consciousness Explained*, 1991

Associations can influence attitudes (Hofmann et al., 2010). When British children viewed novel cartoon characters alongside either ice cream *(Yum!)* or brussels sprouts *(Yuck!)*, they came to like best the ice-cream-associated characters (Field, 2006). Other researchers have classically conditioned adults' attitudes, using little-known Pokémon characters (Olson & Fazio, 2001). The participants, playing the role of a security guard monitoring a video screen, viewed a stream of words, images, and Pokémon characters. Their task, they were told, was to respond to one target Pokémon character by pressing a button. Unnoticed by the participants, when two other Pokémon characters appeared on the screen, one was consistently associated with various positive words and images (such as *awesome* or a hot fudge sundae); the other appeared with negative words and images (such as *awful* or a cockroach). Without any conscious memory for the pairings, the participants formed more gut-level liking for the characters associated with the positive stimuli.

Follow-up studies indicate that conditioned likes and dislikes are even stronger when people notice and are aware of the associations they have learned (Shanks, 2010). Cognition matters.

Such experiments help explain why classical conditioning treatments that ignore cognition often have limited success. For example, people receiving therapy for alcohol use disorder may be given alcohol spiked with a nauseating drug. Will they then associate alcohol with sickness? If classical conditioning were merely a matter of "stamping in" stimulus associations, we might hope so, and to some extent this does occur (as we will see in Module 71). However, one's awareness that the nausea is induced by the drug, not the alcohol, often weakens the association between drinking alcohol and feeling sick. So, even in classical conditioning, it is (especially with humans) not simply the CS-US association but also the thought that counts.

Cognitive Processes and Operant Conditioning

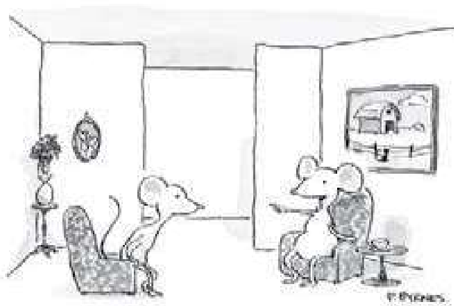
B. F. Skinner acknowledged the biological underpinnings of behavior and the existence of private thought processes. Nevertheless, many psychologists criticized him for discounting the importance of these influences.

A mere eight days before dying of leukemia in 1990, Skinner stood before the American Psychological Association convention. In this final address, he again resisted the growing belief that cognitive processes (thoughts, perceptions, expectations) have a necessary place in the science of psychology and even in our understanding of conditioning. He viewed "cognitive science" as a throwback to early twentieth-century introspectionism. For Skinner, thoughts and emotions were behaviors that follow the same laws as other behaviors.

Nevertheless, the evidence of cognitive processes cannot be ignored. For example, animals on a fixed-interval reinforcement schedule respond more and more frequently as the time approaches when a response will produce a reinforcer. Although a strict behaviorist would object to talk of "expectations," the animals behave as if they expected that repeating the response would soon produce the reward.

LATENT LEARNING

Evidence of cognitive processes has also come from studying rats in mazes, including classic studies by Edward Chase Tolman (1886–1959) and C. H. Honzik that were done in Skinner's youth. Rats exploring a maze, given no obvious rewards, seem to develop a **cognitive map,** a mental representation of the maze, much like your mental map of your school. This map, and the rats' learning, is not demonstrated until the experimenter places food in the maze's goal box, which motivates the rats to run the maze at least as quickly and efficiently as other rats that were previously reinforced with food for this result (Tolman & Honzik, 1930).



"Bathroom? Sure, it's just down the hall to the left, jog right, left, another left, straight past two more lefts, then right, and it's at the end of the third corridor on your right."

Like people sightseeing in a new town, the exploring rats seemingly experienced **latent learning** during their earlier tours. That learning became apparent only when there was some incentive to demonstrate it. Children, too, may learn from watching a parent but demonstrate the learning only much later, as needed. The point to remember: *There is more to learning than associating a response with a consequence; there is also cognition.* In Unit VII we will encounter more striking evidence of cognitive abilities in solving problems and in using language.

INSIGHT LEARNING

Some learning occurs after little or no systematic interaction with our environment. For example, we may puzzle over a problem, and suddenly, the pieces fall together as we perceive the solution in a sudden flash of **insight**—an abrupt, true-seeming, and often satisfying solution (Topolinski & Reber, 2010). Ten-year-old Johnny Appleton's insight solved a problem that had stumped construction workers: how to rescue a young robin that had fallen into a narrow 30-inch-deep hole in a cement-block wall. Johnny's solution: Slowly pour in sand, giving the bird enough time to keep its feet on top of the constantly rising pile (Ruchlis, 1990).

INTRINSIC MOTIVATION

The cognitive perspective has also shown us the limits of rewards: Promising people a reward for a task they already enjoy can backfire. Excessive rewards can destroy **intrinsic motivation**—the desire to perform a behavior effectively for its own sake. In experiments, children have been promised a payoff for playing with an interesting puzzle or toy. Later, they played with the toy *less* than other unpaid children did (Deci et al., 1999; Tang & Hall, 1995). Likewise, rewarding children with toys or candy for reading diminishes the time they spend reading (Marinak & Gambrell, 2008). It is as if they think, "If I have to be bribed into doing this, it must not be worth doing for its own sake." This overuse of bribes—leading people to see their actions as externally controlled rather than internally appealing—has been called *overjustification*.

cognitive map a mental representation of the layout of one's environment. For example, after exploring a maze, rats act as if they have learned a cognitive map of it.

latent learning learning that occurs but is not apparent until there is an incentive to demonstrate it.

insight a sudden realization of a problem's solution.

intrinsic motivation a desire to perform a behavior effectively for its own sake.

Pure love If this girl were suddenly told that she must look after her baby cousin from now on, she might lose some of the joy that her intrinsic motivation to care for him has provided.

To sense the difference between intrinsic motivation and **extrinsic motivation** (behaving in certain ways to gain external rewards or avoid threatened punishment), think about your experience in this course. Are you feeling pressured to finish this reading before a deadline? Worried about your grade? Eager for college credit by doing well on the AP® Exam? If *Yes,* then you are extrinsically motivated (as, to some extent, almost all students must be). Are you also finding the material interesting? Does learning it make you feel more competent? If there were no grade at stake, might you be curious enough to want to learn the material for its own sake? If *Yes,* intrinsic motivation also fuels your efforts.

