Learning

Brief Chapter Outline

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   A. The Elements and Procedures of Classical Conditioning
   B. General Learning Processes in Classical Conditioning

II. Learning Through Operant Conditioning
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III. Biological and Cognitive Aspects of Learning
   A. Biological Preparedness in Learning
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Detailed Chapter Outline

Behavioral psychologists have focused on the learning of associations through classical conditioning and operant conditioning (the first two sections of this chapter).

Cognitive psychologists studying learning are interested in the more complex type of learning involved in human memory (the final section of this chapter).

I. Learning Through Classical Conditioning

Classical conditioning is the process of learning that occurs when one stimulus signals the arrival of another stimulus. Classical conditioning is sometimes called Pavlovian conditioning because Ivan Pavlov was the first researcher to systematically study this type of learning.

Scientific American Introductory Psychology Videos: Classical Conditioning: Pavlov and His Legacy (9:00)
This video provides relevant examples that a student can relate to, such as fear associated with being pulled over for speeding, along with other more humorous examples in order to introduce the topic of classical conditioning. Key concepts of classical conditioning are explained with unique mechanical and animation accompanying interview and narration. The video summarizes the work of Pavlov and Watson and introduces the cognitive perspective to explain the complexities of human behavior.

As an alternative video resource, Pavlov’s Discovery of Classical Conditioning (3:08) in the Worth Video Anthology for Introductory Psychology provides an accurate reenactment of Ivan Pavlov’s discovery of classical conditioning processes. The Worth Video Anthology for Introductory Psychology resource titled Watson’s Little Albert (0:49) also presents footage from this classic study. Watson’s Little Albert study is discussed at the end of this section of the text.
A. The Elements and Procedures of Classical Conditioning

Pavlov was a Russian physiologist who studied digestive processes in dogs. The dogs were strapped into harnesses, and tubes were inserted into their cheeks to measure the quality and quantity of saliva produced. Salivation is the initial step in the digestive process. Over time, Pavlov noticed that the dogs started to salivate before food (meat powder) was even put into their mouths, and he wanted to know why this was happening. He conducted a series of experiments that resulted in new terms and explanations.

1. Unconditioned stimulus (UCS) and unconditioned response (UCR)

Dogs salivate when meat powder is put in their mouths. This is a reflex, a response that occurs automatically in the presence of a certain stimulus (in this case, the meat powder).

a. An unconditioned stimulus (UCS) is the stimulus that elicits the reflexive response (here, the UCS is the meat powder).

b. An unconditioned response (UCR) is the response automatically elicited by the UCS (here, the UCR is salivating in response to the meat powder).

2. Conditioned stimulus (CS) and conditioned response (CR)

A neutral stimulus (in Pavlov’s experiments, an auditory tone) is a stimulus that does not naturally elicit the to-be-conditioned response. To achieve conditioning, the neutral stimulus (the tone) is presented just before (ideally one-half to one full second before) the UCS (in Pavlov’s experiments, the meat powder) for several trials.

a. Once the conditioning occurs (the dog starts to salivate at the sound of the tone before the food is put in its mouth), the neutral stimulus is called the conditioned stimulus (CS).

b. The learned response to the conditioned stimulus is called the conditioned response (CR).

3. Delayed and trace conditioning

Delayed conditioning is the most effective procedure for classical conditioning; trace conditioning can be effective provided the interval between stimuli is brief. It also appears that for trace conditioning, processing by both the cerebellum and hippocampus is essential for successful conditioning; whereas for delayed conditioning, only processing by the cerebellum is necessary.

a. In delayed conditioning, the offset of the CS is delayed until after the UCS is presented so that the two stimuli occur at the same time. In Pavlov’s experiments, the tone was turned on and continued to sound until the meat powder was placed in the dog’s mouth.

b. In trace conditioning, there is a period of time between the offset of the CS and the onset of the UCS when neither stimulus is present. This period is called a trace interval. It is given this name because there must be a memory trace of the CS for the association between stimuli to be learned.

4. John Watson and Rosalie Rayner conducted the Little Albert study on an 11-month-old infant named Albert. While Albert was looking at a little white rat, Watson quietly sneaked behind him with a long iron bar and a hammer and clanged the two together. Albert’s reflexive response, the UCR, was a fear-avoidance response (crying and trying to crawl away) to the loud noise, which was the UCS. After pairing the white rat with the unexpected loud noise only seven times, the white rat became a CS.

In 1934, Elise Bregman was unable to condition infants to fear inanimate objects such as wooden blocks and cloth curtains, suggesting possible biological predispositions to learning certain fears more easily than others.

