Adaptive Pathway Instructor Guide for Chapter 5

Learning

MODULE 5.1–5.3: CLASSICAL CONDITIONING

LO 5.1 AP 5.1 Identify the components of classical conditioning.

LO 5.2 Recognize how emotional responses can be classically conditioned.

LO 5.3 Explain different factors that affect the acquisition and extinction of classically conditioned responses.

MODULE 5.4–5.7: OPERANT CONDITIONING

LO 5.4 Recognize the similarities and differences between classical conditioning and operant conditioning.

LO 5.5 Distinguish between positive and negative reinforcement.

LO 5.6 AP 5.2 Distinguish between positive and negative punishment.

LO 5.7 AP 5.3 Identify how the different schedules of reinforcement affect behavior.

MODULE 5.8–5.9: MODIFYING BEHAVIOR WITH OPERANT CONDITIONING

LO 5.8 Identify how behaviors are modified through the process of shaping.

LO 5.9 Describe applied behavior analysis.

MODULE 5.10–5.11: OBSERVATIONAL LEARNING

LO 5.10 Identify the role of mirror neurons in learning.

LO 5.11 Recognize the characteristics necessary for observational learning.

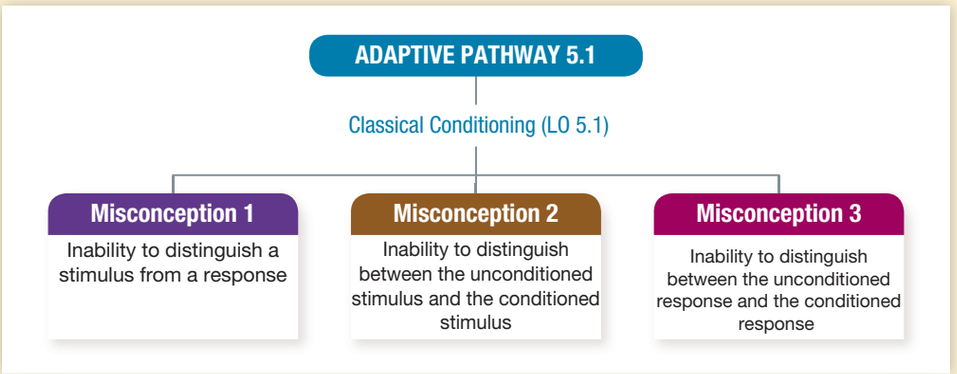
MODULE 5.12–5.13: LEARNING AND COGNITION

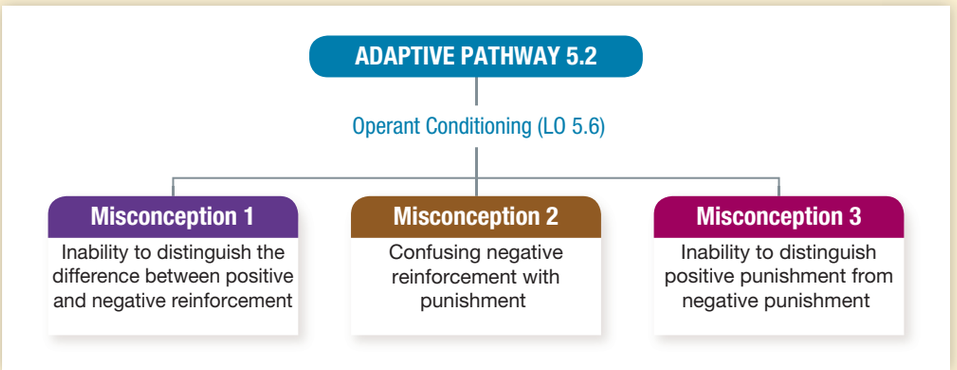
LO 5.12 Explain the cognitive theory of insight learning.

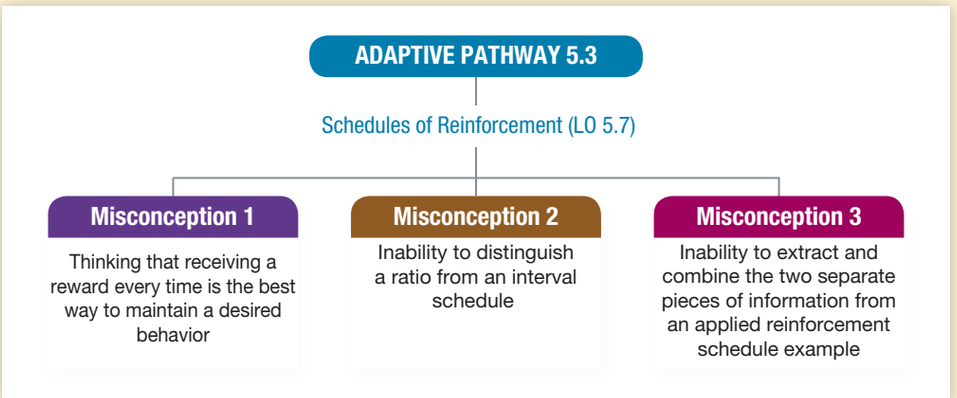
LO 5.13 Define latent learning.

MODULE 5.14: PIECING IT TOGETHER: VIOLENT VIDEO GAMES

LO 5.14 **Analyze how the cross-cutting themes of psychology are related to the topic of violent video games.**







Adaptive Pathway Content

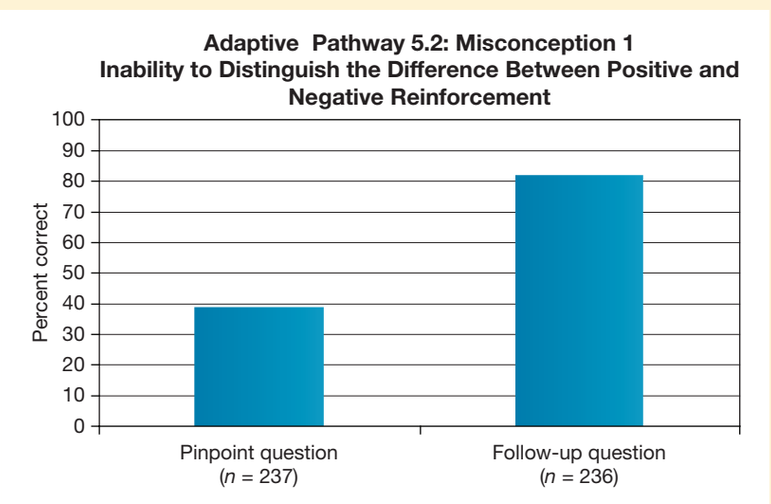
If you have taught introductory psychology before, you already know the learning chapter can be challenging for many students. In fact, research evaluating "bottleneck concepts" in psychology (or concepts that are traditionally difficult for students to master) demonstrated that psychology instructors rated classical conditioning and operant conditioning as the top two most difficult concepts for students in all of introductory psychology (Gurung & Landrum, 2013). We conducted two separate surveys (Study 1 = 38 instructors; Study 2 = 59 instructors) and found the majority of instructors rated the following topics in learning as "most difficult concepts":

- Classical conditioning
- Operant conditioning
- Schedules of reinforcement

In the Adaptive Pathways for Chapter 5, we have identified three common misconceptions associated with each of these concepts based on data from instructors and our own experiences with students. For example, every semester when our students complete their online quizzing prior to coming to class, more than 50 percent of them tend to answer questions about the difference between positive and negative reinforcement incorrectly because they often believe that "positive" means "good" and "negative" means "bad." To assess the specific misconceptions, we wrote single-diagnostic multiple-choice questions (which we call "pinpoint questions") for each concept. If a student answers this question incorrectly, they are automatically presented with a brief (i.e., less than two-minute) targeted video aimed at correcting the misconception and/or providing information to further explain a difficult concept. After the video, students are presented with a follow-up multiple-choice question. Global student performance data on the pinpoint and follow-up questions can be found in your instructor dashboard.

Efficacy Data

The assessment items and videos continue to be pilot tested to examine (1) the difficulty level of the assessment questions (ensuring the pinpoint question and follow-up questions are similar in terms of difficulty) and (2) the effectiveness of the targeted video for improving student performance on the follow-up question. In this chapter, our research has demonstrated that students understanding improved after watching the targeted video. For example, in one of our classes, only 39 percent of students correctly answered the pinpoint question, but after watching the video, 82 percent of students answered the follow-up question correctly.



Instructor Follow-Up Class Activity

Although the Adaptive Pathways in Revel are designed to provide immediate assistance for students where they are likely to need it the most, students will often still need additional help. In the above example, 18 percent of students continued to struggle with this concept after watching a video that explicitly addressed the misconception. Being able to identify areas where your students continue to struggle will allow you, as an instructor, to focus your preparation and class time in the areas where your expertise is clearly needed. To assist you in class preparation, we have identified a variety of class activities, demonstrations, and assignments in Revel that can be used to target these difficult concepts across a variety of course formats (e.g., large classes, small classes, online sections). The following describes one in-class activity that can be used to help demonstrate the difference between positive/negative reinforcement and positive/negative punishment.

This demonstration was developed by Jon Skalski, Joel Lynch, and Amy Martin (2017) at Rockford University. They ask a volunteer in the class to step outside the room while the class selects a behavior they would like to "shape." This typically works best with straightforward behaviors such as standing on one leg, scratching the head, or turning in circles. When the volunteer returns to the class, he or she is asked to wear a backpack loaded with books. To demonstrate negative reinforcement, a few books will be removed when the volunteer engages in a behavior that approximates the desired behavior the class selected. Books will be added when the volunteer engages in behaviors that are not consistent with the desired behavior (demonstrating positive punishment). Skalski and colleagues also add and remove Skittles in a cup or add and remove extra credit points based on the behavior of the volunteer to demonstrate positive reinforcement and negative punishment. After the volunteer achieves the desired behavior, have the class discuss/identify each type of reinforcement and punishment. (This would be a nice way to implement student response systems, if you use them.)

Gurung, R. A., & Landrum, R. E. (2013). Bottleneck concepts in psychology: Exploratory first steps. *Psychology Learning & Teaching, 12*(3), 236–245.

Skalski, J., Lynch, J, & Martin, A. (2017, January). *Teaching negative reinforcement; it's not punishment*. Poster session presented at the National Institute on the Teaching of Psychology, St. Petersburg Beach, FL.

*See Revel Instructor Resources within this course for a video demonstration of this class activity.

Chapter 5
Learning

Chapter Outline and Learning Objectives

Module 5.1–5.3: Classical Conditioning

LO 5.1 Identify the components of classical conditioning.

LO 5.2 Recognize how emotional responses can be classically conditioned.

LO 5.3 Explain different factors that affect the acquisition and extinction of classically conditioned responses.

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Module 5.12–5.13: Learning and Cognition

LO 5.12 Explain the cognitive theory of insight learning.

LO 5.13 Define latent learning.

Module 5.14: Piecing It Together: Violent Video Games

LO 5.14 Analyze how the cross-cutting themes of psychology are related to the topic of violent video games.

Teaching Tip: Lecture Ideas

When introducing this chapter, start by asking students what comes to mind when they think of "learning." How do they see learning as different from memory (the next chapter in this book)? Why do students think learning and memory might be two separate chapters?

Learning Objectives

Numbered learning objectives are listed at the start of each chapter, as well as alongside every section heading, to help students better organize and understand the material.

Teaching Tip: Active Learning

Ask students to generate examples of "learning" in their lives—in particular, probe for things they have learned since starting this course, or starting college. You can point out how learning doesn't have to happen intentionally; show a few letters from well-known corporate logos that students will recognize immediately and ask how they learned them—did they have to practice or try?

Journal Prompt: Examples of Learning in Your Life

Journal writing prompts promote critical thinking by asking students to apply what they've learned to their experiences. Instructors can select the ones they want to emphasize, as there are generally more of these prompts in each chapter than could be used in class. This prompt encourages students to think about their own experiences with classical conditioning, operant conditioning, or observational learning.

Teaching Tip:

Responses can be discussed in class so students can compare their experiences or integrated into an online journal that students periodically turn in.

Teaching Tip: Lecture Ideas

Is all behavior learned? Ask students if they can think of any behaviors that they didn't have to learn. Students may recognize reflexes as behaviors that are involuntary and don't require learning. This is a way to help introduce the idea of classical conditioning—that even though some reactions are involuntary they can still be influenced by learning when we develop associations with other stimuli. This basic idea is foundational to important concepts later on in the course including implicit memory, social psychology, and abnormal psychology.

What is Learning?

If psychology is the scientific study of behavior and mental processes, then it might be difficult to find a more relevant topic than learning. How do people learn to behave and think? Under what circumstances does learning occur? Can learning be automatic, or does it always require significant effort? Why does it seem relatively effortless to learn your native language, but trying to learn a second language can be an entirely new ballgame? These are just a few examples of the types of questions that psychologists have explored when it comes to the concept of learning.

learning

a relatively permanent change in behavior due to experience

Learning has been defined as a relatively permanent change in behavior due to experience. If you think about that definition for a moment, you'll notice two distinct components of learning: (1) learning leads to a relatively permanent change in behavior, and (2) learning is a result of experience.

Psychologists have discovered that learning actually involves biological changes in the brain. For example, early studies of the biological underpinning of learning indicate that repeated experiences lead to the increased synaptic strength between neurons (Kandel, 2001; Nithianantharajah & Hannan, 2013). The connections between neurons lead to the development of long-lasting neural pathways. These findings suggest that learning is considered generally permanent, even if memory may not be perfect. For example, what was one of your favorite songs when you were in high school? If you can remember one, can you sing the words? Many of us will have a hard time remembering something like that. But, what would happen if you heard that song start playing the next time you were out? Chances are, you could immediately start singing along and remember all of the words! In order to remember something, you must have learned it in the first place.

As this chapter explains, a variety of "experiences" lead to learning. For example, your experiences may lead you to associate two events in your mind (e.g., going to the movie and craving popcorn), or you may learn to avoid a situation because of a negative prior experience (e.g., avoiding walking in a neighborhood where you got mugged), or you might learn something new by the simple experience of observing someone else (e.g., watching a cooking show). All of these "experiences" can lead to learning through a variety of mechanisms, which will be explained throughout this chapter.

Journal Prompt: Examples of Learning in Your Life

Provide a personal example of a time when you learned something by:

a) associating two events in your mind, b) avoiding a situation because of past negative consequences, or c) observing others

Of all the issues discussed in this course, learning and memory are perhaps the most relevant to your role as a student. After all, your primary "job description" is to learn new information through your coursework and remember that information so you can apply it not only for exams but in your future career and relationships. Therefore, as you read and interact with the materials in this chapter, be sure to think about how to apply the concepts to your own study habits. For example, you will discover that learning is often increased when behavior is followed by immediate consequences. When you encounter a question or task in the chapter, it's important to receive immediate feedback (another word for "consequences") on your response (or "behavior"). This feedback is designed to decrease any misconceptions and increase accurate understanding of the topic. To put this learning concept into further action, you could consider writing your own quiz questions after each topic has been covered. Make sure you immediately review the material so that both the question and the answer match the concepts presented in the material. This simple task will likely improve your learning overall, which will lead to many positive consequences—a great exam grade, improved metacognition (see Prologue: Learning to Learn), and skills that can be applied across a variety of settings.

Module 5.1–5.3: Classical Conditioning

If you have different ringtones on your cell phone for different people in your life, you've probably experienced an emotional response as a result. When you hear your mother's ringtone, do you feel suddenly happy, or do you tense up in anticipation of a difficult conversation? How do you feel when you hear the ringtone associated with your significant other—or your boss on a day you're supposed to be off work? These examples are an excellent demonstration of **classical conditioning**, or learning that occurs by associating two events that are repeatedly paired so that you eventually respond to a neutral stimulus in the way you responded to the naturally occurring stimulus.

Cell phone ringtones can become classically conditioned to elicit an emotional response. Just by hearing your mother's ringtone, you might experience a number of different emotions depending on your relationship with your mother and/or whether or not you want to talk to her at that particularly point in time.

Teaching Tip: Active Learning

Open this unit with a demonstration of classical conditioning. Simple demonstrations can use a burst of sound to condition flinching or unsweetened lemonade powder or sour candy to condition salivation—watch the video in the Instructor's Resources on Revel to see an example.

Pavlov and His Salivation Research

LO 5.1 Identify the components of classical conditioning.

Like many important findings, the first discovery of classical conditioning was somewhat of an accident. Russian physiologist Ivan Pavlov (1849–1936) was interested in studying the physiology of digestion. He used dogs as his research subjects and collected and measured the saliva produced by dogs during food consumption. As a part of his experiment, the dogs were provided food, which would trigger a reflexive salivation response. This is true of all animals, including humans—if you put food in your mouth, you'll naturally respond by increasing your saliva production. One of the problems Pavlov and his team encountered was that the dogs started to salivate at times before the food was provided. This discovery changed the focus of Pavlov's research for the rest of his career. Pavlov noticed that the dogs would begin to salivate in response to people (e.g., the lab assistant who typically fed the dogs) or sounds that signified the dogs were about to be fed. Similarly, if you've ever fed an animal canned food, you'll notice that the animal soon learns to come running at the sound of the can opener. Pavlov labeled the dogs' salivation in response to a stimulus that suggested food was coming a "psychic secretion" and began to earnestly study the nuances of reflexive learning.

classical conditioning
an automatic or reflexive type of learning that occurs by making associations between different events and stimuli

Teaching Tip: Assessment

Quick write: Ask students how principles of classical conditioning might impact the ability of a person who is recovering from drug or alcohol addiction to refrain from using when they return to places where they used to drink or use drugs, or other familiar stimuli are present.

In trying to understand classical conditioning, let's first start with the idea that stimuli elicit a natural or reflexive response. These stimuli are labeled the **unconditioned stimulus (UCS)**. In other words, the responses are unconditioned because they are naturally occurring without prior experience. The naturally-occurring, or reflexive response, to an unconditioned stimulus is labeled the **unconditioned response (UCR)**. Some examples of unconditioned stimuli and unconditioned responses include:

unconditioned stimulus (UCS)
stimuli that elicit a natural or reflexive response without prior experience

unconditioned response (UCR)
the naturally occurring or reflexive response to an unconditioned stimulus

1. UCS = puff of air → UCR = blinking
2. UCS = smell or taste of food → UCR = salivation
3. UCS = a loud unexpected noise → UCR = increased heart rate

Pavlov decided to test whether or not he could condition his dogs to salivate to a previously **neutral stimulus** (a stimulus that doesn't elicit the reflexive/desired response) by pairing the neutral stimulus with an UCS to lead to a **conditioned response (CR)**. The CR occurs when a previously neutral stimulus (NS) leads to the response originally associated with the UCS. At first, Pavlov established that the sound of a metronome was a NS that did not elicit salivation in the dogs. Then, he paired the two stimuli (NS and UCS) by first making a metronome tick (NS) and then presenting the food (UCS). After preceding the food repeatedly, the sound of the metronome began to cause the dogs to salivate—even in the absence of the food. In this case, the bell became a **conditioned stimulus (CS)**. See Figure 5.1 for a step-by-step walkthrough of this experiment. The CS is the previously neutral stimulus that comes to predict the UCS so that it produces the response previously elicited by the US.

neutral stimulus
a stimulus that doesn't naturally elicit the reflexive/desired response in classical conditioning

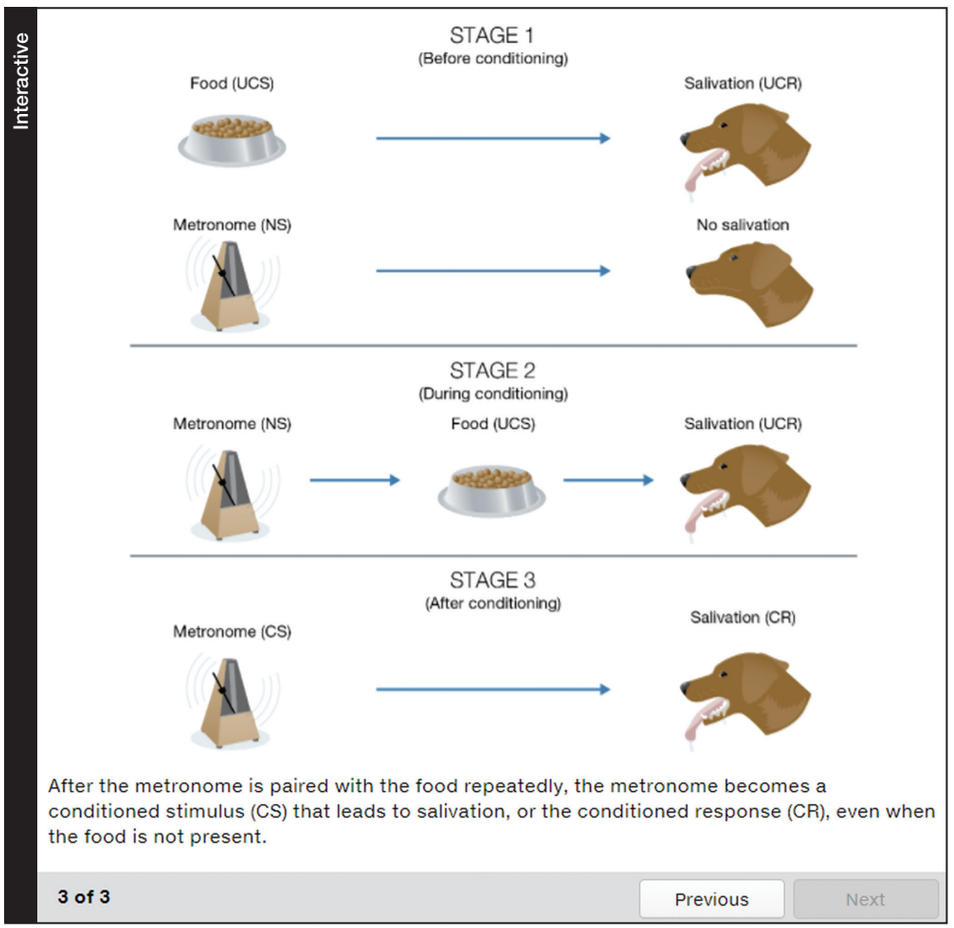
conditioned response (CR)
occurs when a previously neutral stimulus leads to the response originally associated with the unconditioned stimulus

Click-to-Reveal: Figure 5.1: Pavlov's Study

In this activity, students will view the process of Pavlov's original study in a step-by-step fashion to identify the UCS, UCR, CS, and CR.