Youth sports coaches who aim to promote enduring interest in an activity, not just to pressure players into winning, should focus on the intrinsic joy of playing and of reaching one's potential (Deci & Ryan, 1985, 2009). Giving people choices also enhances their intrinsic motivation (Patall et al., 2008). Nevertheless, rewards used to signal a job well done (rather than to bribe or control someone) can be effective (Boggiano et al., 1985). "Most improved player" awards, for example, can boost feelings of competence and increase enjoyment of a sport. Rightly administered, rewards can raise performance and spark creativity (Eisenberger & Aselage, 2009; Henderlong & Lepper, 2002). And extrinsic rewards (such as the college scholarships and jobs that often follow good grades) are here to stay. **TABLE 29.1** compares the biological and cognitive influences on classical and operant conditioning.

extrinsic motivation a desire to perform a behavior to receive promised rewards or avoid threatened punishment.

Table 29.1 Biological and Cognitive Influences on Conditioning

	Classical Conditioning	Operant Conditioning
Biological predispositions	Natural predispositions constrain what stimuli and responses can easily be associated.	Organisms best learn behaviors similar to their natural behaviors; unnatural behaviors instinctively drift back toward natural ones.
Cognitive processes	Organisms develop expectation that CS signals the arrival of US.	Organisms develop expectation that a response will be reinforced or punished; they also exhibit latent learning, without reinforcement.

Learning and Personal Control

29-3 In what two ways do people learn to cope with personal problems?

Problems in life are unavoidable. This fact gives us a clear message: We need to learn to **cope** with the problems in our lives by alleviating the *stress* they cause with emotional, cognitive, or behavioral methods.

Some problems, called stressors, we address directly, with **problem-focused coping.** If our impatience leads to a family fight, we may go directly to that family member to work things out. We tend to use problem-focused strategies when we feel a sense of control over a situation and think we can change the circumstances, or at least change ourselves to deal with the circumstances more capably.

We turn to **emotion-focused coping** when we cannot—or *believe* we cannot—change a situation. If, despite our best efforts, we cannot get along with that family member, we may search for stress relief by reaching out to friends for support and comfort. Emotion-focused strategies can be adaptive, as when we exercise or keep busy with hobbies to avoid thinking about an old addiction. Emotion-focused strategies can be maladaptive, however, as when

coping alleviating stress using emotional, cognitive, or behavioral methods.

problem-focused coping attempting to alleviate stress directly—by changing the stressor or the way we interact with that stressor.

emotion-focused coping attempting to alleviate stress by avoiding or ignoring a stressor and attending to emotional needs related to one's stress reaction.

Huntstock, Inc/Alamy

Emotion-focused coping Reaching out to friends can help us attend to our emotional needs in stressful situations.

students worried about not keeping up with the reading in class go out to party to get it off their mind. Sometimes a problem-focused strategy (catching up with the reading) more effectively reduces stress and promotes long-term health and satisfaction.

When challenged, some of us tend to respond with cool problem-focused coping, others with emotion-focused coping (Connor-Smith & Flachsbart, 2007). Our feelings of personal control, our explanatory style, and our supportive connections all influence our ability to cope. So, how might learning influence whether we cope successfully?

Learned Helplessness

29-4 How does a perceived lack of control affect people's behavior and health?

Picture the scene: Two rats receive simultaneous shocks. One can turn a wheel to stop the shocks. The helpless rat, but not the wheel turner, becomes more susceptible to ulcers and lowered immunity to disease (Laudenslager & Reite, 1984). In humans, too, uncontrollable threats trigger the strongest stress responses (Dickerson & Kemeny, 2004).

Feeling helpless and oppressed may lead to a state of passive resignation called **learned helplessness** (**FIGURE 29.4**). Researcher Martin Seligman (1975, 1991) discovered this in some long-ago experiments in which dogs were strapped in a harness and given repeated shocks, with no opportunity to avoid them. Later, when placed in another situation where they *could* escape the punishment by simply leaping a hurdle, the dogs cowered as if without hope. In contrast, animals able to escape the first shocks learned personal control and easily escaped the shocks in the new situation.

learned helplessness the hopelessness and passive resignation an animal or human learns when unable to avoid repeated aversive events.

Humans can also learn helplessness. When repeatedly faced with traumatic events over which they have no control, people come to feel helpless, hopeless, and depressed.

Perceiving a loss of control, we become more vulnerable to stress and ill health. A famous study of elderly nursing home residents with little perceived control over their activities found that they declined faster and died sooner than those given more control (Rodin, 1986). Workers able to adjust office furnishings and control interruptions and distractions in their work environment have experienced

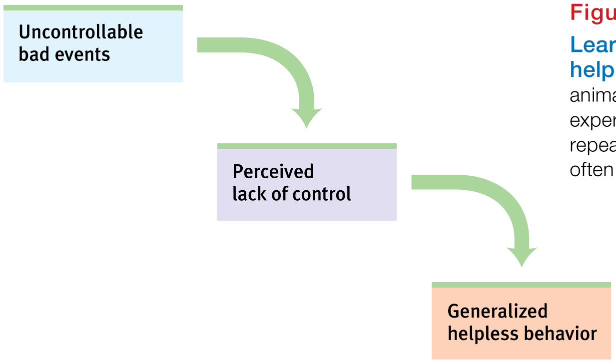


Figure 29.4 **Learned helplessness** When animals and people experience no control over repeated bad events, they often learn helplessness.

PRNewsFoto/Home Interiors & Gifts; Habitat for Humanity Women Build

Happy to have control After working on the building—alongside Habitat for Humanity volunteers—for several months, this family is finally experiencing the joy of having their own new home.

less stress (O'Neill, 1993). Such findings may help explain why British civil service workers at the executive grades have tended to outlive those at clerical or laboring grades, and why Finnish workers with low job stress have been less than half as likely to die of strokes or heart disease as those with a demanding job and little control. The more control workers have, the longer they live (Bosma et al., 1997, 1998; Kivimaki et al., 2002; Marmot et al., 1997).

Increasing self-control—allowing prisoners to move chairs and control room lights and the TV, having workers participate in decision making, offering nursing home patients choices about their environment—noticeably improves health and morale (Humphrey et al., 2007; Wang et al., 2010). In the case of the nursing home patients, 93 percent of those encouraged to exert more control became more alert, active, and happy (Rodin, 1986). As researcher Ellen Langer (1983, p. 291) concluded, "Perceived control is basic to human functioning."

Control may also help explain a well-established link between economic status and longevity (Jokela et al., 2009). In one study of 843 grave markers in an old graveyard in Glasgow, Scotland, those with the costliest, highest pillars (indicating the most affluence) tended to have lived the longest (Carroll et al., 1994). Likewise, those living in Scottish regions with the least overcrowding and unemployment have the greatest longevity. There and elsewhere, high economic status predicts a lower risk of heart and respiratory diseases (Sapolsky, 2005). Wealthy predicts healthy among children, too (Chen, 2004). With higher economic status come reduced risks of low birth weight, infant mortality, smoking, and violence. Even among other primates, individuals at the bottom of the social pecking order have been more likely than their higher-status companions to become sick when exposed to a cold-like virus (Cohen et al., 1997). But high status also entails stress: High-status baboons and monkeys who frequently have to physically defend their dominant position show high stress levels (Sapolsky, 2005).