It is also important to note that classical conditioning is used to condition positive reactions, such as in advertising to condition positive attitudes and feelings toward certain products. For example, a celebrity might serve as a UCS; the product would be the CS.
For additional information about Little Albert and the early history of the field of psychological science, the article “Finding Little Albert: A Journey To John B. Watson’s Infant Laboratory” is an interesting read (http://libres.uncg.edu/ir/a/su/f/Beck_Hall_2009_Finding_Little_Albert.pdf).

Worth Video Anthology for Introductory Psychology: Classical Conditioning and the Immune System: Combating Lupus (3:50)

This video illustrates how conditioning reduced the distress of a young girl who suffered from lupus, a disorder in which an overactive immune system destroys the body’s own healthy issues. Using a technique first tested on rats, the girl learned to associate a strong taste or smell with the steroid drug she had been taking to suppress her immune system. After forming the association, the girl was able to cut her steroid dosage in half, relieving some of its negative side effects. Although the girl died from a heart attack attributed to the side effects of prolonged steroid use, her mother believes that the conditioning effectively lengthened her life.

B. General Learning Processes in Classical Conditioning (Figure 4.2)

Acquisition is the process of acquiring a new response; that is, a CR to a CS. The strength of the CR increases during acquisition.

1. Extinction and Spontaneous Recovery

a. A CS must reliably signal that the UCS is coming. Extinction is the disappearance of the CR when the UCS no longer follows the CS. The strength of the CR decreases during extinction.

b. During the extinction process, the CR increases somewhat in strength following a rest interval. This reaction is called spontaneous recovery, a partial recovery in strength of the CR following a break during extinction trials. As extinction continues, the recovery observed following rest intervals continues to decrease over time.

2. Stimulus Generalization and Discrimination

a. Stimulus generalization (Figure 4.3) is a response with the CR to a stimulus similar to the CS. The more similar the stimulus is to the CS, the stronger the response. For example, if a dog learns to bark at the doorbell, she may, at least in a new home, also bark at the telephone because both stimuli are ringing noises. Stimulus generalization is an adaptive process; classical conditioning would not be very useful if it allowed people to learn only relationships between specific stimuli.

b. Overgeneralizing a response may not be adaptive, however. Thus, people need to learn to discriminate among stimuli. Stimulus discrimination is learning to give the CR only to the CS or only to a small set of very similar stimuli including the CS. For example, after being in her new home for some time, the dog will learn to discriminate between the sounds of the doorbell and the phone.

Discrimination training is used to teach stimulus discrimination. During discrimination training, many different stimuli are presented numerous times, but the UCS follows only one CS. This procedure extinguishes the responses to other stimuli.

Figure 4.3 shows idealized stimulus generalization and discrimination gradients for an auditory stimulus. The text points out the difficulty of creating a discrimination gradient for Watson’s white rat. Table 4.1 summarizes all five of the general learning processes for classical conditioning.
PsychSim 5 Tutorial: Classical Conditioning
This module provides an opportunity for students to review the elements and processes in classical conditioning. There is a visual depiction of Pavlov’s pioneering research, and each element of classical conditioning is explained. Then, attention turns to the processes in classical conditioning. Next, the module includes a demonstration of how classical conditioning might explain a fear of doctors and the doctors’ offices. Finally, there is a simulated experiment, in which students can classically condition an eyeblink (a CR) to a ringing bell (a CS) using a puff of air to the eye (a UCS).

II. Learning Through Operant Conditioning

Operant conditioning is learning to associate behaviors with their consequences. Behaviors that are reinforced (lead to satisfying consequences) are strengthened, and behaviors that are punished (lead to unsatisfying consequences) are weakened. This kind of conditioning is called “operant” conditioning because the organism needs to operate on the environment to bring about consequences from which to learn.

Edward Thorndike’s law of effect states that any behavior that results in satisfying consequences tends to be repeated, and any behavior that results in unsatisfying consequences tends not to be repeated.

Scientific American Introductory Psychology Video: Operant Conditioning: Learned Behaviors (10:00)
This video provides relevant examples that a student can relate to, such as using keys to open a door, making coffee, getting a parking ticket, or buckling your seatbelt to turn off a beeping noise. Key concepts of reinforcement and punishment are presented with engaging animation and narration. Classical and operant conditioning are contrasted to explain similarities and differences between the two. Schedules of reinforcement are also described along with relevant examples. The video summarizes the work of Thorndike and Pavlov and describes the roles of cognition and evolution.

Worth Video Anthology for Introductory Psychology: Thorndike’s Puzzle Box (2:30)
This video could provide an introduction to operant conditioning. The video consists of reenacted footage of Thorndike’s work with cats learning to escape the puzzle box to get food.