Figure 5.1 Pavlov's Study

After the metronome is paired with the food repeatedly, the metronome becomes a conditioned stimulus (CS) that leads to salivation, or the conditioned response (CR), even when the food is not present.



Teaching Tip: Active Learning

John Watson, a Behaviorist, believed that all behavior was a response to a stimulus. Share Watson's controversial quote with students (which also appears in Chapter 1), and use a quick-write or discussion to share their reaction: "Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select—doctor, lawyer, artist, merchant-chief, and, yes, even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors."

conditioned stimulus
during classical conditioning, when a previously neutral stimulus comes to produce the conditioned response because of an association with the unconditioned stimulus

If you consider the examples of unconditioned stimuli and unconditioned responses above, you can imagine pairing a neutral stimulus such as a flashing light with the puff of air that causes blinking. If you flash a light (NS) and then produce a puff of air (US) that causes blinking (UR) repeatedly, eventually the flashing light (CS) itself will lead to blinking (CR).

After Pavlov's studies demonstrated that classical conditioning of physiological responses (e.g., salivation) was possible, later psychologists sought to discover whether or not other types of responses (e.g., emotional responses) could also be classically conditioned.

Little Albert and Classically Conditioned Emotional Responses

LO 5.2 Recognize how emotional responses can be classically conditioned.

Psychologist and professor John B. Watson and his graduate student Rosalie Rayner (Watson & Rayner, 1920) set out to examine whether or not classical conditioning could be used to condition an emotional response. They first tested a 9-month-old infant, referred to as "Little

Albert," by presenting him with a series of objects and animals (e.g., rat, rabbit, monkey, burning newspaper) to see if the child demonstrated any natural fear. They discovered that Little Albert did not demonstrate any fear behavior in response to these animals or objects. On the other hand, they discovered that Little Albert appeared startled and began to cry when a metal pipe was struck with a hammer behind his back (imagine that!). When Little Albert was 11 months old, Watson and Rayner began the process of classically conditioning him to fear a white rat. They began by presenting Albert with a white rat. As Albert reached out to touch the rat, a metal pipe was struck behind his head. After only a few pairings of the rat and the loud noise, Albert began to demonstrate a fear response after seeing a rat alone, as shown in the *Little Albert Study* video.

Little Albert Study

What became of Little Albert after the fear conditioning experiment? Watson reported that Little Albert and his mother moved away before the "deconditioning" portion of the study could be conducted. For years, students and psychologists have wondered what became of Little Albert. In 2009, a paper was published that potentially identified Little Albert as Douglas Merritte, a child who died at age 6 (Beck et al., 2009). If Little Albert was truly Douglas Merritte, this would be concerning on many levels because Merritte appears to have been neurologically impaired from birth. The original Little Albert study has been criticized for many years based on the ethics of conditioning a child to experience fear, but if Watson and Reyner actually conducted the research on a neurologically impaired child, the ethical concerns would have been even greater. Thankfully, several scholars have recently cast significant doubt on the identification of Little Albert as Douglas Merritte and provided substantial evidence that Little Albert was more likely Albert Barger, a healthy and neurologically normal child (Digdon et al., 2014; Powell et al., 2014). The Little Albert case was one of psychology's most notorious studies, and today researchers continue to investigate the findings from 95 years ago.

Little Albert being held by Rosalie Raynor while Watson observes his initial response to a white rat.

While the original intent of the Little Albert case was to determine if fear could be classically conditioned, the principles of classical conditioning have since been applied to help people *reduce* negative emotions and behaviors such as fear, anxiety, and substance abuse. For example, phobias (a persistent, irrational fear of a specific object or situation) have been successfully treated by teaching people to pair states of deep relaxation with anxiety-provoking situations. These types of treatments will be discussed in more detail in Chapter 16 (LO 16.5).

Teaching Tip: Lecture Ideas

Watson, once president of the American Psychological Association (1915), eventually left his academic position as a professor and joined an advertising firm, where he conducted experiments on consumers and applied principles of classical conditioning in advertisements. Watson noticed how some consumers had strong emotional feelings about certain brands. He developed strategies to take advantage of "good feelings" associated with a product based on principles of classical conditioning. Ask students to find examples of advertisements that try to associate emotions with their products.

Video: Little Albert Study

This video demonstrates how Watson and Rayner used classical conditioning to train Little Albert to fear a white rat.

Teaching Tip: Scale It Up, Scale It Down, Put It Online

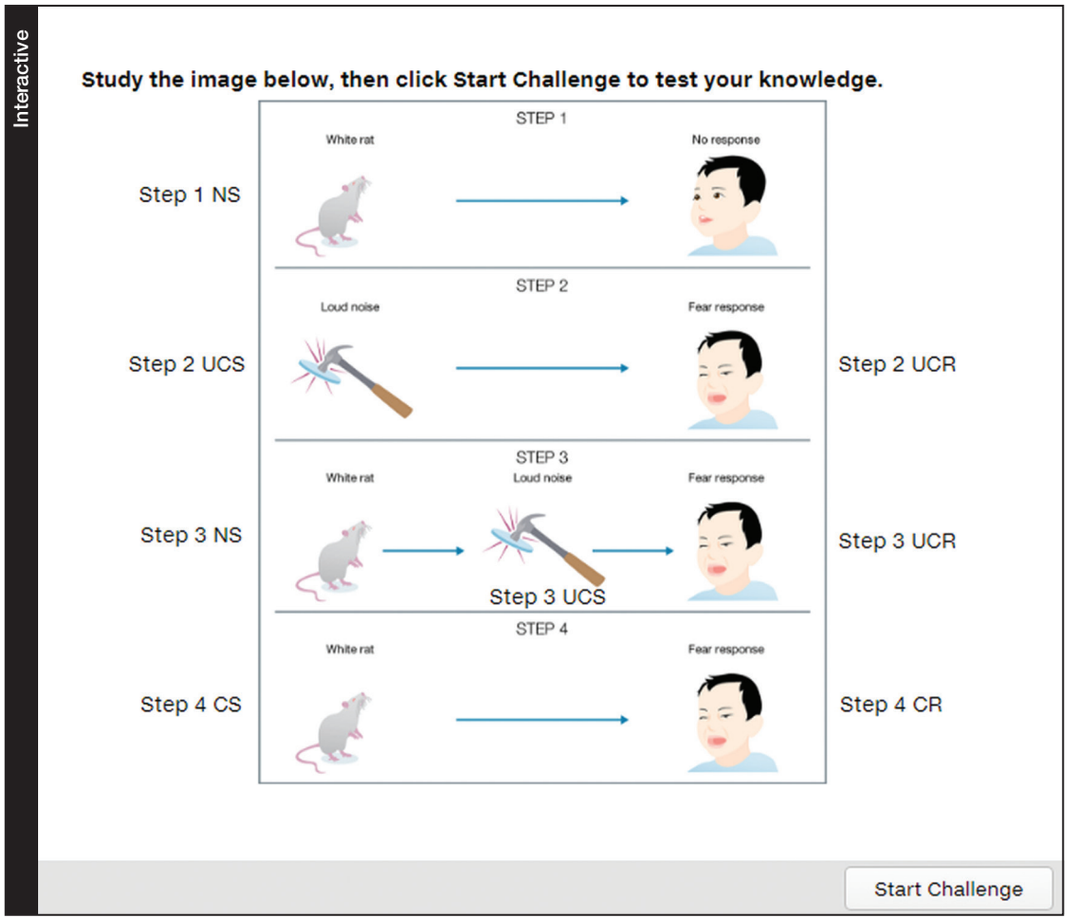
This is a great point to review ethical guidelines with students. Psychologists are constantly working to ensure that the process of studying human behavior does not in any way adversely impact research participants. What steps could Watson and Rayner have taken to protect Little Albert? What is done to protect children and other vulnerable populations today? In a small class, this could be a discussion or quick write. In a larger class, this could be an activity students complete in small groups and submit one response online via your course LMS. In an online class, this could be a group activity or discussion board post.

Image Drag-and-Drop: Identifying the Components of the Little Albert Experiment

In this activity, students will drag and drop appropriate labels (UCS, CS, etc.) to images related to the Little Albert study.

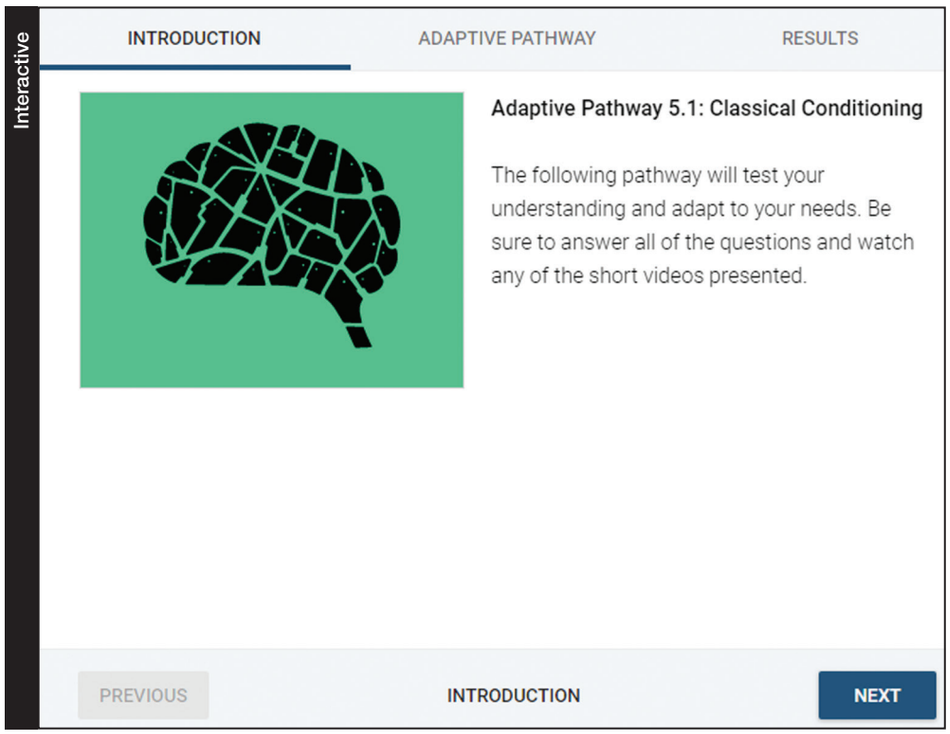
Identifying the Components of the Little Albert Experiment

While the white rat is initially a neutral stimulus, when it is paired with a loud noise (unconditioned stimulus) repeatedly, the white rat becomes a conditioned stimulus that elicits fear from Little Albert.



Assuming you've not been the subject of ethically questionable childhood research, you might wonder if the examples provided by Pavlov and Watson's work have much application to your daily life. In fact, you likely experience classically conditioned responses throughout your day. Let's go back to the example of the cell phone ringtone from the beginning of this discussion. In this example, talking to your mother is the unconditioned stimulus (US) because it elicits a natural, unconditioned response (good or bad). Your mother then gets paired with the particular sound of the ringtone you assign to her in your cell phone. Every time your mother calls and you hear the ringtone, you've paired an unconditioned stimulus (your mother) with a neutral stimulus (the ringtone). After enough pairings of your mother (UCS) and the ringtone (NS), you will eventually have an emotional response to the sound of the ringtone alone. The ringtone is now called the conditioned stimulus (CS), and the emotional response is now a conditioned response (CR). Again, a conditioned response occurs when a previously neutral stimulus (e.g., a ringtone) leads to the response originally associated with the UCS (e.g., your mother). Imagine your friend has the same ringtone programmed on his/her phone, and it starts to play while you're having lunch together one day. You will quite likely experience a conditioned response to the sound of the ringtone, even though it has nothing to do with your mother.

Adaptive Pathway 5.1: Classical Conditioning



Adaptive Pathway 5.1: Classical Conditioning

All of the content and data in this Adaptive Pathway (pinpoint questions, targeted videos, follow-up questions, global student performance data, and class instructional ideas) can be accessed in the Revel Instructor Resources.

Factors That Affect Conditioning

LO 5.3 **Explain different factors that affect the acquisition and extinction of classically conditioned responses.**

You may be wondering if classically conditioned responses last forever. Will the ringtone associated with your mother still cause you to have an emotional reaction when you hear it again in 5 years? And, how would you respond if you heard a ringtone that was similar—would it lead to the same emotional response? To answer these questions, it's important to understand a few important factors that affect conditioning.

ACQUISITION, EXTINCTION, AND SPONTANEOUS RECOVERY The **acquisition phase** occurs while the neutral stimulus and the CS are repeatedly paired and the association between the neutral stimulus and the CR becomes strengthened. In Pavlov's study, this was the phase when the food and the metronome were repeatedly paired and classical conditioning had occurred the first time the metronome was presented alone and led to salivation. During the acquisition phase, the association between the neutral stimulus and the CR will typically be the strongest when the neutral stimulus is presented immediately prior to the UCS. For example, if the food was provided to the dogs after a 5-minute delay in playing the metronome, the association between food and the bell would be very weak or even nonexistent.

acquisition phase
the period of time during classical conditioning when the neutral stimulus comes to evoke the conditioned response

When the CS is no longer paired with the UCS, the response will eventually be subject to **extinction**. Extinction occurs when the CS no longer elicits the CR. If you change your ringtone for your mother, you will eventually stop having an emotional response when you hear the previous ring tone. Similarly, after the metronome is repeatedly presented without food to the dogs, the salivation response will decrease. Interestingly, after a period of time when a CS is not presented, there will be a brief reappearance of the CR—even if there had been an extinction phase previously. For example, if the dog stops salivating to the sound of the metronome because it's repeatedly presented without food (extinction) but hears the metronome a week later, there will likely be a **spontaneous recovery** of the initial CR. This effect is short lived, and extinction will be rapid if the UCS is not presented again with (or before) the CS.

extinction
the disappearance of a learned behavior when the behavior is no longer reinforced or no longer associated with the unconditioned stimulus

spontaneous recovery
the brief reappearance of a previously extinguished response

Teaching Tip: Lecture Ideas

Stimulus generalization might explain why people who are afraid of spiders and snakes are just as afraid of the nonvenomous varieties as they are of venomous ones. Ask students if they can think of other examples of stimulus generalization.

stimulus generalization
responding to stimuli similar to but distinct from the original stimulus

stimulus discrimination
responding to the original stimulus only without responding to other stimuli

higher-order conditioning
when a conditioned stimulus eventually acts as an unconditioned stimulus in a second round of conditioning

STIMULUS GENERALIZATION AND DISCRIMINATION Pavlov and Watson also demonstrated that stimulus generalization and stimulus discrimination can occur. **Stimulus generalization** occurs when the CR is elicited in response to stimuli that are similar to the original CS. Watson showed that Little Albert also demonstrated fear in response to stimuli that were similar to the rat. For example, Little Albert showed fear in response to a rabbit, a fur coat, a dog, and even a Santa Claus beard. If your cat becomes classically conditioned to the sound of an electric can opener, stimulus generalization might occur if the cat begins to expect dinner when you use a drill to make a home repair. **Stimulus discrimination** occurs when the CR is elicited in response to a specific CS and does not occur in response to stimuli that are similar to the CS. In Pavlov's studies, he was able to condition dogs to salivate in response to specific tones while not salivating to other similar tones. Your cat might demonstrate stimulus discrimination by expecting to be fed only when you use the can opener but not when other people do so because you are the only one in the house who feeds the cat.

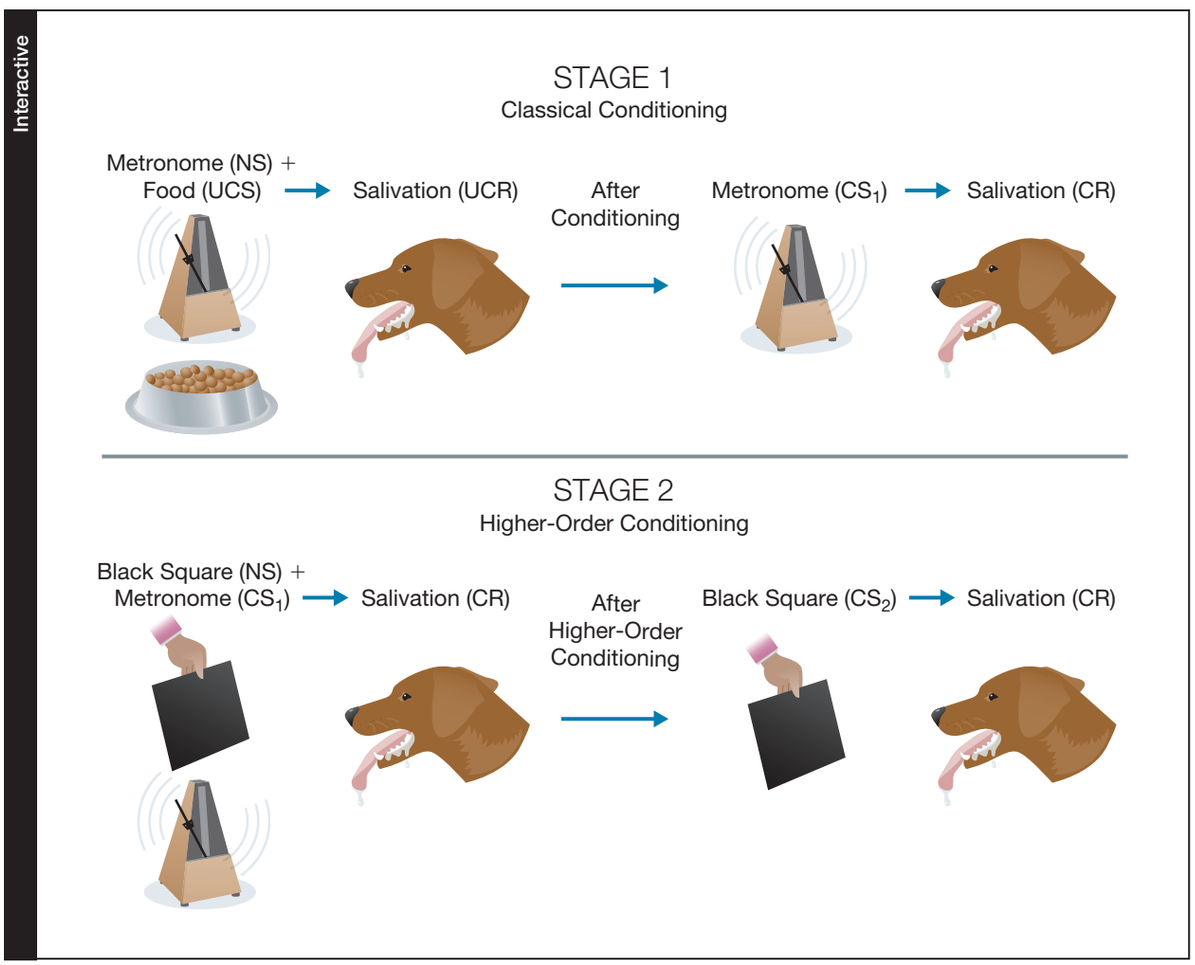
HIGHER-ORDER CONDITIONING Pavlov also discovered that classical conditioning doesn't always stop with the first associations between a previously neutral stimulus and an unconditioned stimulus. He found that a conditioned stimulus could eventually act as an unconditioned stimulus in a second round of conditioning. This phenomenon is known as **higher-order conditioning** (see Figure 5.2). Pavlov showed that a sound

Click-to-Reveal: Figure 5.2: Higher-Order Conditioning

In this activity, students walk through stages of a higher-order conditioning study.