Why does perceived loss of control predict health problems? Because losing control provokes an outpouring of stress hormones. When rats cannot control shock or when primates or humans feel unable to control their environment, stress hormone levels rise, blood pressure increases, and immune responses drop (Rodin, 1986; Sapolsky, 2005). Captive animals therefore experience more stress and are more vulnerable to disease than are wild animals (Roberts, 1988). Human studies have confirmed that crowding in high-density neighborhoods, prisons, and college and university dorms is another source of diminished feelings of control—and of elevated levels of stress hormones and blood pressure (Fleming et al., 1987; Ostfeld et al., 1987).

INTERNAL VERSUS EXTERNAL LOCUS OF CONTROL

If experiencing a loss of control can be stressful and unhealthy, do people who generally feel in control of their lives enjoy better health? Consider your own feelings of control. Do you believe that your life is beyond your control? That getting a decent summer job depends mainly on being in the right place at the right time? Or do you more strongly believe that what happens to you is your own doing? That being a success is a matter of hard work? Did your parents influence your feelings of control? Did your culture?

Hundreds of studies have compared people who differ in their perceptions of control. On one side are those who have what psychologist Julian Rotter called an **external locus of control**—the perception that chance or outside forces determine their fate. On the other are those who perceive an **internal locus of control,** who believe that they control their own destiny. In study after study, "internals" have achieved more in school and work,

external locus of control the perception that chance or outside forces beyond our personal control determine our fate.

internal locus of control the perception that you control your own fate.

acted more independently, enjoyed better health, and felt less depressed than did "externals" (Lefcourt, 1982; Ng et al., 2006). Moreover, they were better at delaying gratification and coping with various stressors, including marital problems (Miller & Monge, 1986). One study followed 7551 British people for two decades. Those who expressed a more internal locus of control at age 10 exhibited less obesity, hypertension, and distress at age 30 (Gale et al., 2008). Other studies have found that people who believe in free will, or that willpower is controllable, learn better, perform better at work, and are more helpful (Job et al., 2010; Stillman et al., 2010).

Compared with their parents' generation, more Americans now endorse an external locus of control (Twenge et al., 2004). This shift may help explain an associated increase in rates of depression and other psychological disorders in the new generation (Twenge et al., 2010).

DEPLETING AND STRENGTHENING SELF-CONTROL

Self-control is the ability to control impulses and delay short-term gratification for longer-term rewards. In studies, this ability has predicted good adjustment, better grades, and social success (Tangney et al., 2004). Students who planned their day's activities and then lived out their day as planned were also at low risk for depression (Nezlek, 2001).

self-control the ability to control impulses and delay short-term gratification for greater long-term rewards.

Self-control often fluctuates. Like a muscle, self-control temporarily weakens after an exertion, replenishes with rest, and becomes stronger with exercise (Baumeister & Exline, 2000; Hagger et al., 2010; Vohs & Baumeister, 2011). Exercising willpower temporarily depletes the mental energy needed for self-control on other tasks (Gailliott & Baumeister, 2007). In one experiment, hungry people who had resisted the temptation to eat chocolate chip cookies abandoned a tedious task sooner than those who had not resisted the cookies. And after expending willpower on laboratory tasks, such as stifling prejudice or saying the color of words (for example, "red" even if the red-colored word was *green*), people were less restrained in their aggressive responses to provocation and in their sexuality (DeWall et al., 2007; Gaillot & Baumeister, 2007).

LatitudeStock/Brian Fairbrother/Getty Images

AP Photo/Marty Lederhandler

Extreme self-control Our ability to exert self-control increases with practice, and some of us have practiced more than others! Magician David Blaine (above) endured standing in a block of ice (in which a small space had been carved out for him) for nearly 62 hours for a stunt in New York's Times Square. A number of performing artists make their living as very convincing human statues, as does this actress (left) performing on The Royal Mile in Edinburgh, Scotland.

Researchers have found that exercising willpower depletes the blood sugar and neural activity associated with mental focus (Inzlicht & Gutsell, 2007). What, then, might be the effect of deliberately boosting people's blood sugar when self-control is depleted? Giving energy-boosting sugar (in a naturally rather than an artificially sweetened lemonade) had a sweet effect: It strengthened people's effortful thinking and reduced their financial impulsiveness (Masicampo & Baumeister, 2008; Wang & Dvorak, 2010). Even dogs can experience both self-control depletion on the one hand and rejuvenation with sugar on the other (Miller et al., 2010).

In the long run, self-control requires attention and energy. With physical exercise and time-managed study programs, people have strengthened their self-control, as seen in both their performance on laboratory tasks and their improved self-management of eating, drinking, smoking, and household chores (Oaten & Cheng, 2006a,b). *The bottom line:* We can grow our willpower muscles—our capacity for self-regulation. But doing so requires some (dare I say it?) willpower.

Before You Move On

▶ ASK YOURSELF

How are you intrinsically motivated? What are some extrinsic motivators in your life?

▶ TEST YOURSELF

When faced with a situation over which you feel you have no sense of control, is it most effective to use emotion- or problem-focused coping? Why?

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

Module 29 Review

29-1 How do biological constraints affect classical and operant conditioning?

- Classical conditioning principles, we now know, are constrained by biological predispositions, so that learning some associations is easier than learning others.
- Learning is adaptive: Each species learns behaviors that aid its survival.
- Biological constraints also place limits on operant conditioning. Training that attempts to override biological constraints will probably not endure because animals will revert to predisposed patterns.

29-2 How do cognitive processes affect classical and operant conditioning?

- In classical conditioning, animals may learn when to expect a US and may be aware of the link between stimuli and responses.
- In operant conditioning, *cognitive mapping* and *latent learning* research demonstrate the importance of cognitive processes in learning.
- Other research shows that excessive rewards (driving *extrinsic motivation*) can undermine *intrinsic motivation.*

29-3 In what two ways do people learn to cope with personal problems?

- We use *problem-focused coping* to change the stressor or the way we interact with it.
- We use *emotion-focused coping* to avoid or ignore stressors and attend to emotional needs related to stress reactions.

29-4 How does a perceived lack of control affect people's behavior and health?

- Being unable to avoid repeated aversive events can lead to *learned helplessness*.
- People who perceive an *internal locus of control* achieve more, enjoy better health, and are happier than those who perceive an *external locus of control*.
- *Self-control* requires attention and energy, but it predicts good adjustment, better grades, and social success.
- A perceived lack of control provokes an outpouring of hormones that put people's health at risk.