Worth Video Anthology for Introductory Psychology: The Research of Carolyn Rovee-Collier: Learning and Memory in Preverbal Infants (2:15)
This video is narrated by Carolyn Rovee-Collier as she presents an experimental trial to test learning and memory in young infants. This video is another excellent option for introducing operant conditioning. Rovee-Collier’s work is relevant to contextual cues in operant conditioning, such as changes to the crib surround make a baby less likely to produce a previously learned behavior.

PsychSim 5 Tutorial: Operant Conditioning
Another excellent resource for students is the Operant Conditioning tutorial to review key concepts covered in this section of the textbook. The tutorial covers the history as well as terms used in operant conditioning procedures. Students can run a simulated experiment in which thirsty rats are placed on a partial reinforcement schedule of the students’ choosing, and subsequent behavior is observed and recorded.
A. **Learning Through Reinforcement and Punishment**

A reinforcer is a stimulus that increases the probability of a prior response. Reinforcement is the process by which the probability of a response is increased by the presentation of a reinforcer following the response. For example, if a person operantly conditions a dog to bark by giving the dog a treat each time the dog “speaks,” the food is a reinforcer, and the process of increasing the dog’s speaking behavior by using this reinforcer is reinforcement.

A **punisher** is a stimulus that decreases the probability of a prior response. **Punishment** is the process by which the probability of a response is decreased by the presentation of a punisher following the response. As an example, if a person conditions a dog to stop getting up on the couch by spraying the dog with water each time the dog gets up on the couch, the spraying is the punisher, and the process of decreasing the dog’s couch jumping behavior is the punishment.

1. **Positive and negative reinforcement and punishment**

   “Positive” means that a stimulus is *presented*; “negative” means that a stimulus is *removed*. In both positive reinforcement and positive punishment, a stimulus is presented. In both negative reinforcement and negative punishment, a stimulus is removed. Figure 4.4 helps students distinguish between positive reinforcement, negative reinforcement, positive punishment, and negative punishment.

   An **appetitive stimulus** is a stimulus that an organism finds pleasing (e.g., food, money). An **aversive stimulus** is a stimulus that an organism finds unpleasing (e.g., sickness, social isolation).

   a. In **positive reinforcement**, an appetitive stimulus is presented (for example, praise for good work).

   b. In **positive punishment**, an aversive stimulus is presented (for example, scolding for doing poor work).

   c. In **negative reinforcement**, an aversive stimulus is removed (for example, using a heating pad to “remove” a sore back).

   d. In **negative punishment**, an appetitive stimulus is removed (for example, parents taking away dessert from a child).

   In any example of positive or negative reinforcement or punishment, it is important to emphasize that psychologists only know if a stimulus has served as a reinforcer or a punisher and has led to reinforcement or punishment *after* the behavior happens again or stops happening.

The **Premack Principle** is the concept that frequent behaviors can be used to reinforce less frequent behaviors. In Premack’s seminal study, he demonstrated that, depending on initial preference, children would either eat candy or play pinball in order to gain access to the other activity. A more relevant example is the fact that children will do homework in order to watch television.

**Class Activity or Homework Assignment: Reinforcement and Punishment**

The following examples were developed by the Psychology Department at Monroe Community College. You may opt to use them, or a portion of them, for an in-class activity, with or without small-group discussion to decide on answers. Or, you may opt to use some of the examples for a homework assignment.
Check one box to indicate whether each of the following examples illustrates positive reinforcement, negative reinforcement, positive punishment, or negative punishment.

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1) Henrietta smokes cigarettes because she likes how they relax her, and finds she smokes more now than she used to. Her smoking behavior is controlled by which contingency?

2) A school bus driver plays a radio station the students like a lot as long as the children are behaving on the bus. If anyone starts running around, yelling, or otherwise misbehaving, she turns off the radio. Assuming this works to reduce the students’ misbehavior, this is being controlled by which contingency?

3) Marco is lactose intolerant. He loves drinking milk, but when he does he becomes miserably ill. If Marco stops drinking milk, his behavior is controlled by which contingency?

4) Marco has discovered a pill that counteracts the effects of lactose intolerance. Whenever he wants to drink milk, he remembers to take the pill beforehand, and he does not become ill. Marco’s pill-taking behavior is controlled by which contingency?

5) Rowdy teens used to hang out in the parking lot of a convenience store and cause problems. The store owner found that by playing classical music in the parking lot he could reduce the number of teens hanging out there. The teen’s behavior of hanging out in the parking lot is controlled by which contingency?