Figure 5.2 Higher-Order Conditioning

1) When the metronome (NS) is paired repeatedly with the food (UCS), the metronome becomes a conditioned stimulus (CS) which leads to salivation (CR) even when the food is not present. 2) After the metronome becomes a conditioned stimulus, it can be paired with a neutral stimulus (e.g., a black square). After these are repeatedly paired, the black square becomes a conditioned stimulus (CS) leading to salivation (CR).



Teaching Tip: Lecture Ideas

Higher-order conditioning might explain why some people have strong reactions to stimuli that seem nonthreatening or neutral to most other people. For example, the smell of the cologne or perfume one's "ex" used to wear might make them suddenly sad, or after a traumatic experience like a car accident, cues that remind someone of the crash can be just as terrifying as the accident itself.

(e.g., metronome) could be paired with food so that dogs eventually salivate in response to the sound alone. He then further demonstrated the process of higher order conditioning by pairing the sound with an image of a black square. Because the sound had already been conditioned to elicit salivation, by pairing the sound *and* the black square, the black square eventually led to salivation on its own. Importantly, the original UCS (food) was never actually presented in the higher order conditioning paradigm!

For an example in your life, consider the fact that music often serves as a conditioned stimulus for people. Certain music becomes associated with certain events or people in your life. For example, many couples identify a song as "their song." This song can lead to a conditioned positive emotional response—or a conditioned negative emotional response if there's a nasty break-up! After the break-up, every time you hear the song, you may feel sad or angry. Imagine watching a commercial later that uses the song as part of the advertisement. You might develop a negative response to the product advertised through the process of higher-order conditioning. Smart marketers understand this phenomenon well, so they are always attempting to pair their products with stimuli that already have a positive association for most people.

CONDITIONED TASTE AVERSIONS Do you think any stimulus can be classically conditioned? Pavlov stated that "any natural phenomenon chosen at will, may be converted into a conditioned stimulus…" (Pavlov, 1928). However, after many years of research, the answer appears to be that some stimuli are much easier to associate with certain responses than other stimuli (Desimone & Duncan, 1995). Take the example of food and illness. While in college during a particularly brutal winter, one of the authors (BW) decided to drink coffee to warm up. She added a ton of sugar and creamer and began drinking a cup between classes each day. One day, hours after returning home from class, she came down with a nasty stomach virus. All she had to eat or drink that day was, of course, coffee. As a result, she developed a **taste aversion** to coffee, or a classically conditioned dislike and avoidance of a certain food following illness. More than 20 years later, she still has not had a single sip of coffee despite the growing popularity of coffee and coffee bars over that timeframe.

taste aversion
classically conditioned dislike and avoidance of a certain food following illness

When teaching introductory psychology, we've heard from many students who provide funny (and disgusting) examples of taste aversions they have developed. This may seem to be a simple application of classical conditioning in our lives until you look a little closer. First of all, the CS (coffee) was only paired with the UCS (stomach virus) on one occasion, and the timing between the CS and UCS was not seconds or minutes apart but rather hours apart. How can such strong conditioning occur after hours of separation between the CS and UCS? Why wasn't something else associated with the UCS that occurred more closely in time? Researchers have discovered that humans and other animals appear to have a certain **biological preparedness** to develop associations between certain types of stimuli and responses. If you are an animal foraging in the woods and then become ill, it makes sense that you would have a biological tendency to associate your illness with food rather than something else in your environment so that you would avoid that food in the future. Garcia's famous studies with rats showed that he could easily condition rats to develop taste aversions when he paired flavored water with an injection that produced illness. The rats avoided the flavored water when it was presented in the future. On the other hand, he was unable to condition rats to associate a certain taste with an electric shock or associate illness with a noise (Garcia & Koelling, 1966). Likewise, Seligman (1971) further pointed out that humans appear to be biologically prepared to develop fear responses to certain stimuli (e.g., snakes, spiders, heights, tightly enclosed spaces) much more readily than others. One theory is that we are biologically prepared to be afraid of objects or situations that were a threat to people throughout evolution. While many more people are injured or killed in car accidents than by snake bites today, it remains much easier to condition people to experience a fear response to snakes than to cars.

biological preparedness
an organism's predisposition to develop associations between certain types of stimuli and responses based on evolutionary survival

Shared Writing: Advertisements and Classical Conditioning

Marketing campaigns often use classical conditioning techniques so that people will have positive associations with a product. Describe an advertisement that uses classical conditioning, and identify the NS, UCS, CS, and CR. Next, discuss how stimulus discrimination and stimulus generalization related to the advertised product could lead to higher or lower sales of the product.

Teaching Tip: Assessment

Ask students to imagine they were struck by a stomach virus on the same day they ate their favorite food for dinner, and now they have an aversion to that meal. Drawing on the principles of acquisition, extinction, or higher-order conditioning, what could they do to be able to overcome the aversion and be able to enjoy that meal again? This could be an individual or small group activity; either way, consider using your course LMS to collect responses in the form of an online submission or quiz question as a formative assessment.

Teaching Tip: Lecture Ideas

One therapy for chronic alcoholism is a drug that, when ingested with alcohol, causes the person to experience nausea, vomiting, and headaches. Ask students to consider how principles of classical conditioning might contribute to helping people addicted to alcohol abstain from drinking. Yet despite the effectiveness of this treatment, alcoholism remains a significant problem. Ask students why this is the case; see if they identify the fact that people still have to voluntarily take the drug for it to work. This discussion can lead in to the next topic, operant conditioning, which relies on voluntary behavior.

Shared Writing: Advertisements and Classical Conditioning

This application-based activity provides an opportunity for students to establish a routine of regular writing, collaboration, and critical thinking. Students submit a few sentences in response to the prompt, which is then shared in an online forum with the class. By reading and discussing recommendations of others, students can gain a richer understanding of the applications of psychological science.

Teaching Tip:

This prompt would work well both as an online shared writing activity, as it is set up in Revel, or as an in-class activity in which students jot down some ideas in response to the prompt, and then share them in a class discussion.

End-of-Module Quiz

Revel offers an end-of-module quiz focused on classical conditioning that allows students to practice their content mastery. Feedback is provided for correct and incorrect answers. (Note: You can find the correct answers in the Instructor's Manual.)

Quiz for Module 5.1–5.3

1. The neutral stimulus, when paired with an unconditioned stimulus, becomes a(n) _____ in classical conditioning.
   a. conditioned response **b.** conditioned stimulus
   c. unconditioned response **d.** unconditioned stimulus

2. Every week, Jade spends her allowance on ½ pound of sour lemon gummy candies, even though they always make her mouth water. One day, as she is walking down the street, Jade sees a girl carrying a little white bag that looks like a candy shop bag! Jade notices that her mouth is puckering and overflowing with saliva. In this example, the unconditioned stimulus is the _____.
   a. puckering and saliva **b.** sour lemon gummy candy
   c. allowance money **d.** little white bag

3. Normally, when food is placed in the mouth of any animal, the salivary glands start releasing saliva to help with chewing and digestion. In terms of Pavlov's analysis of learning, salivation would be referred to as a(an) _____.
   a. voluntary response **b.** conditioned response
   c. digestive reflux **d.** unconditioned response

4. In Watson and Rayner's "Little Albert" study, each time the rat was presented to the boy, it was accompanied by a loud noise which eventually led Albert to cry when presented with the rat. In this experiment, Albert's reaction of fear upon seeing the rat was a(n) _____ response.
   a. counterconditioned **b.** latent
   c. conditioned **d.** unconditioned

5. In the past, thunder has made you flinch because the loud noise scares you. Lightning always comes before the thunder and after time, you begin to flinch as soon as the lightning strikes. In this scenario, lightning can be interpreted as a(n) _____.
   a. conditioned stimulus **b.** conditioned response
   c. unconditioned response **d.** unconditioned stimulus

6. In classical conditioning, _____ occurs when the conditioned stimulus is no longer paired with the unconditioned stimulus.
   a. extinction **b.** spontaneous recovery
   c. stimulus generalization **d.** stimulus distinction

7. Martha trains her cat Whiskers to salivate to the sound of a bell. She rings the bell every 15 minutes and doesn't follow it with food for Whiskers. Whiskers salivates less and less and finally stops salivating at the sound of the ringing bell. A week later, she finds Whiskers salivating to the sound of a ringing bell. Which of the following terms explains this response?
   a. Stimulus discrimination **b.** Spontaneous recovery
   c. Instinctive drift **d.** Counterconditioning

Module 5.4–5.7: Operant Conditioning

The discovery of classical conditioning highlighted that learning can occur when a neutral stimulus is presented *before* a reflexive behavior such as salivation. On the other hand, learning can also occur—depending on what happens *after* a behavior is performed.

The Beginning of Operant Conditioning

LO 5.4 **Recognize the similarities and differences between classical conditioning and operant conditioning.**

Teaching Tip: Active Learning

The term "operant" refers to intentional actions, or actions that a person or animal intentionally performs that affect their environment. Introduce this topic by conducting a classroom shaping demonstration. Ask for a volunteer who is willing to be adventurous, and ask that person to step outside the classroom. Have the students decide on a behavior they want the student to do—stand on a desk, write something on the board, etc. Tell them to only smile or clap when the volunteer does something close to the desired behavior. Invite the volunteer back in and let the shaping proceed!

Remember the discussion about the emotional response you can have merely from hearing a particular ringtone? When you experience that emotion, your body is also responding physiologically. Your heart rate increases, you start breathing more rapidly, and you may even start to sweat. Imagine you are at home eating dinner when suddenly you hear the ringtone associated with an ex you haven't spoken to in more than 6 months. In this example, you probably didn't *voluntarily* choose to have your heart start racing when you heard the ringtone (we aren't specifying whether your heart racing is a good or a bad thing—that's for you to decide!). Regardless, through repeated associations of that specific ringtone to that specific person, your body *passively* and *reflexively* began to respond to the ringtone in the same way it would in the presence of that person. Sometimes, people refer to classical conditioning as involving *respondent behavior* because your behavior is a passive and reflexive response to a particular stimulus.

operant conditioning
learning related to voluntary behavior that occurs through the application of consequences after a particular behavior is performed

Whereas classical conditioning occurs *before* the reflexive and involuntary response, **operant conditioning** is a type of learning that occurs *after* we *voluntarily* engage in a behavior. This type of conditioning is much more *active* and is based on the *consequences* that occur after a particular behavior is performed. While you may not always be aware that your behavior is shaped through operant conditioning, you almost always have some choice in how you are going to behave. For example, do you remember when you were a child and your mother said "make sure to take a jacket with you because it is going to be cold"? You might have thought "I'll be fine" and ignored her advice and then you froze and were miserable the entire time. You made the choice not to listen to your mother and, as a result, you suffered the consequences.

So, what likely happened the next time you were about to go out and your mother told you to take a jacket? You probably chose to take a jacket because you had learned (through operant conditioning) to listen to your mother. The interesting thing about operant conditioning is that it easily explains how we can both *increase* and *decrease* the frequency of behaviors. In fact, operant conditioning can be defined as a type of learning in which behavior is strengthened or diminished, depending on its desirable or undesirable consequences (Hahn, 2013).

There are also similarities between classical conditioning and operant conditioning. Both types of learning involve making associations between stimuli and responses. In addition, the concepts of extinction, generalization, and discrimination apply to both classical conditioning and operant conditioning.

In the late 19th century, American psychologist Edward Thorndike (1874–1949) studied learning processes in animals. Having worked under the supervision of two of psychology's forefathers (William James and James McKeen Cattell), at age 24 Thorndike published a paper in which he described the ability of animals to learn through association and as a result of consequences of their behavior. Thorndike built what he called a "puzzle box," a wooden cage that required a simple act (such as pushing a lever) to open it (see Figure 5.3). He would place a hungry cat inside the box and a delicious meal of fish just outside the door of the cage so that the cat could see it. To reach the food, the cat had to figure out how to press the lever to open the door, a process Thorndike timed. After pushing and rubbing up against the walls of the cage, the cat accidentally stood on the lever, opening the door. The cat did not immediately learn the connection between the lever and the road to freedom. However, after numerous trials, the cat was able to open the door very quickly, demonstrating that it had learned an association between the lever and the path to food and freedom (Thorndike, 1898). This line of research led Thorndike to develop the **law of effect**, which simply states if a response produces a *satisfying effect*, the response is likely to occur again.

law of effect
if a response produces a *satisfying effect*, the response is likely to occur again

Thorndike's work provided the foundation for B. F. Skinner (1904–1990), who, along with John B. Watson, paved the way for behaviorism to become a dominant school of thought in psychology by the mid-20th century. Although Watson and Skinner are often grouped together as "behaviorists," they were actually representatives from different behavioral camps. Watson was very clear that the only behavior he believed worthy of study was outward behavior, or behavior that can be seen by others. This camp is referred to as *methodological behaviorism* and is known for its beliefs that thoughts are unimportant in learning. Skinner however, did not believe that thoughts had no value in learning; he merely viewed thoughts as a form of "inner behavior" that were subject to the same contingencies, or rules, of outward behavior. Skinner's view represents the camp of behaviorism referred to as *radical behaviorism.* Skinner believed all behaviors (internal and external) were a result of factors in the individual's environment.

Skinner's theory of operant conditioning focused on the ways in which the environment can *operate* on a person or animal (Skinner used the word *organism* when referring to any living thing) to either increase or decrease behavior. Let's discuss the principles related to *increasing* behavior first.

Teaching Tip: Lecture Ideas

A video from Harvard University featuring Professor Mahzarin Banaji gives an excellent overview of reinforcement and Skinner's impact on psychology. Search online for *Mahzarin Banaji* and *Reinforcement Theory.*

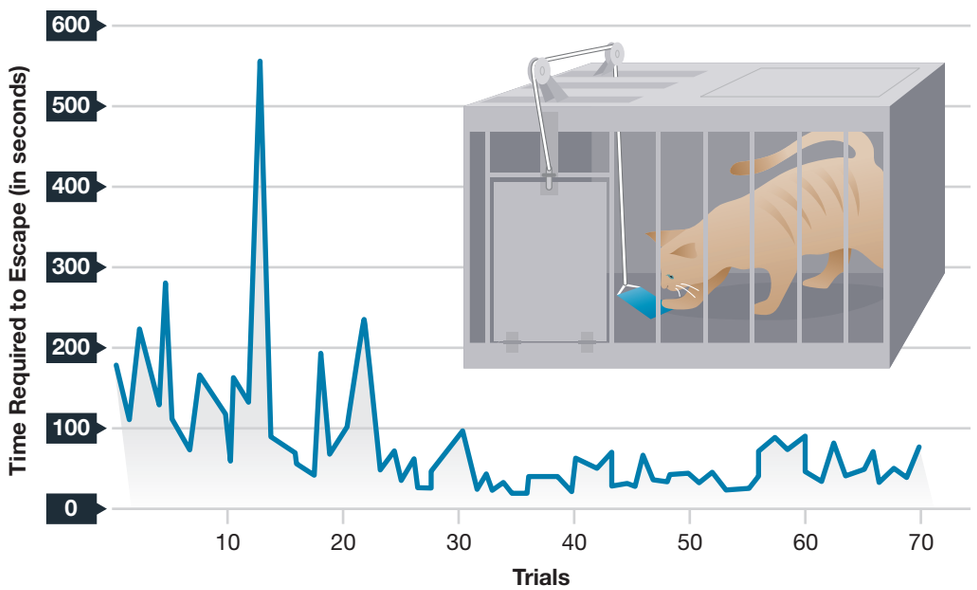


Figure 5.3 Picture of Thorndike's Puzzle Box

The cat becomes quicker at escaping the puzzle box to receive the food over time.

Teaching Tip: Lecture Ideas

Students commonly confuse "positive" with good and "negative" with bad, or punishment. Take time when introducing these terms to draw a comparison to mathematics—"positive" conveys adding something and "negative" conveys taking something away. You will likely need to remind students about this distinction!

Principles of Reinforcement

LO 5.5 Distinguish between positive and negative reinforcement.

Building on Thorndike's law of effect, Skinner (1938) developed some of the principles of behavior control. He developed his own version of a puzzle box, called a "Skinner box," or "operant-conditioning chamber." By pressing a bar in the chamber, a rat could release food pellets or water, while a device recorded the animal's responses. Skinner discovered, as did Thorndike, that animals can learn to perform a behavior quickly when it is followed by a desirable outcome. Skinner referred to this desirable outcome (in this case, the food) as a *reinforcer*. The most important thing you can remember at this point is that whenever you see any form of the word *reinforcement*, it involves the goal of *increasing behaviors*. Think about the idea of adding "reinforcements" to something you are building. The reason you do this is because you want to make the object *stronger*. Reinforcement serves a similar function in the theory of operant conditioning; it refers to any event/thing/outcome that strengthens a preceding response. Skinner demonstrated the ability of animals (and humans) to learn, sometimes very complex behaviors, as a result of reinforcement. For example, Skinner taught pigeons to turn in circles to the left or the right and to play ping pong with each other, and he even consulted with the military about training pigeons to guide missiles in World War II (Skinner, 1953).

Let's think about your own behavior. If you spend a few hours a week working out at the gym, what motivates you to go? Achieving a good level of personal fitness? Reducing your stress level? Avoiding the aches and pains you experience when you stop working out? There are many health-related reasons to jump on a treadmill, but there are also fringe benefits such as spending time with your gym buddies, avoiding an unpleasant household chore, or studying for that next exam. For every repeated action we take, you can guarantee reinforcement played a role in strengthening that behavior. Think of another behavior you engage in on a regular basis. Why do you continue to do this? What are you "getting" out of it? That is, what has been your reinforcement for that behavior?

CHARACTERISTICS OF REINFORCERS Remember, all reinforcers strengthen behavior, but reinforcers can have different characteristics. A **primary reinforcer** satisfies a basic biological need, such as hunger or thirst. Both Thorndike and Skinner used primary reinforcers (i.e., food) in their work with animals. A **secondary reinforcer** becomes satisfying or pleasurable through its association with primary reinforcers. For example, you can use money (a secondary reinforcer) to purchase food (a primary reinforcer). Other examples of secondary reinforcers are praise or recognition. You learn the value associated with a secondary reinforcer over time as it becomes associated with a primary reinforcer.

primary reinforcer
naturally reinforcing stimuli because they satisfy a basic biological need such as hunger or thirst

secondary reinforcer
something that becomes satisfying or pleasurable through its association with a primary reinforcer

Reinforcers can also vary in their effectiveness based on timing. **Immediate reinforcement** typically occurs when the behavior and the delivery of a reinforcer occur very close in time. On the other hand, **delayed reinforcement** occurs when there is a significant delay in time between the behavior and the delivery of a reinforcer. Imagine this scenario and see what you think would happen:

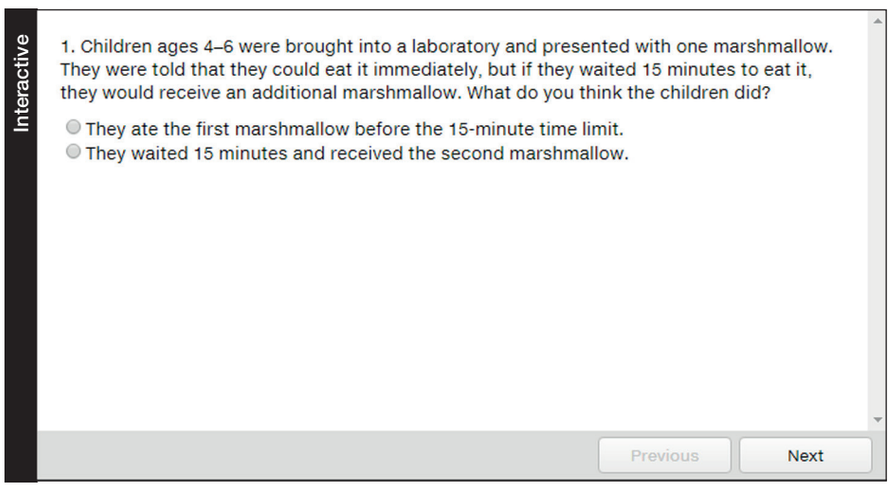
immediate reinforcement
when the desired behavior and the delivery of a reinforcer occur very close in time

delayed reinforcement
a significant delay in time between the desired response of an organism and the delivery of a reinforcer

Polling: Delayed vs. Immediate Rewards

In this activity, students will choose one of two predictions about a classic study.