Multiple-Choice Questions

1. What do we call a desire to perform a behavior in order to receive promised rewards or to avoid threatened punishment?

a. Latent learning
b. Extrinsic motivation
c. Intrinsic motivation
d. Insight learning
e. Emotion-focused coping

2. Which ability is a good predictor of good adjustment, better grades, and social success?

a. Self-control
b. Locus of control
c. Problem-focused coping
d. Learned helplessness
e. Emotion-focused coping

3. Elephants appear to have the capacity to remember large-scale spaces over long periods. Which of the following best identifies this capacity?

a. Latent learning
b. Insight
c. Cognitive maps
d. Intrinsic motivation
e. Extrinsic motivation

4. The perception that we control our own fate is also called what?

a. Self-control
b. Learned helplessness
c. Internal locus of control
d. External locus of control
e. Emotion-focused coping

5. A woman had been pondering a problem for days and was about to give up when, suddenly, the solution came to her. Her experience can be best described as what?

a. Cognitive mapping
b. Insight
c. Operant conditioning
d. Classical conditioning
e. Unconscious associative learning

Practice FRQs

1. Provide two specific examples of how biology can influence classical conditioning.

Answer

Any two examples from the module can be used to answer. Possibilities include:

1 point: Garcia's research showed that rats are more likely to develop a classically conditioned aversion to tastes than to sights or sounds.

1 point: Humans are biologically predisposed to form associations between the color red and sexuality.

2. Describe how each of the following can show the impact of cognition on operant conditioning.

- Latent learning
- Insight learning
- Intrinsic motivation

(3 points)

Module 30

Learning by Observation


JGI/Jamie Grill/Getty Images

Module Learning Objectives

30-1 Describe the process of observational learning, and explain how some scientists believe it is enabled by mirror neurons.

30-2 Discuss the impact of prosocial modeling and of antisocial modeling.

30-1 What is observational learning, and how do some scientists believe it is enabled by mirror neurons?

observational learning learning by observing others. Also called *social learning*.

modeling the process of observing and imitating a specific behavior.

Cognition is certainly a factor in **observational learning** (also called *social learning*) in which higher animals, especially humans, learn without direct experience, by watching and imitating others. A child who sees his sister burn her fingers on a hot stove learns not to touch it. We learn our native languages and various other specific behaviors by observing and imitating others, a process called **modeling.**

Picture this scene from an experiment by Albert Bandura, the pioneering researcher of observational learning (Bandura et al., 1961): A preschool child works on a drawing. An adult in another part of the room is building with Tinkertoys. As the child watches, the adult gets up and for nearly 10 minutes pounds, kicks, and throws around the room a large inflated Bobo doll, yelling, "Sock him in the nose. . . . Hit him down. . . . Kick him."

AP® Exam Tip

Bandura's Bobo doll experiment is one of the most famous in psychology. It shows up frequently on the AP® exam.

The child is then taken to another room filled with appealing toys. Soon the experimenter returns and tells the child she has decided to save these good toys "for the other children." She takes the now-frustrated child to a third room containing a few toys, including a Bobo doll. Left alone, what does the child do?

Albert Bandura "The Bobo doll follows me wherever I go. The photographs are published in every introductory psychology text and virtually every undergraduate takes introductory psychology. I recently checked into a Washington hotel. The clerk at the desk asked, 'Aren't you the psychologist who did the Bobo doll experiment?' I answered, 'I am afraid that will be my legacy.' He replied, 'That deserves an upgrade. I will put you in a suite in the quiet part of the hotel'" (2005).

Compared with children not exposed to the adult model, those who viewed the model's actions were more likely to lash out at the doll. Observing the aggressive outburst apparently lowered their inhibitions. But *something more* was also at work, for the children imitated the very acts they had observed and used the very words they had heard (**FIGURE 30.1**).

That "something more," Bandura suggests, was this: By watching a model, we experience *vicarious reinforcement* or *vicarious punishment,* and we learn to anticipate a behavior's consequences in situations like those we are observing. We are especially likely to learn from people we perceive

Courtesy of Albert Bandura, Stanford University

Figure 30.1
The famous Bobo doll experiment Notice how the children's actions directly imitate the adult's.

as similar to ourselves, as successful, or as admirable. Functional MRI scans show that when people observe someone winning a reward (and especially when it's someone likable and similar to themselves) their own brain reward systems activate, much as if they themselves had won the reward (Mobbs et al., 2009). When we identify with someone, we experience their outcomes vicariously. Lord Chesterfield (1694–1773) had the idea: "We are, in truth, more than half what we are by imitation."

Mirrors and Imitation in the Brain

On a 1991 hot summer day in Parma, Italy, a lab monkey awaited its researchers' return from lunch. The researchers had implanted wires next to its motor cortex, in a frontal lobe brain region that enabled the monkey to plan and enact movements. The monitoring device would alert the researchers to activity in that region of the monkey's brain. When the monkey moved a peanut into its mouth, for example, the device would buzz. That day, as one of the researchers reentered the lab, ice cream cone in hand, the monkey stared at him. As the researcher raised the cone to lick it, the monkey's monitor buzzed—as if the motionless monkey had itself moved (Blakeslee, 2006; Iacoboni, 2008, 2009).

mirror neurons frontal lobe neurons that some scientists believe fire when performing certain actions or when observing another doing so. The brain's mirroring of another's action may enable imitation and empathy.

The same buzzing had been heard earlier, when the monkey watched humans or other monkeys move peanuts to their mouths. The flabbergasted researchers had, they believed, stumbled onto a previously unknown type of neuron (Rizzolatti et al., 2002, 2006). These presumed **mirror neurons** may provide a neural basis for everyday imitation and observational learning. When a monkey grasps, holds, or tears something, these neurons fire. And they likewise fire when the monkey observes another doing so. When one monkey sees, its neurons mirror what another monkey does.

Imitation is widespread in other species. In one experiment, a monkey watching another selecting certain pictures to gain treats learned to imitate the order of choices (**FIGURE 30.2** on the next page). In other research, rhesus macaque monkeys rarely made up quickly after a fight—unless they grew up with forgiving older macaques. Then, more often than not, their fights, too, were quickly followed by reconciliation (de Waal & Johanowicz, 1993). Rats, pigeons, crows, and gorillas all observe others and learn (Byrne et al., 2011; Dugatkin, 2002).

Mirror neurons at work?

David Sipress

"Your back is killing me!"

Figure 30.2
Cognitive imitation Monkey A (far left) watched Monkey B touch four pictures on a display screen in a certain order to gain a banana. Monkey A learned to imitate that order, even when shown the same pictures in a different configuration (Subiaul et al., 2004).

As Module 85 describes, chimpanzees observe and imitate all sorts of novel foraging and tool use behaviors, which are then transmitted from generation to generation within their local culture (Hopper et al., 2008; Whiten et al., 2007).

In humans, imitation is pervasive. Our catchphrases, fashions, ceremonies, foods, traditions, morals, and fads all spread by one person copying another. Imitation shapes even very young humans' behavior (Bates & Byrne, 2010). Shortly after birth, a baby may imitate an adult who sticks out his tongue. By 8 to 16 months, infants imitate various novel gestures (Jones, 2007). By age 12 months (**FIGURE 30.3**), they look where an adult is looking (Meltzoff et al., 2009). And by age 14 months, children imitate acts modeled on TV (Meltzoff, 1988; Meltzoff & Moore, 1989, 1997). Even as 2½-year-olds, when many of their mental abilities are near those of adult chimpanzees, young humans surpass chimps at social tasks such as imitating another's solution to a problem (Herrmann et al., 2007). Children see, children do.

So strong is the human predisposition to learn from watching adults that 2- to 5-year-old children *overimitate*. Whether living in urban Australia or rural Africa, they copy even irrelevant adult actions. Before reaching for a toy in a plastic jar, they will first stroke the jar with a feather if that's what they have observed (Lyons et al., 2007). Or, imitating an adult, they will wave a stick over a box and then use the stick to push on a knob that opens the box—when all they needed to do to open the box was to push on the knob (Nielsen & Tomaselli, 2010).

Humans, like monkeys, have brains that support empathy and imitation. Researchers cannot insert experimental electrodes in human brains, but they can use fMRI scans to see brain activity associated with performing and with observing actions. So, is the human

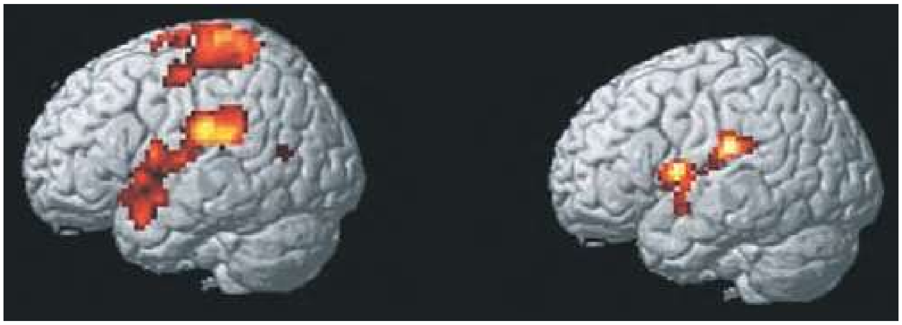
> "Children need models more than they need critics." -Joseph Joubert, *Pensées*, 1842

Figure 30.3
Imitation This 12-month-old infant sees an adult look left, and immediately follows her gaze. (From Meltzoff et al., 2009.)

capacity to simulate another's action and to share in another's experience due to specialized mirror neurons? Or is it due to distributed brain networks? That issue is currently being debated (Gallese et al. 2011; Iacoboni, 2008, 2009; Mukamel et al., 2010). Regardless, children's brains enable their empathy and their ability to infer another's mental state, an ability known as *theory of mind.*

The brain's response to observing others makes emotions contagious. Through its neurological echo, our brain simulates and vicariously experiences what we observe. So real are these mental instant replays that we may misremember an action we have observed as an action we have performed (Lindner et al., 2010). But through these reenactments, we grasp others' states of mind. Observing others' postures, faces, voices, and writing styles, we unconsciously synchronize our own to theirs—which helps us feel what they are feeling (Bernieri et al., 1994; Ireland & Pennebaker, 2010). We find ourselves yawning when they yawn, laughing when they laugh.

When observing movie characters smoking, smokers' brains spontaneously simulate smoking, which helps explain their cravings (Wagner et al., 2011). Seeing a loved one's pain, our faces mirror the other's emotion. But as **FIGURE 30.4** shows, so do our brains. In this fMRI scan, the pain imagined by an empathic romantic partner has triggered some of the same brain activity experienced by the loved one actually having the pain (Singer et al., 2004). Even reading fiction may trigger such activity, as we mentally simulate (and vicariously experience) the experiences described (Mar & Oatley, 2008; Speer et al., 2009). The bottom line: *Brain activity underlies our intensely social nature.*



Pain Empathy

Figure 30.4
Experienced and imagined pain in the brain Brain activity related to actual pain (left) is mirrored in the brain of an observing loved one (right). Empathy in the brain shows up in emotional brain areas, but not in the somatosensory cortex, which receives the physical pain input.

Applications of Observational Learning

30-2 What is the impact of prosocial modeling and of antisocial modeling?

So the big news from Bandura's studies and the mirror-neuron research is that we look, we mentally imitate, and we learn. Models—in our family or neighborhood, or on TV—may have effects, good or bad.

Prosocial Effects

The good news is that **prosocial** (positive, helpful) models can have prosocial effects. Many business organizations effectively use *behavior modeling* to help new employees learn communications, sales, and customer service skills (Taylor et al., 2005). Trainees gain these skills faster when they are able to observe the skills being modeled effectively by experienced workers (or actors simulating them).

prosocial behavior positive, constructive, helpful behavior. The opposite of antisocial behavior.

Zumapress/Newscom

A model caregiver This girl is learning orphan-nursing skills, as well as compassion from her mentor in this Humane Society program. As the sixteenth-century proverb states, "Example is better than precept."

People who exemplify nonviolent, helpful behavior can also prompt similar behavior in others. India's Mahatma Gandhi and America's Martin Luther King, Jr., both drew on the power of modeling, making nonviolent action a powerful force for social change in both countries. Parents are also powerful models. European Christians who risked their lives to rescue Jews from the Nazis usually had a close relationship with at least one parent who modeled a strong moral or humanitarian concern; this was also true for U.S. civil rights activists in the 1960s (London, 1970; Oliner & Oliner, 1988). The observational learning of morality begins early. Socially responsive toddlers who readily imitate their parents tend to become preschoolers with a strong internalized conscience (Forman et al., 2004).

Models are most effective when their actions and words are consistent. Sometimes, however, models say one thing and do another. To encourage children to read, read to them and surround them with books and people who read. To increase the odds that your children will practice your religion, worship and attend religious activities with them. Many parents seem to operate according to the principle "Do as I *say,* not as I do." Experiments suggest that children learn to do both (Rice & Grusec, 1975; Rushton, 1975). Exposed to a hypocrite, they tend to imitate the hypocrisy—by doing what the model did and saying what the model said.