Delayed vs. Immediate Rewards



This study demonstrates that immediate reinforcers are typically preferable to delayed reinforcers. You might think this only applies to children, but reconsider the previous example of going to the gym. Some of the positive effects (or reinforcement) associated with exercise include maintaining a healthy weight and improved fitness. However, these are often very delayed reinforcers, which helps explain why people sometimes find it difficult to forgo a nap (immediate reinforcer) and head to the gym.

Praise or stickers are examples of positive reinforcement.

POSITIVE AND NEGATIVE REINFORCERS Reinforcers can also vary in terms of whether something is *added* or *removed*. **Positive reinforcers** strengthen a response by adding a pleasurable consequence. The consequence can be something tangible (e.g., money, stickers, candy) or intangible (e.g., a feeling of pride after receiving a compliment, feeling empowered after taking your recycling to the local recycling center, or donating blood to the blood bank). If you have ever spent any significant time with young children, you have seen just how powerful positive reinforcement can be. Kids will do just about anything for a sticker!

positive reinforcers
something that strengthens or increases a response by adding a pleasurable consequence

Having young children, your authors would be remiss if we didn't acknowledge practicing what we preach. For example, Dr. Hudson used to struggle on a daily basis to get her children (ages 6, 5, and 2 at the time) out of the house and into the car in under 20 minutes. One day, she came across some "star stickers" and made a big deal of whichever child was engaging in a behavior that would eventually lead to getting into the car. She exclaimed loudly and dramatically to the first child, "Wow, I like how quickly you are getting your shoes on and heading to the car. You get a gold star!" At that point, her daughter received a gold star sticker and responded as if she had just won the lottery. It didn't take long for the others to come running in an attempt to claim their prize—2nd place received a silver sticker and 3rd place a bronze. What do you think happened the next time they needed to leave the house? Dr. Hudson announced, "It is time to go. Let me find my stickers" and guess what? Yes, they all came running, and we had created a new Olympic sport! Even a year later, long after the stickers were all gone, Dr. Hudson would merely state who received the gold, silver, and bronze sticker and would achieve a similar outcome. At that point, even imaginary stickers worked as reinforcers for increasing the speed at which they could leave the house. As this example demonstrates, positive reinforcement involves strengthening a behavior by adding a pleasurable or desirable consequence.

In contrast, **negative reinforcers** strengthen a response by *removing* an undesirable consequence, or what is sometimes referred to as an aversive stimulus. We rock a baby to sleep to stop it from crying. You pick up your dirty clothes off the floor to stop a significant other or roommate from nagging. Sometimes, students get confused by the word "negative" by thinking it is synonymous with "bad." Remember what we said before about the word "reinforcement"? Any time you see that word, you should think about *increasing* or *strengthening* a behavior. So, negative reinforcement is still referring to strengthening behavior. In this case, the word "negative" refers to the fact that something undesirable is *removed* or taken away. Think of "take away" as in "subtract" and when you see the term negative reinforcement, picture a subtraction sign. Conversely, when you see the term *positive reinforcement*, you should picture an addition sign (i.e., something positive is added) (see Table 5.1).

negative reinforcers
strengthening or increasing a response by removing an unpleasant consequence

Table 5.1 Two Ways to Increase Behavior

	Reinforcement
Positive +	*Adding* something desired or pleasurable after a behavior occurs Example: Receiving a bonus check for meeting a sales target at work Explanation: Receiving money (a secondary reinforcer) is strengthening the behavior associated with making sales (e.g., working hard)
Negative −	*Removing* (subtracting) or avoiding something undesirable or annoying Example: A child screaming that they don't like broccoli and the parent takes it off their plate Explanation: The child screaming when they don't like something has been negatively reinforced by the parents removing what was undesirable (the broccoli); removing the broccoli will now strengthen or increase the screaming behavior of the child

Teaching Tip: Connections

Positive and negative reinforcement and punishment are topics that continue to be relevant in later chapters, especially social psychology and psychological disorders. Incorporate examples here that can set the stage for how operant conditioning is relevant in these later topics.

Negative reinforcement is about the positive experience you have after something annoying or undesirable has been removed. Have you ever driven in a car that has a very loud and irritating buzzer that goes off until you buckle your seatbelt? Why would the car company design a car like this? What are they trying to accomplish? Yes, they are trying to influence your "seatbelt wearing behavior" by using negative reinforcement. Think about how you feel after you click in your seatbelt and the annoying noise stops. Most people would describe a feeling of relief, which is a positive (and reinforcing) feeling. With negative reinforcement, the behavior is still being strengthened as a result of experiencing something positive. The difference is in the way the positive event arises (i.e., in response to the removal of an annoying or aversive stimulus). If you know anyone who suffers from some form of anxiety, then you can now understand how much of their anxious behavior is maintained through negative reinforcement. Most people who experience extreme anxiety about going somewhere, doing something, or interacting socially with someone begin to avoid the situations and experiences that make them most anxious. While this may seem like an intuitive thing to do, it is in fact the worst choice because the avoidance behavior (i.e., removal of the anxious state) leads to an overwhelming sense of relief and therefore negatively reinforces the avoidance behavior (Rosqvist, 2012). So, in this example, the avoidance behavior is strengthened, which means the next time the person is presented with an opportunity to engage in an activity that produces some anxiety, there is an increased likelihood that they will choose to avoid the situation.

Table Drag-and-Drop: Positive vs. Negative Reinforcement

In this activity, students will read four scenarios and drag and drop to either positive or negative reinforcement to correctly label the examples.

Positive vs. Negative Reinforcement

Interactive

You will be provided with 4 scenarios. Identify each as an example of either positive reinforcement or negative reinforcement.

Positive Reinforcement	Negative Reinforcement
You give your dog a treat after he sits.	The buzzer in your car stops after you secure your seat belt.
Your roommate says "thanks" after you clean up the kitchen.	Your headache is relieved after taking aspirin.

Start Over

Punishment

LO 5.6 **Distinguish between positive and negative punishment.**

punishment
consequences for behavior that decrease the probability of that behavior occurring again

Most of us probably remember being punished for bad behavior at some point during childhood. Were you sent to your room to "think about what you had done"? Ever been grounded or lost special privileges? What about receiving a spanking? As you think back on those experiences, ask yourself, "Did that work?" Was the punishment you received effective in terms of decreasing undesirable behavior? So far, we have only discussed principles of increasing behavior. Whereas reinforcement increases or strengthens a behavior, **punishment** *decreases* or *weakens* a behavior (Skinner, 1953).

Sometimes distinguishing between reinforcement and punishment can be tricky. It is helpful to consider the response to the situation rather than the situation itself. For example, think of the following situation: You have an annoying family member who loves to ask you personal questions in front of other family members. Over the years, you have politely said to them that this makes you uncomfortable, but there has been no change in their behavior. Finally, at the summer family reunion, you can't take it anymore and when asked about your current love

Distinguishing Reinforcement from Punishment

Interactive

[ ] leads to an increase in behavior while
[ ] leads to a decrease in behavior.

Start Over | Check Answers

Fill-In: Distinguishing Reinforcement from Punishment

Students will type "reinforcement" and "punishment" in the appropriate blanks to correctly identify which leads to an increase versus decrease in behavior.

life, you yell "It's none of your business!" and stomp off. Now, was yelling at the person a form of punishment? Well, it depends on the outcome. Did your outburst lead to a decrease in your family member's meddling ways, or was your outburst just the response they were looking for and has now helped them to figure out exactly what to ask in order to get a rise out of you in the future? If the behavior stopped or decreased, then losing your temper was a form of punishment. But, if your outburst led to an increase in that family member's behavior, then it was most definitely a reinforcer.

Just like our discussion about reinforcement, punishment can also take two forms: **positive punishment** (adding something undesirable after a behavior) and **negative punishment** (removing something desirable or enjoyable after a behavior). Click through the following table to learn about positive and negative punishment.

positive punishment
adding something undesirable after a behavior with the intention of decreasing the likelihood of that behavior occurring again in the future

negative punishment
removing something desirable or enjoyable after a behavior with the intention of decreasing the likelihood of that behavior occurring again in the future

Two Ways to Decrease Behavior

Interactive

Positive Punishment = [ ] something [ ] after a behavior with the intention of decreasing the likelihood of that behavior occurring again in the future.

Negative Punishment = [ ] something [ ] after a behavior with the intention of decreasing the likelihood of that behavior occurring again in the future.

WORD BANK
- unpleasant or undesirable
- Removing (subtracting)
- pleasant or enjoyable
- Adding

Start Over | Check Answers

Fill-In: Two Ways to Decrease Behavior

In this activity, students will fill in the blanks in the definitions of positive and negative punishment to complete the definition of each.

Teaching Tip: Active Learning

Ask students to think about a behavior of their roommate or a family member that they would like to change. Working with a partner or in a small group, ask students to come up with examples of how they could use positive reinforcement, negative reinforcement, positive punishment, and negative punishment to change the behavior.

Polling: Spanking

In this activity, students will be polled about the research on spanking, then receive feedback.

ISSUES RELATED TO THE EFFECTIVENESS OF PUNISHMENT The issue of punishment is one of the topics in the field of psychology that stimulates great debate among people, including psychologists. For example, consider the issue of spanking as a discipline technique in childhood. You've likely been exposed to strong opinions both for and against the practice of spanking. Let's walk through the research regarding spanking.

Spanking

Interactive

1. Within the punishment literature, there is probably no more controversial topic than the corporal (physical) discipline of children. While corporal punishment is a broad term that refers to purposely inflicting pain as a punishment for engaging in an inappropriate behavior, most often, people think of spanking when they hear the term corporal punishment. So, what do you think the scientific research says about spanking?

- The research says spanking is harmful to children and should never be used as a form of punishment.
- The research says spanking can be an effective form of punishment if delivered in an appropriate way.
- The research is mixed and says spanking is both harmful and effective.

Previous Next

Was your answer to the question at right based on your own experience as a child? If so, did your guess about the scientific research mirror the method of discipline you experienced as a child? That wouldn't be unusual. Simons and Wurtele (2010) conducted a study with 102 families and found that the parents who experienced frequent spankings as children were more likely to view spanking as acceptable and reported spanking their own children frequently. Furthermore, the children of these parents who experienced frequent spankings tended to also agree that spanking was an acceptable form of discipline.

Learning how to think critically about real-world issues by reading scientific literature or even articles you find on the Internet is an important skill. It takes practice to seek out *all* relevant information, even if we don't agree with that information. For example, the *confirmation bias* states that once we establish an opinion on a particular topic, we tend to only look for evidence to support our position.

Table Drag-and-Drop: Research on Spanking

In this activity, students will drag and drop statements to clarify different research findings on spanking.

Research on Spanking

Interactive

Below you will find a list of statements or conclusions derived from, or used in actual psychological research related to, corporal punishment (e.g., spanking). Drag and drop the following statements into the column that best represents each statement.

Spanking Has No Serious Detrimental Effects and Its Use Should Be At the Discretion of the Parents	Spanking is Ineffective and/or Harmful and Should Not Be Used
The use of corporal punishment is not always associated with poor outcomes; however, there is no added benefit to spanking over other discipline practices (Simons et al., 2013).	Recent findings showed that spanking was associated with 13 negative outcomes and no positive outcomes. Detrimental outcomes were not only associated with spanking that verged on physical abuse. Researchers found that any spanking at all can be harmful to a child (Gershoff & Grogan-Kaylor, 2016).
Prudently used, spanking can effectively accomplish its limited goals with no more harm than alternative disciplinary tactics (Baumrind, 1996).	Many parents who spank their children often spank them more than recommended (Holden et al., 2014). Evidence suggests that corporal punishment can easily escalate into abuse (Hall, 2013).
When not overused, spanking has been found to have beneficial outcomes, including increased compliance, in children from ages 2–6 (Larzelere, 2000; Larzelere & Kuhn, 2005).	Being spanked more than 2 times in the past month, at age 3, by either mother or father, is associated with increased child aggression at age 5 (Lee et al., 2013).
	Currently, 37 countries have made corporal punishment illegal in the home (GITEACPOC, 2014).

Start Over

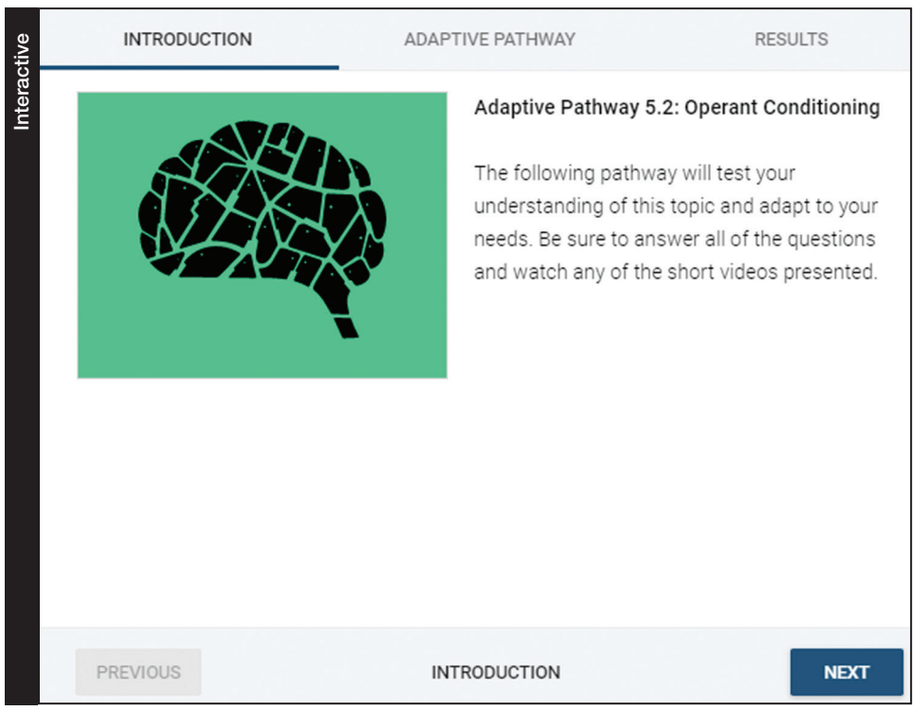
Now that you've had a chance to review the research on spanking and realize it is a complicated topic, let's consider the issues related to punishment in general. Skinner and other behaviorists discovered that punishment was not as effective in changing behavior as reinforcement (Skinner, 1974). Imagine having a roommate who is very messy and never picks up her belongings. If your goal is to increase your roommate's cleaning behavior, you will probably be more successful by finding a way to reward her when you see her pick up something and put it away than if you simply criticize her when you find something on the floor. Why is this true? It turns out that punishment only provides information that the behavior was not correct or acceptable, but it does not inform the person about what behavior to perform instead. By rewarding appropriate behavior, your roommate would clearly know what behavior leads to a positive response from you. This does not mean that punishment is ineffective. Research has suggested that punishment can be effective if it is:

1. Immediately applied after the behavior
2. Consistently applied every time the behavior occurs

When you consider how punishment is actually used in our society, it becomes clear that these two criteria are rarely applied. The practice of incarcerating people who break the law is meant to serve as a punishment with the hopes of reducing future criminal behavior. However, this is often ineffective, and one reason is the delay in time between the criminal behavior and the incarceration. In fact, sometimes it takes years for the legal process to transpire. Consistency is another important consideration when thinking about the effectiveness of punishment. For example, sometimes when you speed while driving, you receive a speeding ticket (a form of positive punishment). However, this form of punishment is not likely to be very successful at reducing your speeding behavior because it is not consistently applied every time the behavior occurs. Imagine if you had a computer monitor built into your car that alerted the police every time your car went over the speed limit and you were sent a ticket in the mail. This would be a much more effective way of using punishment to reduce speeding behavior!

In this section, you have been reading about and experiencing different ways to change behavior through the principles of operant conditioning. You've seen how to increase behaviors through positive and negative reinforcement and decrease behaviors through positive and negative punishment. In the next section, we'll look at the way in which you present the reinforcement and how it can impact the resulting behavior.

Adaptive Pathway 5.2: Operant Conditioning



Adaptive Pathway 5.2: Operant Conditioning

All of the content and data in this adaptive pathway (pinpoint questions, targeted videos, follow-up questions, global student performance data, and class instructional ideas) can be accessed in the Revel Instructor Resources.

Teaching Tip: Lecture Ideas

How did researchers figure out that partial schedules of reinforcement could be as (if not more) effective than continuous reinforcement? This is the perfect opportunity to tell the story of how B. F. Skinner, faced with the prospect of spending an entire weekend painstakingly making food pellets to use as reinforcers for the rats he was training, started to wonder whether he could reinforce only some of the lever presses. Reinforcing some, but not all, of the desired responses would help him conserve his supply of pellets and keep his training regimen progressing. Skinner not only enjoyed his weekend, but he started experimenting with different rates and schedules of delivering the reinforcers and found they produced very different patterns of behavior. Skinner relates this story in his 1956 *American Psychologist* article, A Case History in Scientific Method.

Journal Prompt: Extinction Bursts

Journal writing prompts promote critical thinking by asking students to apply what they've learned to their experiences. This prompt encourages students to generate examples of extinction bursts that they have witnessed or experienced in their own lives.

Schedules of Reinforcement

LO 5.7 Identify how the different schedules of reinforcement affect behavior.