Antisocial Effects

The bad news is that observational learning may have *antisocial effects.* This helps us understand why abusive parents might have aggressive children, and why many men who beat their wives had wife-battering fathers (Stith et al., 2000). Critics note that being aggressive could be passed along by parents' genes. But with monkeys we know it can be environmental. In study after study, young monkeys separated from their mothers and subjected to high levels of aggression grew up to be aggressive themselves (Chamove, 1980). The lessons we learn as children are not easily replaced as adults, and they are sometimes visited on future generations.

FYI

Screen time's greatest effect may stem from what it displaces. Children and adults who spend several hours a day in front of a screen spend that many fewer hours in other pursuits—talking, studying, playing, reading, or socializing face-to-face with friends. What would you have done with your extra time if you had spent even half as many hours in front of a screen, and how might you therefore be different?

TV shows and Internet videos are a powerful source of observational learning. While watching TV and videos, children may "learn" that bullying is an effective way to control others, that free and easy sex brings pleasure without later misery or disease, or that men should be tough and women gentle. And they have ample time to learn such lessons. During their first 18 years, most children in developed countries spend more time watching TV shows than they spend in school. The average teen watches TV shows more than 4 hours a day; the average adult, 3 hours (Robinson & Martin, 2009; Strasburger et al., 2010).

TV-show viewers are learning about life from a rather peculiar storyteller, one that reflects the culture's mythology but not its reality. Between 1998 and 2006, prime-time violence reportedly increased 75 percent (PTC, 2007). If we include cable programming and video rentals, the violence numbers escalate. An analysis of more than 3000 network and cable programs aired during one closely studied year revealed that nearly 6 in 10 featured violence, that 74 percent of the violence went unpunished, that 58 percent did not show the victims' pain, that nearly half the incidents involved "justified" violence, and that nearly half involved an attractive perpetrator. These conditions define the recipe for the *violence-viewing effect* described in many studies (Donnerstein, 1998, 2011). To read more about this effect, see Thinking Critically About: Does Viewing Media Violence Trigger Violent Behavior?

"The problem with television is that the people must sit and keep their eyes glued to a screen: The average American family hasn't time for it. Therefore the showmen are convinced that . . . television will *never* be a serious competitor of [radio] broadcasting."
-New York Times, 1939

Thinking Critically About

Does Viewing Media Violence Trigger Violent Behavior?

Was the judge who, in 1993, tried two British 10-year-olds for the murder of a 2-year-old right to suspect that the pair had been influenced by "violent video films"? Were the American media right to wonder if Adam Lanza, the 2012 mass killer of young children and their teachers at Connecticut's Sandy Hook Elementary School, was influenced by his playing of the violent video games found stockpiled in his home? To understand whether violence viewing leads to violent behavior, researchers have done some 600 correlational and experimental studies (Anderson & Gentile, 2008; Comstock, 2008; Murray, 2008).

Correlational studies do support this link:

- In the United States and Canada, homicide rates doubled between 1957 and 1974, just when TV was introduced and spreading. Moreover, census regions with later dates for TV service also had homicide rates that jumped later.
- White South Africans were first introduced to TV in 1975. A similar near-doubling of the homicide rate began after 1975 (Centerwall, 1989).
- Elementary schoolchildren with heavy exposure to media violence (via TV, videos, and video games) tend to get into more fights (**FIGURE 30.5**). As teens, they are at greater risk for violent behavior (Boxer et al., 2009).

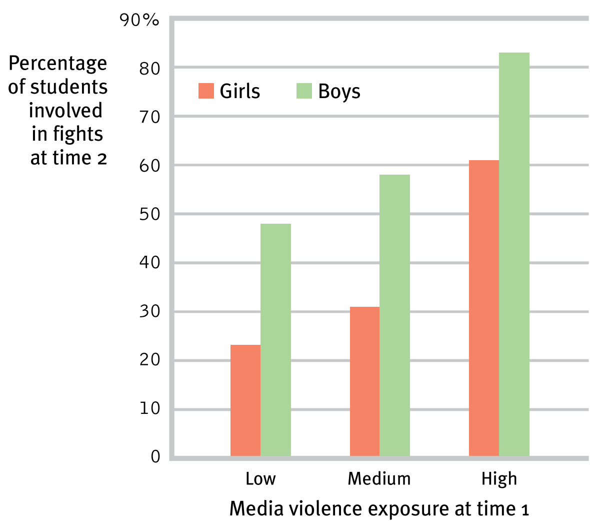
But as we know from Unit II, correlation need not mean causation. So these studies do not prove that viewing violence causes aggression (Freedman, 1988; McGuire, 1986). Maybe aggressive children prefer violent programs. Maybe abused or neglected children are both more aggressive and more often left in front of the TV or computer. Maybe violent programs simply reflect, rather than affect, violent trends.

To pin down causation, psychologists experimented. They randomly assigned some viewers to observe violence and others to watch entertaining nonviolence. Does viewing cruelty prepare people, when irritated, to react more cruelly? To some extent, it does. This is especially so when an attractive person commits seemingly justified, realistic violence that goes unpunished and causes no visible pain or harm (Donnerstein, 1998, 2011).

The violence-viewing effect seems to stem from at least two factors. One is *imitation* (Geen & Thomas, 1986). Children as young as 14 months will imitate acts they observe on TV (Meltzoff & Moore, 1989, 1997). As they watch, their brains simulate the behavior, and after this inner rehearsal they become more likely to act it out. Thus, in one experiment, violent play increased sevenfold immediately after children viewed *Power Rangers* episodes (Boyatzis et al., 1995). As happened in the Bobo doll experiment, children often precisely imitated the models' violent acts—in this case, flying karate kicks.

Prolonged exposure to violence also *desensitizes* viewers. They become more indifferent to it when later viewing a brawl, whether on TV or in real life (Fanti et al., 2009; Rule & Ferguson, 1986). Adult males who spent three evenings watching sexually violent movies became progressively less bothered by the rapes and slashings. Compared with those in a control group, the film watchers later expressed less sympathy for domestic violence victims, and they rated the victims' injuries as less severe (Mullin & Linz, 1995). Likewise, moviegoers were less likely to help an injured woman pick up her crutches if they had just watched a violent rather than a nonviolent movie (Bushman & Anderson, 2009).

Drawing on such findings, the American Academy of Pediatrics (2009) has advised pediatricians that "media violence can contribute to aggressive behavior, desensitization to violence, nightmares, and fear of being harmed." Indeed, an evil psychologist could hardly imagine a better way to make people indifferent to brutality than to expose them to a graded series of scenes, from fights to killings to the mutilations in slasher movies (Donnerstein et al., 1987). Watching cruelty fosters indifference.



Stanislav Solntsev/Getty Images

Figure 30.5 Heavy exposure to media violence predicts future aggressive behavior Researchers studied more than 400 third- to fifth-graders. After controlling for existing differences in hostility and aggression, the researchers reported increased aggression in those heavily exposed to violent TV, videos, and video games (Gentile et al., 2004).

* * *

Our knowledge of learning principles comes from the work of hundreds of investigators. This unit has focused on the ideas of a few pioneers—Ivan Pavlov, John Watson, B. F. Skinner, and Albert Bandura. They illustrate the impact that can result from single-minded devotion to a few well-defined problems and ideas. These researchers defined the issues and impressed on us the importance of learning. As their legacy demonstrates, intellectual history is often made by people who risk going to extremes in pushing ideas to their limits (Simonton, 2000).

Before You Move On

▶ ASK YOURSELF

Who has been a significant role model for you? For whom are you a model?

▶ TEST YOURSELF

Jason's parents and older friends all smoke, but they advise him not to. Juan's parents and friends don't smoke, but they say nothing to deter him from doing so. Will Jason or Juan be more likely to start smoking?

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

Module 30 Review

30-1 What is observational learning, and how do some scientists believe it is enabled by mirror neurons?

- In *observational learning,* as we observe and imitate others we learn to anticipate a behavior's consequences, because we experience vicarious reinforcement or vicarious punishment.
- Our brain's frontal lobes have a demonstrated ability to mirror the activity of another's brain. The same areas fire when we perform certain actions (such as responding to pain or moving our mouth to form words), as when we observe someone else performing those actions.

30-2 What is the impact of prosocial modeling and of antisocial modeling?

- Children tend to imitate what a model does and says, whether the behavior being *modeled* is *prosocial* (positive, constructive, and helpful) or antisocial.
- If a model's actions and words are inconsistent, children may imitate the hypocrisy they observe.

Multiple-Choice Questions

1. Bandura's famous Bobo doll experiment is most closely associated with which of the following?

a. Latent learning
b. Classical conditioning
c. Operant conditioning
d. Cognitive maps
e. Observational learning

2. Which of the following processes is the best term for explaining how we learn languages?

a. Biofeedback
b. Discrimination
c. Modeling
d. Insight
e. Creativity

3. Which of the following is the most likely consequence of the brain's tendency to vicariously experience something we observe?

a. Actual physical injury
b. The risk of misremembering our own actions
c. Interference with associative learning
d. The elimination of classically conditioned responses to stimuli
e. A confusion between reinforcers and rewards in an operant conditioning setting

4. When is prosocial modeling most effective?

a. When the model acts in a way consistent with the prosocial lesson
b. When the model verbally emphasizes the prosocial lesson but acts as she chooses
c. When the model is predisposed to the prosocial conduct
d. When the observer has a close personal relationship with the model
e. When the model is well-known

5. Which of the following is the best synonym for social learning?

a. Observational learning
b. Modeling
c. Mirror neuron imitation
d. Prosocial model
e. Imitation

Practice FRQs

1. Explain how Bandura's Bobo doll experiment illustrates each of the following:

- Modeling
- Mirror neurons

Answer

1 point: Modeling can be described as the behavior of the child as he or she imitates the adult.

1 point: Mirror neurons on the child's brain presumably would fire the same way when watching the adult or when imitating the adult's behavior.

2. A young boy is left at home with his older brother while their parents drop off the family car for repairs. While the parents are out, the older brother prepares lunch for the young boy. Then the older brother takes the younger brother outside where he entertains him by building several fires with small twigs. Explain how the older brother's conduct is:

- Prosocial modeling
- Antisocial modeling

(2 points)

Unit VI Review

Key Terms and Concepts to Remember

learning, p. 263
habituation, p. 264
associative learning, p. 264
stimulus, p. 264
cognitive learning, p. 265
classical conditioning, p. 266
behaviorism, p. 266
neutral stimulus (NS), p. 266
unconditioned response (UR), p. 267
unconditioned stimulus (US), p. 267
conditioned response (CR), p. 268
conditioned stimulus (CS), p. 268
acquisition, p. 268
higher-order conditioning, p. 268
extinction, p. 269
spontaneous recovery, p. 269
generalization, p. 269
discrimination, p. 270
operant conditioning, p. 275
law of effect, p. 275
operant chamber, p. 276
reinforcement, p. 276
shaping, p. 276
discriminative stimulus, p. 277
positive reinforcement, p. 277
negative reinforcement, p. 278
primary reinforcer, p. 278
conditioned reinforcer, p. 278
reinforcement schedule, p. 279
continuous reinforcement, p. 279
partial (intermittent) reinforcement, p. 279
fixed-ratio schedule, p. 279
variable-ratio schedule, p. 280
fixed-interval schedule, p. 280
variable-interval schedule, p. 280
punishment, p. 281
biofeedback, p. 289
respondent behavior, p. 289
operant behavior, p. 289
cognitive map, p. 297
latent learning, p. 297
insight, p. 297
intrinsic motivation, p.297
extrinsic motivation, p. 298
coping, p. 298
problem-focused coping, p. 298
emotion-focused coping, p. 298
learned helplessness, p. 299
external locus of control, p. 300
internal locus of control, p. 300
self-control, p. 301
observational learning, p. 304
modeling, p. 304
mirror neurons, p. 305
prosocial behavior, p. 307

Key Contributors to Remember

Ivan Pavlov, p. 266
John B. Watson, p. 266
B. F. Skinner, p. 275
Edward Thorndike, p. 275
John Garcia, p. 293
Robert Rescorla, p. 296
Edward Tolman, p. 297
Albert Bandura, p. 304

AP® Exam Practice Questions

Multiple-Choice Questions

1. Which of the following most accurately describes an impact of punishment?

a. Punishment is a good way to increase a behavior, as long as it is not used too frequently.
b. Punishment may create problems in the short term but rarely produces long-term side effects.
c. Punishment can be effective at stopping specific behaviors quickly.
d. Punishment typically results in an increase of a behavior that caused the removal of an aversive stimulus.
e. Punishment should never be used (in the opinion of most psychologists), because the damage it causes can never be repaired.

2. Which of the following is an application of shaping?

a. A mother who wants her daughter to hit a baseball first praises her for holding a bat, then for swinging it, and then for hitting the ball.
b. A pigeon pecks a disk 25 times for an opportunity to receive a food reinforcement.
c. A rat presses a bar when a green light is on but not when a red light is on.
d. A rat gradually stops pressing a bar when it no longer receives a food reinforcement.
e. A gambler continues to play a slot machine, even though he has won nothing on his last 20 plays, and he has lost a significant amount of money.

3. What is one of the principal functions of mirror neurons?

a. To allow an organism to replace an unconditioned response with a conditioned response
b. To help produce intrinsic motivation in some children
c. To be the mechanism by which the brain accomplishes observational learning
d. To produce the neural associations that are the basis of both classical and operant conditioning
e. To explain why modeling prosocial behavior is more effective than modeling negative behavior

4. Which of the following illustrates generalization?

a. A rabbit that has been conditioned to blink to a tone also blinks when a similar tone is sounded.
b. A dog salivates to a tone but not to a buzzer.
c. A light is turned on repeatedly until a rat stops flexing its paw when it's turned on.
d. A pigeon whose disk-pecking response has been extinguished is placed in a Skinner box three hours later and begins pecking the disk again.
e. A child is startled when the doorbell rings.