Not only can we change behavior through the use of reinforcement, but the rate at which the reinforcement is delivered can alter future behavior patterns (Ferster & Skinner, 1957). Skinner referred to this as *schedules of reinforcement* and, through a series of studies, he concluded that animals and humans respond in a very predictable pattern based on the schedule of the delivery of their reinforcement.

continuous reinforcement
when a desired response is reinforced every time it occurs; this schedule results in rapid learning, but if the reinforcement stops, extinction also occurs rapidly

The most straightforward schedule is **continuous reinforcement**, which means the desired response is reinforced every time it occurs. This schedule results in rapid learning; but, if the reinforcement stops, extinction also occurs rapidly. If a rat suddenly stops receiving food pellets every time it presses a bar, it will soon give up and stop pressing it. Many activities we engage in on a daily basis exist as a result of continuous reinforcement. For example, when you push a button for an elevator, you are rewarded by the elevator doors opening eventually. Assuming the elevator is working properly, the behavior of pushing the button will be reinforced every time the behavior is performed. What do you do if you push the button and no elevator comes after a couple of minutes? You will likely very quickly give up and find another elevator or take the stairs. This is the process of extinction discussed earlier. However, if you are like most people, you probably won't give up right away. In fact, you may find yourself pushing that elevator button over and over with great enthusiasm, hoping your perseverance will open the doors. Rats do the same thing when they are initially deprived of reinforcement. That is, when the food is removed, they rapidly push their lever over and over in hopes of obtaining another pellet (Weissman, 1960). This behavior is called an **extinction burst**, and it often occurs in response to the removal of previous reinforcement (Lerman & Iwata, 1995; Lerman & Iwata, 1996).

extinction burst
a burst of responding following the removal of previous reinforcement

Journal Prompt: Extinction Bursts

Can you give an example of an extinction burst, maybe one you have experienced or witnessed?

partial (intermittent) reinforcement
when responses are only occasionally reinforced; this produces slower initial learning, but the learning is more resistant to extinction

Partial (intermittent) reinforcement occurs when responses are only occasionally reinforced. This produces slower initial learning, but the learning is more resistant to extinction. Never knowing when the reinforcement will be presented maintains the behavior for a longer period of time. There are several types of partial reinforcement, and they exist along two dimensions. The first dimension is related to the *rate* at which the reinforcement is provided. The rate can either be *fixed*, meaning the reinforcement is provided according to a set and unchanging schedule, or the rate can be *variable*, meaning the reinforcements are delivered according to a random or unpredictable schedule. The second dimension involves the *reason* for the reinforcement. If the reinforcement depends on the number of responses, then it is said to be a *ratio* schedule (think "r" for ratio and "r" for responses). If the reason for the reinforcement has to do with the amount of time that has passed, then it is considered an *interval* schedule (think about people who do circuit training for exercise—they may engage in a particular exercise for two-minute *intervals* and then move on to the next one). Specific schedules of reinforcement merely involve all four possible combinations of these variables: fixed ratio, variable ratio, fixed interval, variable interval.

fixed-ratio schedules
when a behavior is reinforced after a set number of responses; fixed-rate schedules produce high rates of responding with only a brief pause following reinforcement

Fixed-ratio schedules reinforce behavior after a *set number* of *responses*. For example, you might get one free latte after every 10 purchases at the local coffee shop. Fixed-rate schedules produce high rates of responding with only a brief pause following reinforcement.

variable-ratio schedules
reinforcing behavior after varying and unpredictable numbers of responses; have high response rates and produce behavior that is difficult to extinguish

Variable-ratio schedules reinforce behavior after *varying* and *unpredictable numbers* of responses. A gambler at a slot machine may put in thousands of coins and receive no payout, or insert a single quarter into the slot and win thousands of dollars. Variable-ratio schedules have high response rates and produce behavior that is difficult to extinguish.

fixed-interval schedules
when a behavior is reinforced after a fixed time period; fixed-interval schedules produce rapid responses at the expected time of reward and slower responses outside of those times

With **fixed-interval schedules**, behavior is reinforced after a *fixed time period*. If we know our dinner is almost ready, we will check the oven more frequently, producing rapid responses at the expected time of reward and slower responses outside of those times.

Variable-interval schedules reinforce behavior after *variable* periods of *time*. We may obsessively check our phones for new text messages and be rewarded for our efforts at varying time intervals. This schedule generally produces slow and steady behavioral responses.

variable-interval schedules
reinforcing behavior after variable periods of time; generally produce slow and steady behavioral responses

Schedules of Reinforcement

Interactive

1. You have been asked to sell cookie dough as a way of raising money for your school. After every 5 tubs of cookie dough that you sell, you will earn a $5.00 Visa gift card. _____

2. You work at a store that is part of a chain. Your manager is responsible for your store and the 4 other stores in town. Your manager typically shows up to your store at least once each week, but you never know which day. _____

3. You are playing a video game where if you die, you have to wait 5 minutes before your character is regenerated. _____

4. You are learning about psychology, and you can earn "surprise" bonus points after correct responses on quizzes. Sometimes you can get an extra point after 3 correct responses and sometimes it takes 10 correct responses. _____

WORD BANK

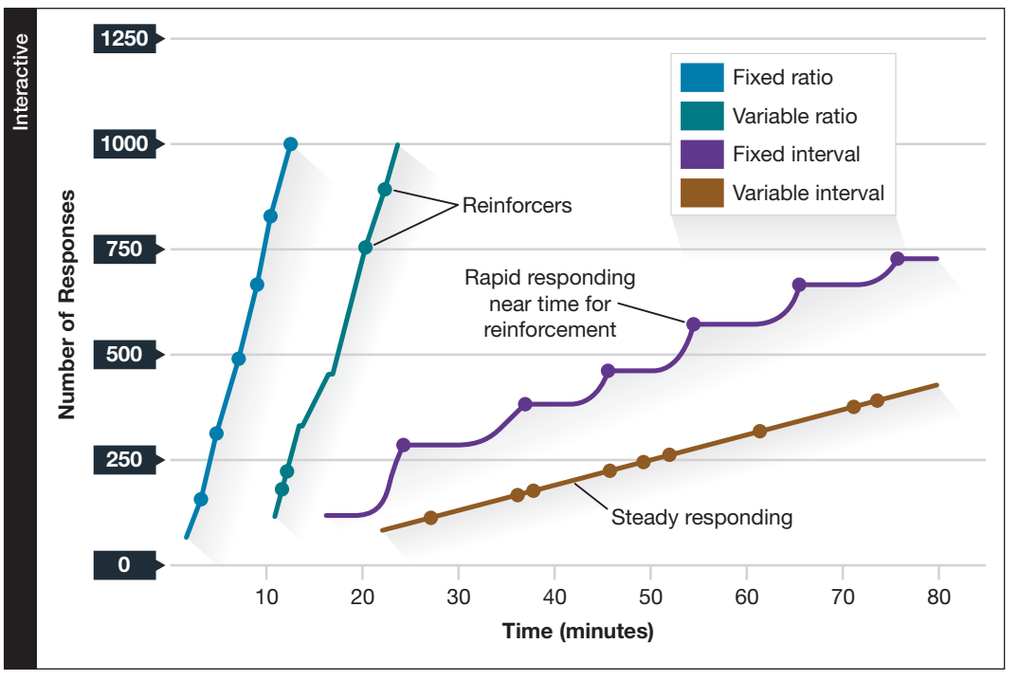
- variable interval
- fixed ratio
- fixed interval
- variable ratio

Start Over | Check Answers

Rates of Responding Based on Different Schedules

Fixed and variable ratio reinforcement lead to high response rates. Fixed interval reinforcement leads to higher response rates at the expected time of reinforcement. Variable interval reinforcement leads to very steady response rates.

Interactive



Teaching Tip: Scale It Up, Scale It Down, Put It Online

Ask students to identify schedules of reinforcement used in retail loyalty programs in which they participate. Which programs use fixed ratio schedules? Which use variable interval schedules? In a small class, discuss how the schedule of reinforcement impacts their behavior with respect to shopping at that retailer. In a larger class, use think-pair-share or have students submit ideas in an open-ended question using a classroom response system (TopHat, Socrativ, etc.). In an online class, use this as a formative assessment to check their understanding.

Fill-In: Schedules of Reinforcement

In this activity, students will read four text examples and identify which schedule of reinforcement goes with each.

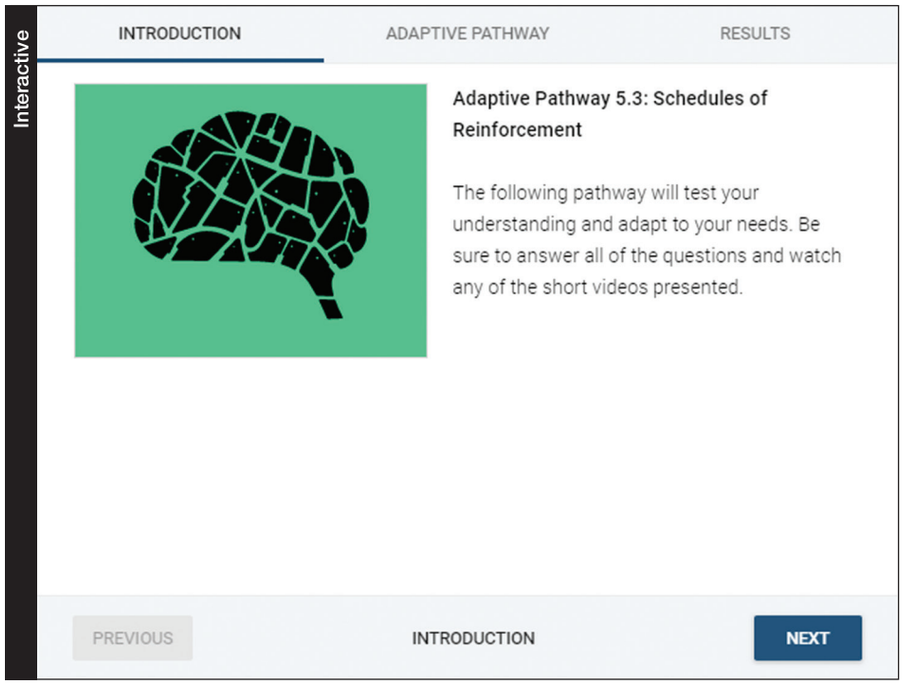
Image Drag-and-Drop: Rate of Responding Based on Different Schedules

In this activity, students see an unlabeled graph with four colored lines and have to drag/drop labels (schedules of reinforcement) onto each.

Adaptive Pathway 5.3: Schedules of Reinforcement

All of the content and data in this Adaptive Pathway (pinpoint questions, targeted videos, follow-up questions, global student performance data, and class instructional ideas) can be accessed in the Revel Instructor Resources.

Adaptive Pathway 5.3: Schedules of Reinforcement



End-of-Module Quiz

Revel offers an end-of-module quiz focused on operant conditioning that allows students to practice their content mastery. Feedback is provided for correct and incorrect answers. (Note: You can find the correct answers in the Instructor's Manual.)

Quiz for Module 5.4–5.7

1. Discrimination, generalization, and extinction occur in_____.
   - **a.** classical conditioning only
   - **b.** operant conditioning only
   - **c.** both operant and classical conditioning
   - **d.** neither operant nor classical conditioning

2. _____ reinforcement occurs when something pleasant follows a behavior.
   - **a.** Positive
   - **b.** Negative
   - **c.** Neutral
   - **d.** Compound

3. Fred is afraid of spiders. He won't even watch a nature show on TV about them. When he sees a picture of a spider, he has a panic attack, but when he avoids looking at the image, his panic goes away. Fred's avoidance of spiders is _____ .
   - **a.** positively reinforced; he is rewarded by his anxiety going down
   - **b.** negatively reinforced; he is rewarded by his anxiety going down
   - **c.** recovered spontaneously; he will never get better
   - **d.** extinguished; he feels anxious after doing so

4. Kyla wants to make sure her dog Axel does not beg for food from the table. Every time Axel begs, Kyla says, "no" in a sharp, scolding voice and she never gives in. Kyla is using _____.
   - **a.** stimulus generalization
   - **b.** negative reinforcement
   - **c.** positive punishment
   - **d.** negative punishment

5. Being grounded or put in "time out" effectively removes pleasant stimuli (e.g., attention from others) from the individual. This is called _____.
   - **a.** positive punishment
   - **b.** positive reinforcement
   - **c.** negative reinforcement
   - **d.** negative punishment

6. When the number of responses is important to a schedule of reinforcement, that schedule is called a _____ schedule.
   - **a.** ratio
   - **b.** interval
   - **c.** conditioned
   - **d.** time-delayed

7. Which schedule of reinforcement tends to get the highest response rate?
   - **a.** Variable interval
   - **b.** Fixed ratio
   - **c.** Variable ratio
   - **d.** Fixed interval

Module 5.8–5.9: Modifying Behavior with Operant Conditioning

The principles of operant conditioning have broad applications to all sorts of behaviors for both people and animals. Have you ever seen a seal balance a ball on its nose at an aquarium? Or have you seen a child throwing a tantrum in public while his/her parent appears to be ignoring the behavior completely? If so, you've witnessed how operant conditioning principles can be applied to modify behaviors.

Operant conditioning is the basis of animal training--whether you are teaching your dog to sit or a seal to balance a ball.

Teaching Tip: Lecture Ideas

Reflect back on the shaping demonstration used to introduce this chapter, or conduct a shaping demo here. Alternatively, ask students to search online for a video of an animal trainer using shaping and deconstruct or explain the components of the process.

Shaping

LO 5.8 **Identify how behaviors are modified through the process of shaping.**

The process of **shaping** behavior uses reinforcers to guide an individual's or animal's actions toward a desired behavior (Kazdin, 2012). This new behavior is achieved by using *successive approximations*, or behaviors that are incrementally closer to the overall desired action. Most amazing animal tricks are taught according to this method, as shown in the video *Shaping Techniques*.

shaping
the use of reinforcement of successive approximations of a desired end behavior

Shaping Techniques

Video: Shaping Techniques

Students will watch a short video on shaping techniques.

One method of shaping complex behavior is referred to as **chaining**. A chain is a combination or series of responses performed in a particular order (Kazdin, 2012). The reward is ultimately tied to the full sequence of behaviors; but, during training, reinforcement of the successive approximations (each behavior in the chain) is used to shape the overall sequence of behaviors. This is exactly how Skinner managed to train a rat to wait to hear the "Star-Spangled Banner" before sitting up on its hind legs, pulling a string to hoist the U.S. flag, and finally saluting the banner in a remarkable display of rodent patriotism.

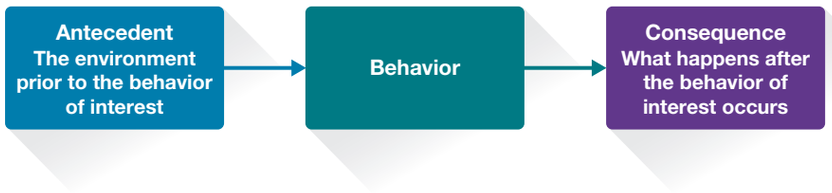
chaining
a method of shaping complex behavior by rewarding a combination or series of responses performed in a particular order

Applied Behavior Analysis

LO 5.9 **Describe applied behavior analysis.**

One of the most exciting aspects of psychology is the ability to learn something new and then immediately apply it to your own life. **Applied behavior analysis (ABA)** has been defined as the systematic extension of the principles of operant psychology to problems and issues of social importance to people (Baer et al., 1968). In recent years, researchers and clinicians have favored the use of the name *applied behavior analysis* (rather than behavior modification) because of its less negative connotation (Cooper, 1982; Fielding et al., 2013). You can use techniques from ABA to change some of your own behaviors, or you can use it with others to alter their behavior patterns. True to the principles of operant conditioning, applied behavior analysis can be employed to either increase or decrease behaviors through the use of reinforcement and punishment. These techniques have been and continue to be applied to many aspects of life such as school, work, home, sports, and relationships. It is likely that you have experienced these techniques in your own life—maybe without even knowing it!

applied behavior analysis (ABA) or behavior modification
using the principles of operant psychology to address problems and issues of social importance to people



EDUCATIONAL APPLICATIONS Skinner believed it was possible to achieve an ideal education. He stated: "Good instruction demands two things. 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, 1961). Think about what you are doing right now. This introductory psychology program is focused on providing you with (1) immediate scores and feedback on your performance related to the questions you answer and (2) directions to the next step along the learning pathway based on your performance. Skinner's thinking was well ahead (about 55 years ahead!) of technology, but hopefully, through this program, you are experiencing the benefits of his contributions to education.

Premack principle
high probability (or preferred) behaviors can be used to reinforce low probability (or nonpreferred) behaviors

As we have seen, enticing rewards tend to be good motivators. The **Premack principle** states that people (and animals) are more likely to engage in a low probability activity if they know it will be followed by a high probability activity they enjoy (Premack, 1959). That is, promising yourself some kind of reward for completing a task you are not excited about can motivate you to begin and finish the task quickly (e.g., "I'll get a snack after I finish reading this chapter."). The Premack principle is a very useful strategy when it comes to completing homework or studying for exams.

Journal Prompt: Premack Principle

Journal writing prompts promote critical thinking by asking students to apply what they've learned to their experiences. This prompt encourages students to generate ideas about how they could apply the Premack principle in their own lives.

Journal Prompt: Premack Principle

Write an example of how you could use the Premack principle in your own life right now.

In order to use the Premack principle, you must know how or be capable of performing the behavior required to obtain the reward.

APPLICATIONS TO THE TREATMENT OF AUTISM In recent years, ABA has often been discussed most often in terms of its treatment potential for *autism-spectrum disorders (ASD)*. ABA interventions are personalized based on individual needs but typically focus on communication, sociability, self-care, play, and academic skills (www.autismspeaks.org). For example, an ABA therapist may help a child with autism learn how to communicate hunger in an appropriate way rather than throwing a tantrum. The therapist would break the skill down into small components and provide reinforcements for performing the small steps. First, they may focus on making the sounds of the words, "I'm hungry." Then, they may work on having the child sign the word for "eat." Finally, if they are at home, they may encourage the child to go to the kitchen when they are hungry. Each of these skills would be taught discretely (one at a time), and then the therapist would work with the child to put them all together.

An ABA therapist uses positive reinforcement after a child performs a desired behavior.

According to recent data, the rates of ASDs are the highest they have ever been with 1 in every 68 children aged 8 years are diagnosed with ASD (Developmental, D.M.N.S.Y, & 2010 Principal Investigators, 2014). These rates have increased from 1 in every 88 children in 2008 and 1 in every 150 children in 2002 (Mandell & Lecavalier, 2014). It isn't clear whether the increased rates are a result of more children developing ASD or simply a consequence of greater public awareness, increased advocacy, wider screening with better assessment techniques, and/or earlier detection (Neggers, 2014). Regardless of the reasons for the increased numbers, early intervention utilizing applied behavior analysis has been an effective treatment for ASD (Eikeseth et al., 2012; Reichow, 2012). With the recent increase in the number of states mandating insurance companies to cover the cost of applied behavior analysis for ASD (Johnson et al., 2014), many colleges and universities are offering training and credentialing of behavior analysts at the undergraduate, masters, and doctoral levels.

BUSINESS APPLICATIONS Outside of autism and education, applied behavior techniques are evident in most modern successful businesses—a field of study referred to as organizational behavior management (Abernathy, 2013). There may be no better company example of this than Google—a leader in developing a corporate culture that empowers, self-motivates, and rewards employees for creative innovation and contributions to the company. According to Cook (2012),

> Many talented people work for Google, Inc. because of their unique culture, rewards, and perks. At the Googleplex, employees can show up to work anytime they want, bring their dog, wear pajamas, eat gourmet food for free, enjoy a free fitness center and trainer, see the onsite doctor if they are sick, wash their clothes and partake in free espresso at each corner of their "office." This relaxed, fun environment has worked well for Google, Inc. because it provides a psychological benefit to encourage employees to become more committed, more creative, and more productive.

Google has gone further than other companies in terms of personalizing rewards for its employees. So, rather than having a static reward system where everyone earns the same reward if they meet a certain goal or objective, Google has empowered its managers to truly get to know each of their employees and decide what types of rewards would be most meaningful to them. Just think: Wouldn't you work harder and more effectively if you knew you could potentially earn a trip to a destination you have always wanted to visit?

This strategy of keeping employees happy through the use of reinforcement has certainly been rewarding to Google founders Larry Page and Sergey Brin who in 2017 made the Forbes list of billionaires with a net worth of more than $44 billion each! While most of us are probably never going to work for Google, that doesn't mean we can't use some of the principles from ABA to become more productive, learn new skills, or promote positive behavior changes.

TOKEN ECONOMIES If you have ever been to Chuck E. Cheese, have a frequent flyer account, or have one (or 50) coffee shop punch cards, then you have participated in a token economy. A token is anything (e.g., a sticker, a coin, a point, a cotton ball) that represents a currency that can be cashed in for something rewarding (Doll et al., 2013). Therefore, a **token economy** is an interconnected system of token production, token accumulation, and token exchange for desirable goods or services (Hackenberg, 2009). A token is considered a conditioned reinforcer because it becomes associated with a primary or secondary reinforcer (Kazdin, 1982). Getting a punch on your coffee card isn't inherently rewarding, but over time it becomes rewarding because it is associated with receiving free coffee (which is very exciting for most coffee lovers).

token economy
providing tokens (e.g., stickers, coins, points) for desired behaviors that can be exchanged for something rewarding

Teaching Tip: Lecture Ideas

Ask students to reflect on the idea of a "token economy." Do any of their current classes use a system of accruing points they can exchange for something desirable?

This is an example of a token economy system that could be used in a classroom where the teacher defines what behavior will earn a point.

Teaching Tip: Assessment

In addition to the educational, occupational, and therapeutic applications of applied behavior analysis discussed here, ask students whether they can think of other applications. How else can principles of operant conditioning be used to improve one's life?

Token economies were initially developed as a technique to manage the behavior of patients in psychiatric wards by providing tokens for specific desirable behaviors such as daily self-care, interacting with others in nonaggressive ways, and demonstrating responsibility. These tokens could be exchanged for things like movies and well-located beds (Atthowe & Krasner, 1968). Token economies are still used in some psychiatric facilities today to promote healthy behaviors such as exercise (Kokaridas et al., 2013). The use of token economies has been generalized to other populations (e.g., individuals with developmental disorders) and situations such as classrooms (Hulac & Briesch, 2017; Nelson, 2010). In fact, Dr. Hudson distinctly remembers the token economy from her 7th grade classroom where little pieces of blue paper with one hole punched in the middle could be earned for good behavior and entered into the drawing at the end of the week for a new record. (Yes, they were called "record stickers" and yes—that was a long time ago!)

ABA offers a number of strategies to change your own behavior or the behavior of others. Many colleges offer an entire psychology course in applied behavior analysis, with a project that involves developing your own behavior change plan.

Quiz for Module 5.8–5.9

End-of-Module Quiz

Revel offers an end-of-module quiz focused on modifying behavior with operant conditioning that allows students to practice their content mastery. Feedback is provided for correct and incorrect answers. (Note: You can find the correct answers in the Instructor's Manual.)

1. _____ is the process of reinforcement of complex behaviors by rewarding the small steps in the overall sequence of behaviors.

a. Observational learning **b.** Operant conditioning
c. Chaining **d.** Classical conditioning

2. Gary trains his hamster to roll a marble. First, he reinforces the hamster when it walks toward the marble, then he reinforces when it touches the marble with its nose. Finally, the hamster learns to roll the marble and is reinforced for it. This example illustrates _____.

a. shaping **b.** counterconditioning
c. classical conditioning **d.** the Premack principle

3. The application of operant-conditioning techniques to teach new responses or to reduce or eliminate maladaptive or problematic behavior is called _____.

a. applied behavior analysis **b.** counterconditioning
c. higher-order conditioning **d.** stimulus generalization

4. Ms. Wang gives a sticker for each book her 3rd grade students read. At the end of the year, any student with more than 10 stickers gets to attend a pizza party. What behavioral technique is Ms. Wang using?

a. Classical conditioning technique **b.** Shaping
c. Negative reinforcement **d.** Token economy

5. Promising yourself some kind of reward for completing a task you are not excited about is an example of _____.

a. a token economy **b.** the Premack principle
c. positive punishment
d. negative punishment

Module 5.10–5.11: Observational Learning

Teaching Tip: Connections

The introduction for this chapter includes an example of a child who learned how to drive by watching YouTube videos. YouTube videos are not curated, and the only way to limit access to content is for parents to screen every video their children watch. This is an opportunity to link to the development chapter—given what we know about cognitive development, why is it important to think carefully about what children should watch?

If learning only occurred by classical conditioning or operant conditioning, then we would have a difficult time learning complex tasks such as how to drive a car or even how to tie our shoes. Imagine using only trial-and-error methods to learn to tie your shoes when you were a young child. After only a few minutes, you would likely have learned what *not* to do, but stumbling across the correct solution would likely try the patience of any 5-year-old. Instead, often the best way to learn a new behavior is to watch others and imitate their actions. Take the Ohio youngster who, in 2017, at the age of 8, drove his 4-year-old sister to McDonald's to buy a cheeseburger while his parents were sleeping at home. When the officers asked the boy how he learned to drive, he told them that he just watched videos on YouTube.

observational learning
learning by observing and imitating others

modeling
the act of observing behavior exhibited by someone else in order to imitate the behavior

Observational Learning and Mirror Neurons

LO 5.10 Identify the role of mirror neurons in learning.

Observational learning, in which we learn by observing and imitating others, plays a large part in our overall learning process. After you think about it for a few minutes, you'll likely come up with many examples of observational learning in humans. Language development is highly influenced by **modeling** (the act of observing and imitating others), such that young

Primates often learn by observing the behavior of fellow primates.

Children learn many behaviors such as how to repair a bicycle through the process of observational learning.

children learn the vocabulary and even the accent of the language(s) they are exposed to the most. Observational learning can also help protect us. For example, you don't have to be hit by a car (which would be very "punishing" in an operational learning sense) to learn that it is dangerous to walk across the street without looking carefully. Likewise, observational learning does not occur in humans alone. Many nonhuman animals provide excellent examples of observational learning, which is also referred to as "social learning." Learning how to obtain safe foods, how to identify predators, and how to select a mate have all been shown to have a strong social learning component. Consider the experiment by Whiten et al. (1996) in which researchers showed chimpanzees and human children (ages 2–4) different human models accessing an "artificial fruit" by different methods. Similar to the way a banana must be peeled, the artificial fruit had some sort of covering or "shell" that had to be removed in a certain way in order to access the "treat" inside. The human models demonstrated how to "peel" the fruit. The researchers found that the chimpanzees successfully copied some of the methods they witnessed. The human children were even more successful in imitating the adult model's methods, demonstrating that humans are very adept at imitation and social learning. Outside of the laboratory, examples of social learning in many species can be found. Songbirds such as the sparrow learn to sing their songs by listening to and imitating other sparrows in their territory (Beecher, 2008; Beecher et al., 1994). Young cheetahs are often taught how to hunt by being provided with injured prey (Eaton, 1970).

Over the past 25 years, there has been a surge in research on social learning in human and nonhuman animals (Nielsen et al., 2012). One current debate focuses on the difference between *imitation* (copying the actions of others) and *emulation* (reproducing the end results of the actions of others through different means) (Call et al., 2005; Subiaul & Schilder, 2014; Whiten, 2017; Whiten et al., 2009) with significant evidence suggesting that primates are more adept at imitation than other animals. The fact that humans are very adept at imitation may help explain why human cultures have become so rich and diverse—the ability to imitate another person and then further that learned skill and teach the next generation sets humans apart from other nonhuman animals.

Research advances have also demonstrated the importance of specific types of neurons in the brain to explain how social learning works. Like many important scientific findings, these neurons were first discovered by accident. In the early 1990s, a group of Italian scientists implanted electrodes into macaque monkeys' brains to study brain activity involved in various motor movements such as grasping food. One day, as one of the researchers reached for his own food, he noticed that neurons in the monkey's prefrontal cortex had fired just by watching the researcher reach for food. The monkey's brain responded to watching the researcher reach for his food in the same way as if the monkey were reaching for its own food (Di Pellegrino et al., 1992). These neurons, which were named **mirror neurons**, fire not only when a monkey engages in a particular action, but also if a monkey observes another monkey (or human) engaging in the same action (Di Pelligreno et al., 1992, Gallese et al., 1996, Rizzolatti & Sinigaglia, 2016;

mirror neurons
neurons that fire not only when an animal engages in a particular action, but also if the animal observes another animal engaging in the same action

Rizzolatti & Craighero, 2004). Much indirect evidence that primarily comes from fMRI studies strongly suggests that humans also have mirror neurons (Molenberghs et al., 2012). This means that anytime you watch another person make a face after biting into a sour lemon or flinch in pain when receiving a painful injection, your brain also simulates the experience.

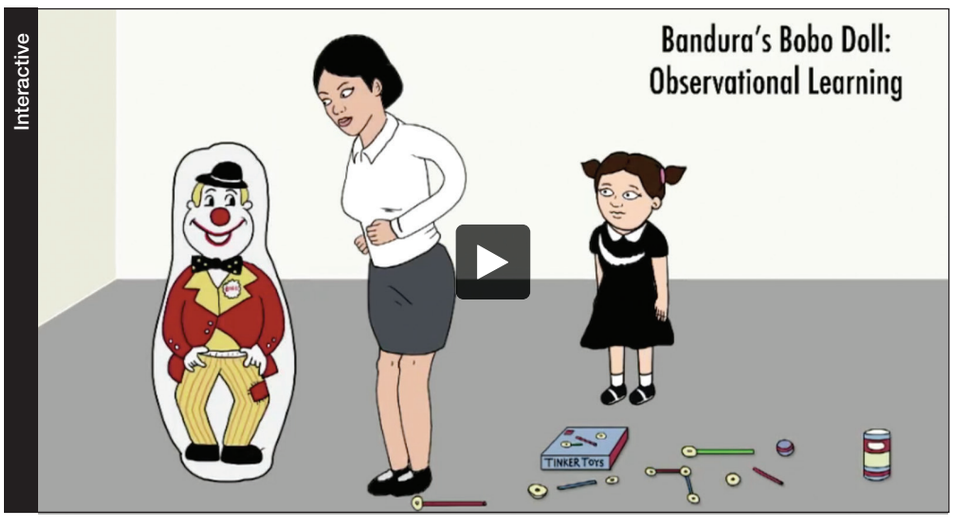
These findings have very important implications to a wide variety of issues. Recent research has discovered that mirror neurons not only allow us to imitate, but they also allow us to infer the intention behind an action. Mirror neurons have been linked to the experience of empathy (the ability to understand and share the feelings of another). One adaptive response when people experience pain is to either freeze or escape. One study showed that watching a person have a needle injected into his hand led the observer to experience the same type of disinhibition (or "freezing") response as the person receiving the injection. This response did not occur when the individual observed the person being touched with a nonpainful Q-tip or when they watched a tomato being injected with the same needle (Avenanti et al., 2005). Studies like this have demonstrated that mirror neurons provide us with the ability to actually experience the pain, joy, or sadness of others. While these findings are fascinating, other scientists have cautioned about overinterpreting research findings related to mirror neurons (Hickok, 2014).

Bandura's Experiments

LO 5.11 **Recognize the characteristics necessary for observational learning.**

One of the first studies of observational learning was conducted by psychologist Albert Bandura. He conducted a famous experiment in which he attempted to evaluate the nature of observational learning in children with respect to aggressive behavior (Bandura, 1961). Watch the video *Bobo Doll Study* to see an overview of this experiment.

Bobo Doll Study



Bandura pointed out that some key "ingredients" must be present for observational learning to occur (Bandura, 1986). The first of these is *attention*. In order to learn something by watching others, an individual must be paying attention to the model. For example, if an art professor is demonstrating a particular painting technique, the students must be paying attention to the demonstration to actually learn how to use that technique. *Retention* is the second process of successful observational learning. Retention is the ability to encode and store the information so that it can later be retrieved from memory. Sometimes, when observing a complicated lesson (e.g., watching a gourmet cooking show), the reason you can't replicate the model's behavior (baking a perfect soufflé) is because you weren't able to accurately retain the information in your memory for later recall. The third process important in observational learning is *motor reproduction*. You must be capable of reproducing the action that was observed for observational learning to be successful. Simply watching a talented gymnast demonstrate how to complete a complicated tumbling pass will not be sufficient

Teaching Tip: Lecture Ideas

The results of Bandura's experiments may seem somewhat obvious now. Caution students to beware the hindsight bias—once we know the outcome, we have a more difficult time imagining how the study might have turned out differently. Also, at the time it was done, theorists didn't know whether viewing aggressive behavior would make people more aggressive or whether by watching someone else act aggressively, the viewer would become less aggressive (an idea called catharsis). Bandura's experiment was thus important in understanding aggressive behavior but, more broadly, how people learn though observation without directly experiencing reinforcement or punishment themselves.

Video: The Bobo Doll Study

Students will watch a short video outlining Bandura's famous Bobo Doll experiment.

Teaching Tip: Lecture Ideas

Children's toys often allow them to model adult behaviors. Ask students to look up advertisements for children's toys, and think about what kinds of behaviors they are most likely to imitate. Students will inevitably notice a gender bias in the nature of toys marketed to boys and girls. Discuss how this might impact boys' and girls' behavior. This is a point you can emphasize again when discussing stereotypes in the Social Psychology chapter and gender development in the Human Sexuality and Gender chapter.

for most people to learn how to engage in that same behavior because they don't have the motor ability to do so. Finally, Bandura pointed out that *motivation* is the final ingredient for successful observational learning. To replicate the behavior of someone else, the individual needs to be motivated to do so by some sort of incentive. While observing, if the model's behavior is followed by a positive consequence (positive reinforcement), then the observer will be more likely to attempt to imitate the behavior. If the consequences are negative, the observer is less likely to be motivated to imitate the behavior.

Observational Learning

Interactive

Drag and drop the observational learning process that best represents each example.

Example	Observational Learning Process
Juan stared off into space while the guide demonstrated how to secure the harness to the zipline. When handed his harness, he was embarrassed to admit he didn't know what to do.	Attention
Because she had just learned how to make the letter "P," preschooler Meg was successfully able to reproduce the letter "B" after her teacher provided an example on her paper.	Motor Reproduction
Alec was hesitant at first, but after watching a fellow student be awarded extra credit points for volunteering for a class demonstration, he quickly raised his hand the next time the instructor asked for volunteers.	Motivation
Aleni was able to recreate the first three steps in the process of assembling the display like her supervisor had demonstrated, but she couldn't remember the last two steps.	Retention

Start Over

Table Drag-and-Drop: Observational Learning

Students will drag and drop the correct observational learning processes (attention, retention, motor reproduction, reinforcement) that are described in four examples.

Quiz for Module 5.10–5.11

1. A _____ neuron fires not only when an animal engages in a particular action, but also if an animal observes another animal (or human) engaging in the same action.

a. motor **b.** chaining
c. mirror **d.** reflex

2. Research on mirror neurons shows that these neurons fire when an animal _____.

a. engages in a particular behavior only
b. watches another animal engage in a particular behavior only
c. is at rest
d. either engages in a particular behavior or watches another animal engage in the behavior

3. Michael grows up in a home where his father is generally unloving toward his mother. He observes his father yell and degrade his mother, and he notices that his mother never resists this treatment. Based on the work of Bandura, what might we predict about Michael's own relationships when he is older?

a. Michael may treat women with discourtesy and disrespect, as he repeats the behavior he saw in his father.
b. Michael will probably have no relationships with women, as his father has taught him that relationships are not worth having.
c. Michael will always be very distant from his father, as he has learned that his father does not care about anyone but himself.
d. Michael will probably treat women very well, as he rebels against the behaviors he saw in his father.

4. For observational learning to occur, each of the following must happen *except* _____.

a. being reinforced for imitating the model
b. doing what the model did
c. remembering what the model did
d. paying attention to what the model does

End-of-Module Quiz

Revel offers an end-of-module quiz focused on observational learning that allows students to practice their content mastery. Feedback is provided for correct and incorrect answers. (Note: You can find the correct answers in the Instructor's Manual.)

Module 5.12–5.13: Learning and Cognition

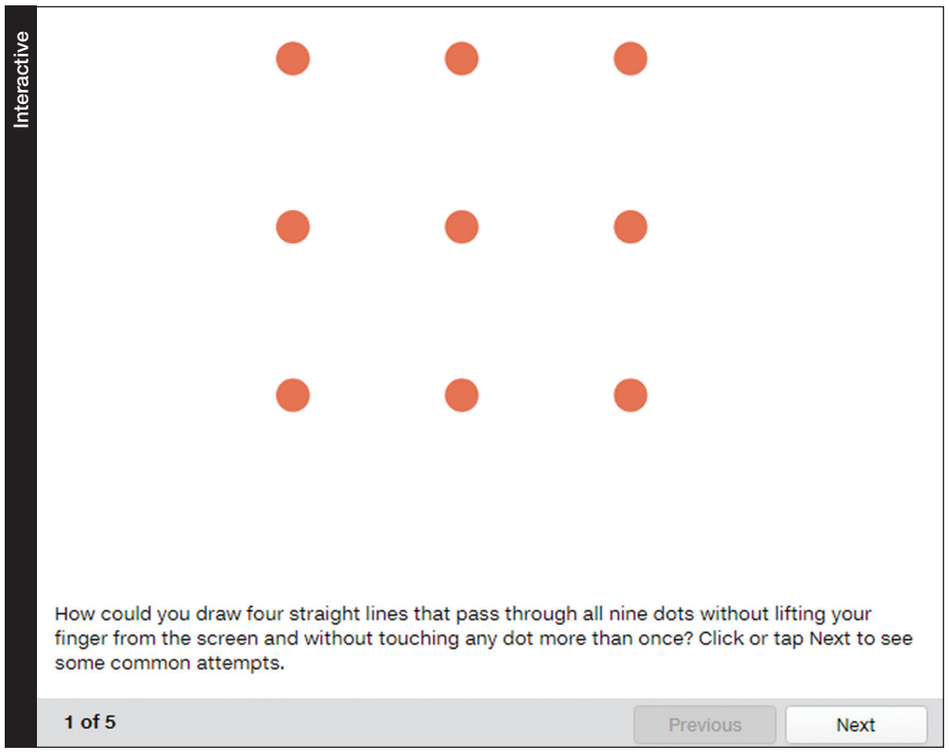
After studying classical conditioning, operant conditioning, and observational learning, you might assume all learning involves some type of conditioning or observation. However, have you ever had an "aha moment" where the solution to a problem seems to come to you out of the blue? If you're anything like the authors, these moments are rarely timely (e.g., a sudden brainstorm while in the shower or better yet, while trying to go to sleep), but they do suggest the possibility that **cognition**, or mental events, can lead to learning without other forms of conditioning or observation taking place. To provide an example, take a moment and try to find the solution to the following problem:

cognition
mental processes, including thinking, knowing, judging, problem solving, and remembering

Dot Problem

Students will progress through a "dot problem" activity where they are asked how you could draw four straight lines through nine dots without lifting their finger or touching any dot more than once.

Dot Problem



Insight Learning

LO 5.12 **Explain the cognitive theory of insight learning.**

In the 1920s, Wolfgang Köhler was conducting research on problem solving in chimpanzees. One chimpanzee, Sultan, became famous for developing excellent problem-solving skills. In one experiment, Köhler placed Sultan in a cage and provided him with a stick that was reachable just outside the cage. Köhler then placed some bananas a short distance away. Sultan quickly became adept at using the stick to retrieve the bananas. One day, Köhler moved the bananas out of the reach of the stick. Sultan had access to two sticks and, after approximately an hour, Sultan appeared to suddenly discover that he could fit the two sticks together and retrieve the bananas. Köhler argued that Sultan's abrupt inspiration on how to use the sticks to retrieve the bananas was not achieved through shaping, or gradual reinforcement of behavior. Rather, Sultan appeared to experience a flash of insight that led the chimpanzee to come up with a solution to the problem. In another of Köhler's experiments, the chimpanzees were left in a room with several boxes and bananas hanging out of reach. The chimpanzees learned to stack the boxes on top of one another to be able to access the fruit. Köhler argued that it is possible for **insight learning** to occur when you suddenly realize how to solve a problem (Köhler, 1927) which does not exclusively occur through trial and error. This theory was very influential in the development of models of learning that focused on the role of cognitions.

insight learning
sudden realization of how to solve a problem that does not occur as a result of trial-and-error

The chimpanzee learns to stack the boxes in order to reach the food through a process Kohler labeled insight learning.

Latent Learning

LO 5.13 **Define latent learning.**

Around the same time Köhler was working with his chimpanzees, psychologist Edward Tolman was conducting experiments with rats. Tolman was timing how long it took rats to learn to navigate successfully through a maze. In one of his most famous experiments (Tolman & Honzik, 1930), Tolman divided his rats into three different groups and measured how quickly the rats were able to navigate a maze, taking into account the number of mistakes the rats made on each trial through the maze. The first group received a food reward every time they successfully reached the end of the maze. The second group never received any reinforcement (i.e., food) upon reaching the end of the maze. The third group did not receive any reinforcement for the first 10 days, but the experimenter added a food reward to be waiting for the rat at the end of the maze on the 11th day of the study. A simple behavioral prediction would be that the first group of rats would learn to navigate the maze faster than the other two groups because they were being reinforced. That is exactly what happened. The rats in group one quickly learned to navigate the maze, while the rats in the unreinforced groups meandered slowly through the maze, appearing to find the end by accident. However, the interesting finding came after day 11 when the third group of rats received a reinforcer. The next day, those rats showed a drastic increase in their speed at navigating the maze, making their performance equivalent to the rats who had received rewards all along. Tolman proposed that the rats who were not reinforced until later were not simply wandering through the maze without learning anything. Rather, he argued that the rats experienced **latent learning**, or learning that is not immediately expressed and occurs without any obvious reinforcement. See Figure 5.4 for a graph of the study's results.

latent learning
learning that is not immediately expressed and occurs without any obvious reinforcement

Years later, Tolman hypothesized that spatial latent learning might be due to the development of a *cognitive map*. That is, prior experience in a setting such as a maze may lead the rat (or other animal) to develop a mental map of the environment that can later be accessed if necessary or if a reward incentivizes the behavior (Tolman, 1948).