5. What did Albert Bandura's Bobo doll experiments demonstrate?

a. Children are likely to imitate the behavior of adults.
b. There may be a negative correlation between televised violence and aggressive behavior.
c. Children are more likely to copy what adults say than what adults do.
d. Allowing children to watch too much television is detrimental to their development.
e. Observational learning can explain the development of fears in children.

6. What did Robert Rescorla and Allan Wagner's experiments establish?

a. That the acquisition of a CR depends on pairing the CS and the US
b. That different species respond differently to classical conditioning situations
c. The current belief that classical conditioning is really a form of operant conditioning
d. That mirror neurons form the biological basis of classical conditioning
e. The importance of cognitive factors in classical conditioning

7. What does Edward Thorndike's law of effect state?

a. The difference between positive and negative reinforcement
b. That behavior maintained by partial reinforcement is more resistant to extinction than behavior maintained by continuous reinforcement
c. How shaping can be used to establish operant conditioning
d. That rewarded behavior is more likely to happen again
e. The limited effectiveness of punishment

8. Which of the following processes would produce the acquisition of a conditioned response?

a. Repeatedly present an unconditioned response
b. Administer the conditioned stimulus without the unconditioned stimulus
c. Make sure that the conditioned stimulus comes at least one minute before the unconditioned stimulus
d. Pair a neutral stimulus with an unconditioned stimulus several times
e. Present the conditioned stimulus until it starts to produce an unconditioned response

9. Which of the following would help determine what stimuli an organism can distinguish between?

a. Negative reinforcement
b. A variable-ratio schedule of reinforcement
c. A fixed-ratio schedule of reinforcement
d. Extinction
e. A discriminative stimulus

10. A student studies diligently to avoid the bad feelings associated with a previously low grade on a test. In this case, the studying behavior is being strengthened because of what kind of reinforcement?

a. Positive reinforcement
b. Negative reinforcement
c. Delayed reinforcement
d. Primary reinforcement
e. Conditioned reinforcement

11. Taste aversion studies lead researchers to which of the following conclusions?

a. Taste is the most fundamental of the senses.
b. There are genetic predispositions involved in taste learning.
c. Animals must evaluate a situation cognitively before taste aversion develops.
d. Taste aversion is a universal survival mechanism.
e. An unconditioned stimulus must occur within seconds of a CS for conditioning to occur.

12. Mary checks her phone every 30 minutes for incoming text messages. Her behavior is being maintained by what kind of reinforcement schedule?

a. Fixed-interval
b. Variable-interval
c. Variable-ratio
d. Fixed-ratio
e. Continuous

13. A dog is trained to salivate when it hears a tone associated with food. Then the tone is sounded repeatedly without an unconditioned stimulus until the dog stops salivating. Later, when the tone sounds again, the dog salivates again. This is a description of what part of the conditioning process?

a. Spontaneous recovery
b. Extinction
c. Generalization
d. Discrimination
e. Acquisition

14. Latent learning is evidence for which of these conclusions?

a. Punishment is an ineffective means of controlling behavior.
b. Negative reinforcement should be avoided when possible.
c. Cognition plays an important role in operant conditioning.
d. Conditioned reinforcers are more effective than primary reinforcers.
e. Shaping is usually not necessary for operant conditioning.

15. Classical and operant conditioning are based on the principles of which psychological perspective?

a. Cognitive
b. Biological
c. Behaviorist
d. Evolutionary
e. Humanist

Free-Response Questions

1. Briefly explain how the concepts below could be used to help a child stop throwing temper tantrums.

- Extinction (operant conditioning)
- Positive reinforcement
- Modeling
- Negative reinforcement
- Shaping
- Extinction (classical conditioning)

Rubric for Free Response Question 1

1 point: **Extinction (operant conditioning)** The child might be throwing a temper tantrum because that behavior is being reinforced (for example, it gains the child desired attention from a parent). Extinction could be used to stop the temper tantrum by removing the reinforcement. Without the reinforcement, eventually the behavior (tantrums) should decrease. Pages 279, 290

1 point: **Positive reinforcement** A positive reinforcement (such as reading a favorite book) could be used to encourage a behavior other than temper tantrums. The child could be given the positive reinforcement after a "prosocial" behavior, such as sharing a toy with a friend instead of throwing a tantrum. Page 277

1 point: **Modeling** The child might learn to avoid temper tantrums through modeling or observational learning. A parent or other adult could show positive behaviors when disappointed, and the child might imitate this behavior. Page 304

1 point: **Negative reinforcement** Negative reinforcement occurs when a stimulus is removed, and this removal reinforces a behavior. In this situation, a parent or adult could sit the child on a "time-out" seat as soon as the temper tantrum begins. The child could leave the time out seat as soon as she or he stops crying. The removal of the aversive stimulus of the time out seat could reinforce not crying, and help to stop the temper tantrums. Page 278

1 point: **Shaping** A parent or other adult could gradually shape the child's negative behavior toward desired behaviors by rewarding successive approximations. For example, a child could first be rewarded for crying more quietly during a tantrum, then for stopping yelling, then for avoiding the tantrum completely. Page 276

1 point: **Extinction (classical conditioning)** In the context of classical conditioning, a behavior becomes extinct because a neutral stimulus is repeatedly presented without the unconditioned stimulus. For example, a child might have been classically conditioned to throw a tantrum whenever the child's brother is present, because the brother always pinches the child. The tantrums could be made extinct by convincing the brother to stop the pinching. The conditioned stimulus (the brother) is presented to the child without the unconditioned stimulus (the pinching). After repeated pairings, the conditioned response of the tantrum should become extinct. Pages 269, 290

Multiple-choice self-tests and more may be found at www.worthpublishers.com/MyersAP2e

2. Martin is a sixth-grade teacher who feels he is not able to connect with some of his students. Several of them have had academic problems in the past and although Martin feels that they can do the work, he believes that these students have given up. Explain how Martin could use each of these concepts to learn how best to help his students succeed.

- External locus of control
- Self-control
- Learned helplessness
- Intrinsic motivation

(4 points)

3. Researchers investigating conditioning throughout the history of psychology reached very different conclusions about how humans learn behaviors. Explain how these theorists might explain this example of behavior and response: A child cries when she sees a large pile of peas on her dinner plate.

- Edward Thorndike
- B. F. Skinner
- Ivan Pavlov
- Albert Bandura

(4 points)