Prominent behaviorists of the time, including Clark Hull and Edwin R. Guthrie, responded by developing and testing behavioral theories with a more traditional "stimulus-response" focus (e.g., that learning occurs when associations are made between a stimulus such as a maze, and a response, such as turning left or right) that could potentially explain Tolman's results. Ultimately, a 30-year debate on latent learning ensued with the results characterized as a "stalemate" (Jensen, 2006) between more traditional

behavioral models and behavioral models such as Tolman's that focus on the intervening role of cognitions between stimuli and responses. Overall, the evidence for cognitive maps has been limited (e.g., Bennett, 1996; Jensen, 2006), but Tolman's work was instrumental in moving behavioral theories forward by evaluating and considering the role of cognition in learning.

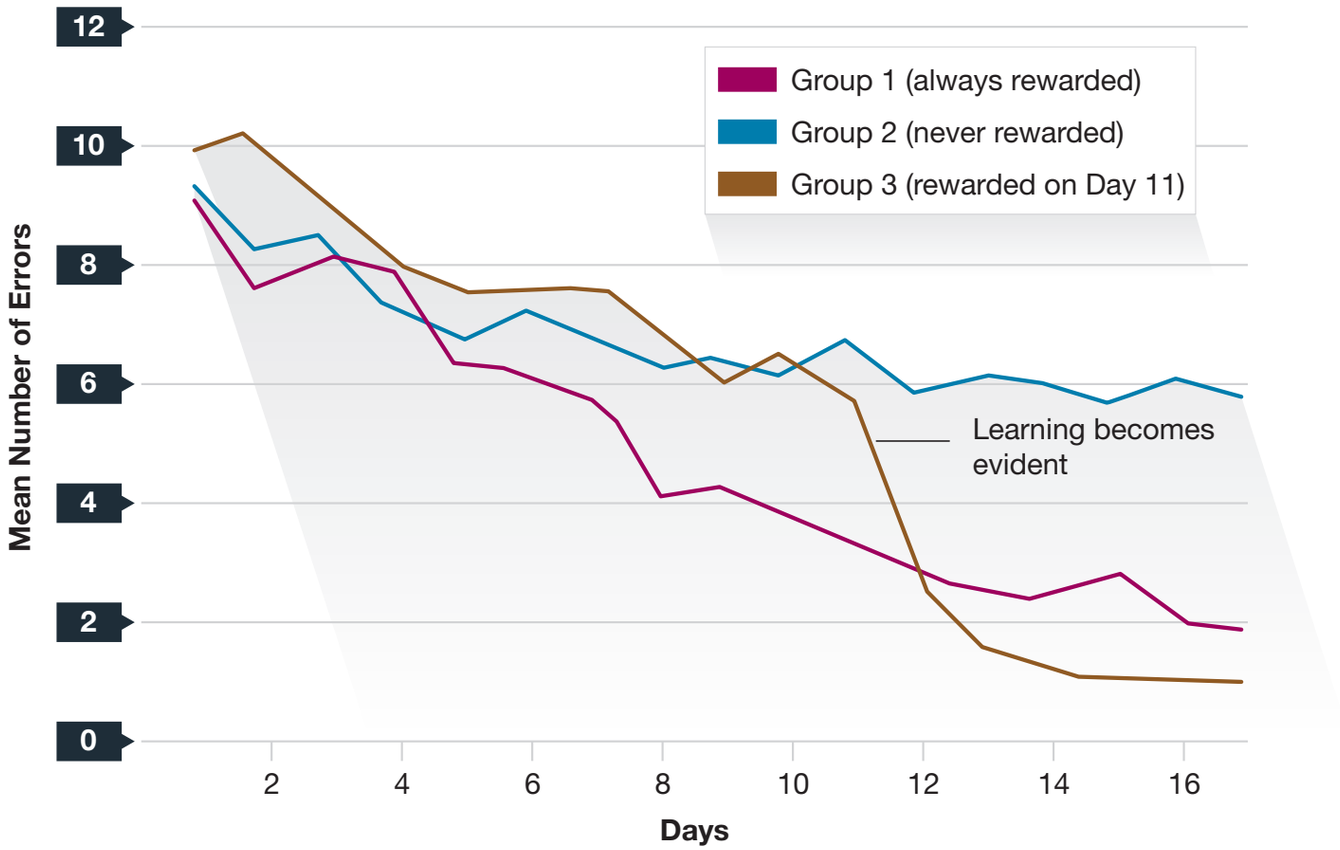
Teaching Tip: Lecture Ideas

Take time to review Figure 5.4 with students, making sure they understand what the three lines represent. Despite the debate over the underlying cognitive mechanism involved, for both humans and rats these mental representations are localized in the hippocampus, which students should recall for its importance in memory.

Teaching Tip: Connections

This is a good place to weave in stories about these early psychologists. Tolman was unique among the behaviorists because he saw learning as more than just stimulus-response and was influenced by the Gestalt school. Whereas behaviorists were primarily interested in "bottom up" processes driven by stimulus-response, Gestalt psychologists were more "top down" and took the view that "the whole is more than the sum of its parts." Tolman's work challenged previous behaviorist views because it suggested there was an additional step between stimulus and response, which later researchers drew from as they started to understand cognitive processes.

Figure 5.4 Results from Tolman's Study



End-of-Module Quiz

Revel offers an end-of-module quiz focused on learning and cognition that allows students to practice their content mastery. Feedback is provided for correct and incorrect answers. (Note: You can find the correct answers in the Instructor's Manual.)

Quiz for Module 5.12–5.13

1. You need to remove a broken light bulb from a lamp. Without a pair of gloves, you are likely to cut yourself on the jagged glass. Suddenly, it occurs to you that you can use a cut potato to remove the light bulb from the socket. You have just demonstrated _____.

a. generalization **b.** insight learning
c. discrimination **d.** latent learning

2. Scientists like Tolman and Köhler conducted important studies to help determine the role of _____ in learning.

a. reinforcement **b.** classical conditioning
c. cognition **d.** operant conditioning

3. Rats that have never received any reinforcement for finding the end of a maze are presented with food the next time they complete the maze. According to the theory of latent learning, the next time the rats enter the maze, their performance will be _____.

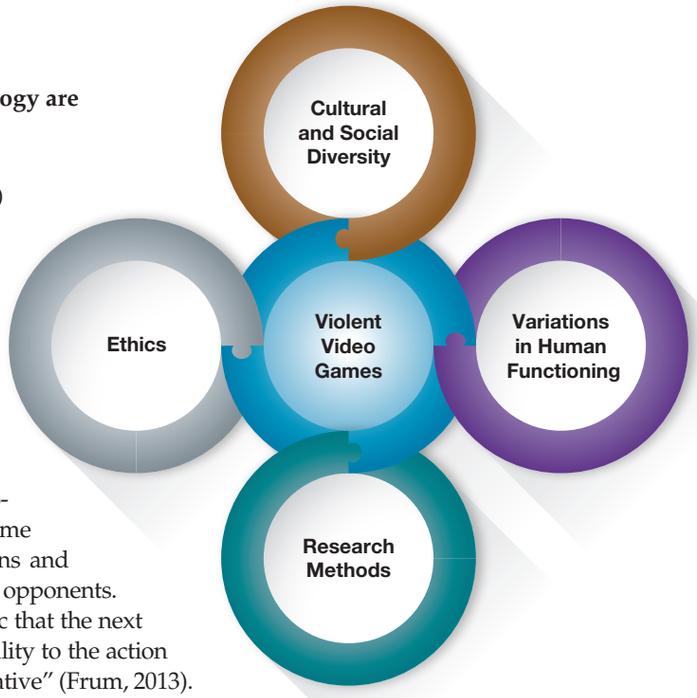
a. slower than rats who have always received reinforcement
b. the same as when they were not reinforced
c. slower than when they were not reinforced
d. as fast as rats who have always received reinforcement

4. What is it called when learning has taken place but has not yet been demonstrated?

a. Latent learning **b.** Observational learning
c. Classical conditioning **d.** Instinctive drift

Module 5.14: Piecing It Together: Violent Video Games

LO 5.14 **Analyze how the cross-cutting themes of psychology are related to the topic of violent video games.**



The relationship between playing violent video games (VVGs) and aggression includes a tale of academic bickering, methodological intricacies, political maneuvering, and even the U.S. Supreme Court. This issue is important to consider as video game sales have surpassed movie box office sales for several years, and statistics indicate that more than half of Americans play video games on a regular basis (Kamenetz, 2013). While many games are nonviolent, there have been concerns about certain games such as "first person shooter" games that position the player to act violently. There are games that simulate gang activity, encouraging players to target innocent characters and use chain saws to attack, maim, and kill. Some games use guns, swords, grenades, bombs, and other weapons and focus on the dismemberment, decapitation, and death of the opponents. New technology has allowed these games to become so realistic that the next generation of games has been touted as having "a film-like quality to the action in the games, creating a deeper feeling of immersion in the narrative" (Frum, 2013).

Given Bandura's theory of observational learning, psychologists have long been interested in the effects of exposure to violence in the media. Hundreds of research studies have been conducted to try to determine if a relationship exists between playing violent video games and aggressive behavior. If you looked at each individual study, you would likely conclude that the findings are mixed—some studies show that violent video games are related to increased aggression, and some do not. One statistical technique that is helpful in situations like this is called *meta-analysis*. This is a way of taking large amounts of data from a variety of studies and pooling it together to see if an overall conclusion about the findings can be made. In 2010, a group of researchers conducted a meta-analysis that included 130 studies and a total of 130,296 participants (Anderson et al., 2010). They found evidence of a causal link between playing violent video games and aggressive behavior, aggressive cognitions, and aggressive affect (or emotions). They also found that violent video games were related to decreased empathy, desensitization to violence, and a reduction in prosocial behavior. Given these results, you would expect these games to be highly regulated (e.g., not sold to minors) and that the American Psychological Association (APA) would be strongly and publicly opposed to the sale and promotion of violent video games. In fact, the Supreme Court ruled in 2005 on the *Brown v. Entertainment Merchants Association* against California's ban of the sale of certain violent video games to minors without parental supervision. The court argued that video games were protected speech under the First Amendment. The video game industry responded by voluntarily instituting a rating system, and some video distributors will not sell games rated as "mature" to minors. The APA released a public statement in 2005 confirming the link between aggression and playing violent video games and advocated a reduction in all video game violence in games targeting children and adolescents. However, after a different set of meta-analyses was published in 2007 with results questioning the established link between aggression and VVGs (Ferguson, 2007), the APA withdrew its policy. In August 2015, the APA released an updated

More money is spent on video games than movies now, and over 50% of Americans play video games regularly.

Piecing It Together: Violent Video Games

Piecing It Together is a feature in each chapter based on the recommendations outlined by an APA working group for strengthening the common core of introductory psychology. Gurung et al. (2016) outlined the importance of having cross-cutting themes infused throughout the curriculum. In each chapter, we will explore an important and timely issue from the perspectives of social and cultural diversity, variations in human functioning, ethics, and research methods.

Gurung, R. A. R., Hackathorn, J., Enns, C., Frantz, S., Cacioppo, J. T., Loop, T., Freeman, J. E. (2016). Strengthening introductory psychology: A new model for teaching the introductory course. *American Psychologist, 71*, 112–124.

Teaching Tip: Active Learning

To underscore the challenge in defining aggressive behavior, show a brief movie clip or classic cartoon—Tom and Jerry or Bugs Bunny cartoons work well for this activity. Ask students to count "the number of aggressive acts." Afterward, ask students how many they saw in the cartoon. The number is likely to vary depending on what students considered "violent." Students could submit their responses through your LMS or a classroom response system; show students the distribution. This activity creates an opportunity to discuss operational definitions, interrater reliability, and validity in the context of this example.

policy that called for more investigation despite continuing to confirm that evidence shows consistent links between VVGs and increased aggression.

Why has this issue been so difficult to sort out? The next section on research methods will discuss the various methodological concerns that have contributed to these muddy waters.

Research Methods

- How has this issue been studied in the past, and what are the limitations of these experiments?
- How do researchers measure aggressive behavior?

The following is only a brief list of some of the methodological issues surrounding the debate about VVGs and aggression.

Teaching Tip: Assessment

Ask students to consider what other individual characteristics might be relevant to understanding the impact of video games. An assignment might have students conduct a literature search and see what recent studies have been published on this topic.

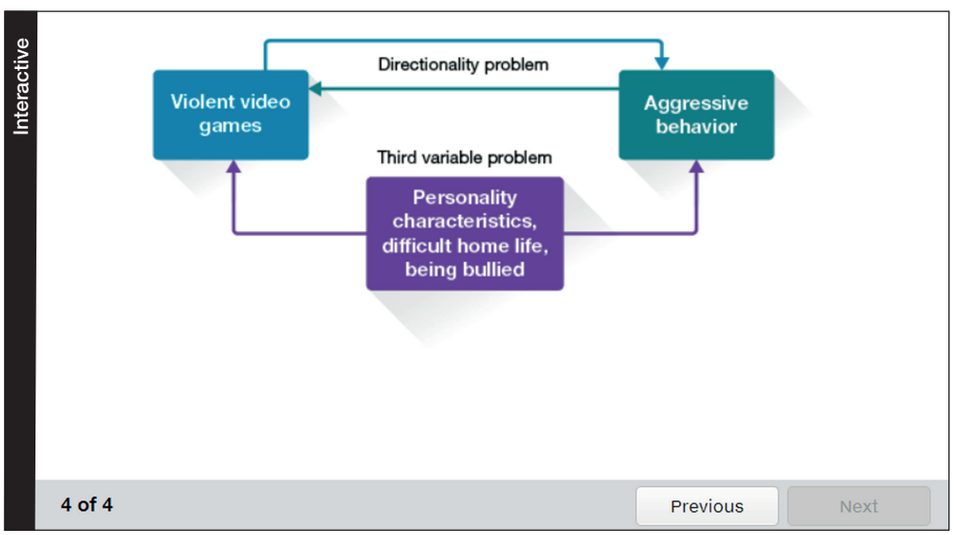
1. **Correlational studies versus experimental designs:**

   As you have learned, it is difficult to determine the nature of the relationship between two variables in a correlational study. It's possible that a third variable could account for the correlation between VVGs and aggression. For example, it's possible that people who watch VVGs and engage in aggression may also be more likely to have certain personality characteristics, and these characteristics might be the *cause* of both the choice to play VVGs and the aggression. Much of the research on VVGs and aggression has been correlational, but in recent years, there have been more experimental designs, and researchers have used more advanced statistical techniques to establish whether or not a causal relationship exists between these two variables.

Simulation: The Third Variable Problem

Students will click to reveal the bidirectional nature of the relationship between video games and aggression and then discover the possibility of a third variable.

The Third Variable Problem



2. **How we measure aggression is important**

   Obviously, if we are interested in determining if playing VVGs leads people to act more aggressively, we need an accurate and consistent way to measure aggression. However, few studies measure aggressive behavior the same way, and the majority of the research has focused on mild aggressive behavior. As a society, we are much more interested in whether VVGs can lead some people to engage in acts of extreme

violence such as the mass school shootings that have occurred with alarming frequency in the past decade.

3. **Is there bias in which studies get published?**

   Some authors have argued that studies associating VVGs with aggressive behavior are more likely to be published than studies that show no such link. These researchers are concerned that "null results" (when the results don't show any relationship between variable A and variable B) are less interesting or don't conform to an underlying social or political agenda and therefore may not be selected for publication in academic journals. However, other authors have suggested that this potential bias could work in the opposite direction. Given the lobbying power of the video industry, it's possible that there could be pressures to avoid publishing studies that suggest VVGs have harmful effects.

Measuring aggression consistently across research studies is difficult, and most studies examine only mild aggressive behavior.

4. **Is the relationship between VVGs and aggression meaningful in the real world?**

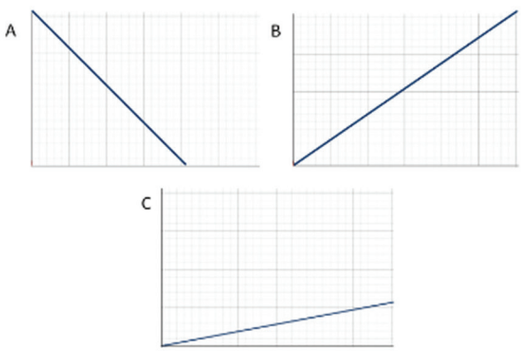
   In the 2010 meta-analysis, the authors found an overall effect of VVGs on aggression to be $r = .19$.

Meaningful Correlations

Adaptive Scenario: Meaningful Correlations

In this activity, students are shown a figure with three lines graphed (positive/negative correlation, steep/not-steep). Students are asked to identify which lettered graph best represents $r = .19$.

Interactive



Is the relationship between VVGs and aggression meaningful in the real world? In the 2010 meta-analysis, the authors found an overall effect of VVGs on aggression to be r = .19. In the three graphs above, the x axis represents aggressive behavior and the y axis represents time spent playing video games. Which of the graphs accurately displays a correlation of .19?

Pick from one of the selections below

- Graph A.
- Graph B.
- Graph C.

Reset Back Next

Ethics

- Given the methodological problems with current research, why can't someone design a good experimental study that avoids these problems and gives us an answer to the question of whether or not exposure to VVGs causes aggressive behavior?

Take a minute to design the best experimental study possible to answer the question, "Does playing VVGs lead people to act more aggressively?" Don't worry about making your study possible to implement. Instead, brainstorm an "ideal" study without regard for the limitations or ethics involved. Use the following steps to help you design the study:

1. Develop your hypothesis.
2. Identify the independent and dependent variables.
3. Consider who will be in the control group and experimental group.
4. Think about the outcome that would support your hypothesis.
5. Next, consider any ethical concerns with your design. Discuss any issues related to random assignment to groups, informed consent, and causing harm to participants.

Journal Prompt: Design Your Own Study

Journal writing prompts promote critical thinking by asking students to apply what they've learned to their experiences. This prompt encourages students to consider the ethical concerns related to conducting a true experiment to evaluate the impact of exposure to violent video games on aggressive behavior.

Journal Prompt: Design Your Own Study

Discuss any issues related to random assignments to groups, informed consent, and causing harm to participants.

Cultural and Social Diversity

- Are VVGs the same across different cultures?
- Are there any cultural differences that would make some people less susceptible to the effect of VVGs?

Researchers have studied cultural differences in the impact of VVGs but have generally found that the relationship between VVGs and aggressive behavior is the same across cultures.

It is interesting to consider if cultural differences might impact how VVGs affect levels of aggression. There has been interesting research on media violence in Eastern versus Western countries. While the amount of violence in the media is often similar between Eastern and Western countries, there are differences in the portrayal of violence. For example, there is an increased focus on the suffering of the victims, and "heroes" often suffer more violence than "villains" in Eastern countries (Kodaira, 1998). In this cultural context, it is possible that individuals would respond differently to VVG exposure.

Research conducted using participants from the United States and Japan, however, found no differences in how individuals from these countries respond on measures of aggressive behavior and aggressive cognition after exposure to VVGs (Anderson et al., 2008; Anderson et al., 2010). A large-scale study examining VVG exposure and aggressive behavior in individuals from seven different countries (Australia, China, Croatia, Germany, Japan, Romania, and the United States) found no differences in the impact of

culture on aggressive behavior. In fact, across all countries, the relationship between violent behavior and VVG exposure was significant, and VVG exposure was the second highest risk factor for aggressive behavior (Anderson et al., 2017).

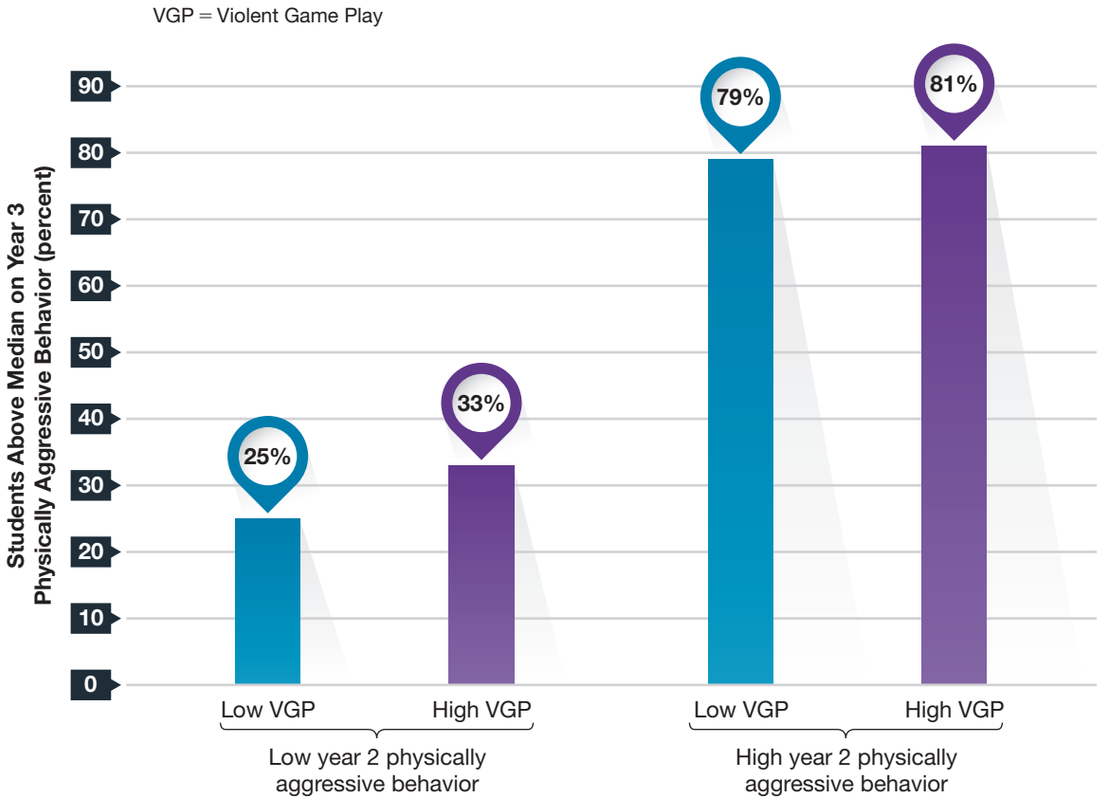
Variations in Human Functioning

- While examining cultural differences as a whole is important, what specific characteristics might predict how one individual might respond to playing VVGs?

It is intuitive to think some characteristics or personality traits might cause certain individuals to respond more negatively to playing VVGs, and research findings have supported this theory. Studies have shown that individuals with high levels of trait hostility (a tendency to be hostile across a variety of situations) or aggressiveness tend to respond to playing VVGs with increased levels of aggression when compared to other individuals (Gentile et al., 2004). These findings are concerning because individuals with high levels of trait hostility are likely to be the very people who are most drawn to playing VVGs.

One recent 3-year study of more than 3,000 adolescents in Singapore confirmed the relationship between playing VVGs and aggressive behavior. As shown in Figure 5.5, however, prior aggressiveness was not an important predictor of aggressive behavior following VVG exposure, suggesting that the negative impact of playing VVGs is not limited to those with prior aggressive tendencies (Gentile et al., 2014).

Figure 5.5 Levels of Aggression After Exposure to VVGs



Teaching Tip: Lecture Ideas

The examples of observational learning discussed here primarily involve aggressive behavior. Ask students whether they think observational learning can have a positive effect—what are some examples of prosocial modeling?

Teaching Tip: Assessment

At the end of this chapter, take time to solicit the points that remain confusing or challenging to students—what questions do they have, or what are they interested to know more about? Use this information to identify topics to review, or have students work together to generate a study guide.

End-of-Module Quiz

Revel offers an end-of-module quiz focused on the Piecing It Together section on violent video games that allows students to practice their content mastery. Feedback is provided for correct and incorrect answers. (Note: You can find the correct answers in the Instructor's Manual.)

Quiz for Module 5.14

1. Which of the following statements is most accurate about the relationship between exposure to violent video games (VVGs) and aggressive behavior?
   a. While there have been some individual studies with mixed findings, the overall evidence suggests a causal link between playing VVGs and aggressive behavior.
   b. The findings have been so mixed that it is too difficult to conclude if there is a relationship between playing VVGs and aggressive behavior.
   c. The data strongly suggests no causal link between playing VVGs and aggressive behavior.
   d. Not enough research has been conducted to make any conclusions about the relationship between playing VVGs and aggressive behavior.
2. Research examining the association between violent video games and aggression is limited by which of the following?
   a. Finding an accurate and consistent way of measuring aggression has been difficult.
   b. Many studies have reported correlational results rather than experimental results.
   c. There may be a bias in the way studies are selected for publication.
   d. All answers are correct.
3. Imagine a study that examines levels of aggression among people who play violent video games (VVGs) and people who do not. What is the primary limitation of this type of study?
   a. People who play VVGs are unlikely to consent to being research participants.
   b. People were not randomly assigned to either play VVGs or not play VVGs, so differences between groups cannot necessarily be attributed to VVGs.
   c. There is no dependent variable in the study.
   d. There is no independent variable in the study.
4. Which of the following statements is true regarding findings across different cultures about the impact of violent video game (VVG) exposure and aggressive behavior?
   a. People in Western cultures are more likely to exhibit aggressive behavior after exposure to VVGs than people in Eastern cultures.
   b. People in Eastern cultures are more likely to exhibit aggressive behavior after exposure to VVGs than people in Western cultures.
   c. No cultural differences have been found in the impact of VVGs on aggressive behavior.
   d. Cultural differences have only been studied in a few countries with very small sample sizes.
5. Studies have shown that individuals with high levels of ____ tend to respond to playing violent video games (VVGs) with increased levels of aggression when compared to other individuals.
   a. anxiety
   b. depression
   c. hostility
   d. introversion

Summary: Learning

Module 5.1–5.3: Classical Conditioning

Learning is a relatively permanent change in behavior due to experience. Most learning can be explained through the process of connections between behavior and the environment. **Classical conditioning**, discovered by Ivan Pavlov, is an automatic or reflexive type of learning. This type of learning occurs through the associations between stimuli (i.e., things). That is, when pairing a stimulus like food (**unconditioned stimulus**) that naturally causes salivation (**unconditioned response**) with a previously neutral stimulus like a metronome, the metronome (**conditioned stimulus**) will eventually come to signal to the person or animal that food is coming and will lead to salivation (**conditioned response**) all on its own. In this chapter, you learned about Pavlov's famous salivating dogs but also about how classical conditioning could be at work in your own life. John B. Watson was famous for his work in the ability to condition emotional responses. His famous study with "Little Albert" demonstrated how emotions can be classically conditioned. Many factors can affect classical conditioning such as how similar stimuli can lead to similar responses (**stimulus generalization**), how **discrimination** allows us to differentiate between stimuli that are not the same, the process of **acquisition** of a classically conditioned behavior, and how such behaviors can be extinguished through **extinction** or temporarily re-occur through **spontaneous recovery. Higher order conditioning** occurs when a conditioned stimulus eventually acts as an unconditioned stimulus in a second round of conditioning. Researchers have discovered that humans and other animals appear to have a certain **biological preparedness** to develop associations between certain types of stimuli and responses. For example, **taste aversions** are a classically conditioned dislike and avoidance of a certain food following illness.

Module 5.4–5.7: Operant Conditioning

Classical conditioning occurs *before* a response occurs, whereas **operant conditioning** occurs as a result of the consequences that happen *after* a behavior is exhibited. Operant conditioning is based on voluntary behavior, whereas classical conditioning

is based on reflexive behaviors. B. F. Skinner, one of the most famous behaviorists, taught us about the powerful role reinforcement and punishment plays in our life. Reinforcement refers to consequences that strengthen the preceding response. Reinforcement is always about *increasing* behavior. A **primary reinforcer** satisfies a basic biological need, such as hunger or thirst. Both Thorndike and Skinner used primary reinforcers (i.e., food) in their work with animals. A **secondary reinforcer** becomes satisfying or pleasurable through its association with primary reinforcers. **Immediate reinforcement** typically occurs when the behavior and the delivery of a reinforcer occur very close in time. On the other hand, **delayed reinforcement** occurs when there is a significant delay in time between the behavior and the delivery of a reinforcer. **Positive reinforcement** involves strengthening behavior through the addition of something desirable, whereas **negative reinforcement** involves strengthening behavior by removing something undesirable or aversive. **Punishment** involves consequences for behavior that ultimately decrease the probability of that behavior occurring again in the future. So, punishment is always about *decreasing* behavior. As with reinforcement, punishment can also be delivered by adding something negative or by taking away something positive. Reinforcement can be delivered according to different schedules or timings and, as a result, produces very predictable patterns of responding. The most straightforward schedule is **continuous reinforcement**, which means the desired response is reinforced every time it occurs. When continuous reinforcement is removed, an **extinction burst** (rapid rate of responding) often occurs. **Partial (intermittent) reinforcement** occurs when responses are only occasionally reinforced. This produces slower initial learning, but the learning is more resistant to extinction. **Fixed-ratio schedules** reinforce behavior after a set number of responses. **Variable-ratio schedules** reinforce behavior after varying and unpredictable numbers of responses. With **fixed-interval schedules**, behavior is reinforced after a fixed time period. **Variable-interval schedules** reinforce behavior after variable periods of time.

Module 5.8–5.9: Modifying Behavior with Operant Conditioning

The principles of operant conditioning have broad applications to all sorts of behaviors for both people and animals. The process of **shaping** behavior uses reinforcers to guide an individual's or animal's actions toward a desired behavior by using *successive approximations*, or behaviors that are incrementally closer to the overall desired action. One method of shaping complex behavior is referred to as **chaining**, which includes a combination or series of responses performed in a particular order. **Behavior modification** refers to the application of primarily operant conditioning principles to modify behaviors and has been referred to more recently as **applied behavior analysis** (the field of study concerned with the application of operant conditioning principles to learn new behaviors and solve every day problems). Applied behavior analysis techniques have been widely implemented in homes, schools, hospitals, and the workplace. The **Premack principle** states that people (and animals) are more likely to engage in a low probability activity if they know it will be followed by a high probability activity they enjoy. A **token economy** is an interconnected system of token production, token accumulation, and token exchange for desirable goods or services. A token is considered a conditioned reinforcer because it becomes associated with a primary or secondary reinforcer.

Module 5.10–5.11: Observational Learning

In addition to learning by association and as a result of consequences, people also learn by observation. In this module, you learned about Albert Bandura and how his famous "Bobo Doll" study contributed to the understanding of **observational learning,** or learning by observing and imitating others. Research advances have also demonstrated the importance of specific types of neurons in the brain to explain how social learning works. These neurons, named **mirror neurons**, fire not only when an animal engages in a particular action but also if an animal observes another animal (or human) engaging in the same action. Much indirect evidence that primarily comes from fMRI studies strongly suggests that humans also have mirror neurons. **Modeling** is the act of observing and imitating others. The ability to learn by observing and imitating a **model** requires that a person pay *attention* to the model, *remember* the behavior being modeled, have the necessary *motor skills* to engage in the behavior, and have the *motivation* to learn.

Module 5.12–5.13: Learning and Cognition

Theories of learning tend to involve observable behavior; however, researchers have also pointed to the important role **cognition** (or thinking) can have. Based on his work with Sultan the chimpanzee, Wolfgang Köhler argued that it is possible for learning to occur through **insight** when you suddenly realize how to solve a problem, and it does not exclusively occur through trial and error. Around the same time Köhler was working with his chimpanzees, Edward Tolman was conducting experiments with rats. Rats who did not receive any reinforcement for successfully navigating a maze performed slower than rats who were rewarded. However, once rewards were provided, their performance became equivalent to the rats who had received rewards all along. Tolman argued that the rats experienced **latent learning**, or learning that is not immediately expressed and occurs without any obvious reinforcement. Years later, Tolman hypothesized that spatial latent learning might be due to the development of a *cognitive map*. Overall, the evidence for cognitive maps has been limited, but Tolman's work was instrumental in moving behavioral theories forward by evaluating and considering the role of cognition in learning.

Chapter Quiz

Revel offers a 30-question end-of-chapter quiz that allows students to test their mastery of Chapter 5. Feedback is provided for correct and incorrect answers. (Note: You can find the correct answer for the Chapter 5 Quiz in the Instructor's Manual.)

Chapter 5 Quiz

1. Bill hates to clean up after dinner. One night, he volunteers to bathe the dog before cleaning up. When he finishes with the dog and returns to the kitchen, his wife has cleaned everything up for him. Which of the following statements is most likely true?

a. Bill's wife has negatively reinforced him for bathing the dog.
b. Bill will never bathe the dog again.
c. Bill's wife has positively reinforced him for bathing the dog.
d. Bill will start cleaning up the kitchen before he bathes the dog.

2. Which of the following is true of research on insight?

a. Researchers have found that apes are capable of insight only after being taught this by humans.
b. Researchers have proven that all creatures, even one-celled organisms such as the amoeba, are capable of insight learning.
c. Researchers have found support for the existence of both human and animal insight learning.
d. Researchers have found that only human beings are capable of insight learning.

3. John Watson offered a live, white rat to Little Albert and then made a loud noise behind Albert's head by striking a steel bar with a hammer. Eventually, the white rat alone made Albert cry. The white rat served as the _____ stimulus in this study.

a. unconditioned **b.** counterconditioning
c. conditioned **d.** discriminative

4. Watson's experiment with Little Albert demonstrated that fears might be _____.

a. based on the principals of observational learning
b. deeply rooted in the innate unconscious of infants
c. based on Skinner's analysis of positive reinforcement
d. based on classical conditioning

5. In Pavlov's studies, he was able to condition dogs to salivate in response to specific tones while not salivating to other similar tones. This is called _____.

a. stimulus discrimination **b.** stimulus generalization
c. extinction **d.** behavior modification

6. After Little Albert acquired a conditioned fear of rats, Watson wanted to see how he would react to a white rabbit, cotton wool, and a Santa Claus mask. He was studying whether or not _____ had occurred.

a. stimulus generalization **b.** extinction
c. stimulus discrimination **d.** behavior modification

7. You decide to condition your dog to salivate to the sound of a metronome. You give the dog a biscuit, and then a second later you sound the metronome. You do this several times, but no conditioning seems to occur. This is probably because _____.

a. you should have had a longer interval between the metronome and the biscuit
b. the metronome should have been sounded before the dog ate the biscuit
c. Pavlov found that the CS and UCS must be only seconds apart to condition salivation
d. the metronome was not a distinctive sound

8. _____ classical conditioning, operant conditioning requires the organism to voluntarily produce the _____.

a. Unlike; consequence **b.** Like; stimulus
c. Unlike; response **d.** Like; response

9. You spend days wandering aimlessly around a park with many different paths that end at different parts of the park. One day when you arrive at the park, you get a call on your cell phone from your cousin whom you haven't seen for years, and she says she is waiting for you in a particular section of the park. Even though the paths are complicated and twisted, you manage to find the shortest route to your cousin. Tolman would explain your efficient passage through the park as an example of _____.

a. formation of a cognitive map
b. insight
c. unconscious trial-and-error imagery
d. spontaneous recovery

10. Of the following, _____ would serve as a primary reinforcer for most people.

a. food **b.** praise
c. money **d.** attention

11. Sal's dog loves to go on a walk and starts spinning in circles and wagging his tail in excitement when his lead is clipped onto his collar. Eventually Sal begins to notice that his dog starts to act excited when he puts on his tennis shoes before a walk. His dog's behavior of spinning in circles and wagging his tail when Sal puts on his tennis shoes is a _____.

a. conditioned response **b.** conditioned stimulus
c. unconditioned response **d.** unconditioned stimulus

12. Phil wants to train his parrot to kick a ball into a soccer net. Which of the following should he do?

a. Use positive punishment until the parrot kicks the ball into the net.

b. Use negative punishment until the parrot kicks the ball into the net.

c. Wait until the parrot kicks the ball into the net on its own and then give it a food treat.

d. Begin by reinforcing when the parrot goes near the ball.

13. Cheryl is trying to teach her son to do the laundry by watching her. According to observational learning theory, what must occur for Cheryl to be effective?

a. Her son must be motivated to learn how to do the laundry.

b. Her son must be able to complete other tasks while watching her.

c. Her son must always model the behavior immediately.

d. Cheryl must show her son how to do the laundry while she is making dinner.

14. A reinforcer is a consequence that _____ a behavior, while a punisher is a consequence that _____ a behavior.

a. motivates; stimulates **b.** weakens; strengthens

c. inhibits; motivates **d.** strengthens; weakens

15. You put a dollar in a soda machine and are rewarded with a bottle of root beer. When you put in another dollar, you get another soda. Assuming that the machine has a limitless supply of root beer, which kind of reinforcement schedule does this machine operate on?

a. Continuous reinforcement

b. Ratio reinforcement

c. Interval reinforcement

d. Partial reinforcement

16. Reinforcement given for a response emitted after each hour and a half (e.g., 10 a.m., 11:30 a.m., 1 p.m.) is most likely a _____ schedule.

a. fixed-interval **b.** fixed-ratio

c. variable-interval **d.** variable-ratio

17. Al must build 25 radios before he receives $20. What schedule of reinforcement is used?

a. A variable-ratio schedule

b. A fixed-ratio schedule

c. A fixed-interval schedule

d. A continuous schedule

18. _____ is an operant-conditioning procedure in which successive approximations of a desired response are reinforced.

a. Spontaneous recovery **b.** Stimulus generalization

c. Shaping **d.** Stimulus discrimination

19. Dr. Sardis provides his students with extra credit points every time they speak in class to encourage class participation. Dr. Sardis is using _____.

a. negative punishment **b.** positive reinforcement

c. negative reinforcement **d.** positive punishment

20. The application of operant-conditioning techniques called _____ has been used to help children with autism.

a. applied behavior analysis

b. counterconditioning

c. higher-order conditioning

d. stimulus generalization

21. In order to get her 3rd grade students to memorize the poem written on the chalkboard, Mrs. Thyberg gives the students stickers for each poem they can recite from memory. After earning five stickers, a student gets to pick a prize out of the goody box. Mrs. Thyberg is using _____ to modify the children's behaviors.

a. a token economy **b.** shaping

c. negative reinforcement **d.** classical conditioning

22. What type of neurons fire if a monkey observes another monkey engaging in an action?

a. Magnetic neurons **b.** Mirror neurons

c. Sensory neurons **d.** Motor neurons

23. Which type of learning occurs when we observe how other people act?

a. Operant conditioning **b.** Classical conditioning

c. Observational learning **d.** Insight learning

24. After watching her father slide through pictures on his smartphone using his index finger, Laura, a 5-year-old, learns to use her finger to slide the screen on his smartphone. Laura acquired this behavior through _____.

a. operant conditioning **b.** counterconditioning

c. classical conditioning **d.** observational learning

25. When a stimulus is removed from a person or animal resulting in a decrease in the probability of response, it is known as _____.

a. negative reinforcement **b.** positive reinforcement

c. negative punishment **d.** positive punishment

26. Dad is watching a home improvement show about how to install a new sink. He really wants to do it and watches the show intently. He knows his wife will reward him when he is done. However, when he tests the new sink, water spurts everywhere. Taking the new sink apart, he finds that he has left out the crucial washers in the faucet assembly even though this was emphasized in the TV show. What part of Bandura's theory of the necessary components of observational learning is most likely the reason for this disaster?

a. Memory
b. Imitation
c. Motivation
d. Inadequate motor skills

27. John has been working on a math problem late at night without success, and he falls asleep. Upon awakening, he suddenly realizes how to answer the problem. This scenario best illustrates _____ learning.

a. cognitive
b. insight
c. latent
d. observational

28. In a conditioning experiment, a sound is paired with a brief puff of air to the eye of a rabbit. After several pairings, the rabbit ultimately blinks its eye when it hears the sound. Which of the following is true?

a. The puff of air serves as the conditioned stimulus.
b. The puff of air serves as the unconditioned stimulus.
c. The blinking of the eye serves as the conditioned stimulus.
d. The blinking of the eye serves as stimulus.

29. Learning that occurs but is not immediately reflected in a behavior change is called _____.

a. insight
b. innate learning
c. reflexive learning
d. latent learning

30. Reflexive learning is related to _____ , while learning related to voluntary behaviors is known as _____.

a. observational learning; classical conditioning
b. operant conditioning; classical conditioning
c. classical conditioning; observational learning
d. classical conditioning; operant conditioning