6) Raffio is allergic to paint fumes. Whenever he paints his house he is careful to wear a mask to keep the fumes out, because otherwise he gets a terrible headache. His behavior of wearing the mask is controlled by which contingency?

7) Bonnie works as a waitress and has discovered that if she squats down while taking the customers’ order, so that her head is at the same level as theirs, she gets better tips. Her behavior of squatting down is controlled by which contingency?

8) Marcos likes popcorn, but he hates the way it makes his kitchen smell. These days he almost never cooks popcorn. His popcorn-cooking behavior is controlled by which contingency?

9) Fred’s car has started to make an annoying noise occasionally, but it doesn’t seem to be anything serious. When the noise starts, he turns his radio up to drown it out. His behavior of turning up the radio is controlled by which contingency?

10) When birds come to Sabrina’s bird feeder she loves to watch them. Every time she tries to take a picture of them, though, they fly away. She doesn’t try to take any more pictures, because she would rather see the birds. Her picture-taking behavior is controlled by which contingency?
Answers and Explanations

1) **Positive Reinforcement.** Henrietta’s smoking produces something pleasant (relaxation), and this leads to more smoking in the future.

2) **Negative Punishment.** The bad behavior is reduced, which makes it punishment, and the contingency involves removing something (the radio), so it is negative.

3) **Positive Punishment.** The behavior is decreasing (and therefore it is punishment) because something was added (the illness) after the behavior.

4) **Negative Reinforcement.** This is an example of avoidance learning; the behavior (taking the pill) becomes more likely because it prevents the unpleasant consequence (illness) from happening.

5) **Positive Punishment.** The behavior of hanging out is followed by adding something (classical music—yuk!) and therefore the behavior happens less often in the future.

6) **Negative Reinforcement.** This is an example of avoidance learning. By engaging in the behavior (wearing a mask), something is removed (the headache).

7) **Positive Reinforcement.** The behavior (squatting down) is reinforced by adding something (more money).

8) **Positive Punishment.** The behavior is decreasing because it is followed by adding something (the bad smell).

9) **Negative Reinforcement.** This is an example of escape learning. The behavior (turning up the radio) is followed by the removal of something unpleasant (he can’t hear the noise any more).

10) **Negative Punishment.** The picture-taking behavior is becoming less likely (and therefore this is punishment) because it is followed by something being removed (the chance to watch the birds).

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2. Primary and secondary reinforcers

a. A **primary reinforcer** is innately reinforcing from birth (for example, food, social contact).

b. A **secondary reinforcer** is not innately reinforcing, but it gains reinforcing properties through learning (for example, money, good grades).

c. A token economy is an example of **behavior modification**, the application of conditioning principles, especially operant principles, to eliminate undesirable behavior and to teach more desirable behavior. In a token economy, physical objects, such as wooden tokens, are used as secondary reinforcers that can be exchanged for other, more pleasing reinforcers, such as treats or TV-watching privileges. Token economies have been used successfully for tasks ranging from toilet training to teaching autistic children.

d. Hefferline, Keenan, and Harford (1959) demonstrated that reinforcement can strengthen responding outside of conscious awareness. Participants were told that the purpose of the experiment was to examine the effects of stress on body tension. Electrodes were attached to different areas of the participants’ bodies to measure tension. Tension would be evaluated during randomly alternating periods of harsh noise and soothing music. Whenever a participant contracted a small muscle in their left thumb, the harsh noise was terminated. This muscular response was imperceptible and could only be detected by the electrode on the muscle. During the experimental session, there was a dramatic increase in the contraction of this muscle. Participants did not know they were contracting this muscle.
e. Pessiglione (2008) conducted a more recent demonstration of operant conditioning without conscious awareness. To understand this experiment, we must first understand the concept of visual masking. When a visual stimulus is masked, it is exposed for a short period of time (e.g., 50 milliseconds) and followed immediately by another visual stimulus that completely overrides it, thereby masking (i.e., preventing conscious awareness of) the original stimulus. In this experiment, after being exposed to a masked contextual cue (an abstract novel symbol masked by a scrambled mixture of other cues) flashed briefly on a computer screen, a participant had to decide if he wanted to take a risky response (i.e., winning or losing money) or a safe response (not winning or losing any money). The participant was told that the outcome of the risky response on each trial depended on the cue hidden in the masked image. If the participant took the safe response, it was a neutral outcome (no win or loss). The participant was also told that if he never took the risky response or always took it, his winnings would be nil. Because the participant could not consciously perceive the cues, they were instructed to follow their intuition in making their response decisions. Overall, participants won money in the task, indicating that the risky response was more frequently chosen following reinforcement predictive cues relative to punishment predictive cues.

B. General Learning Processes in Operant Conditioning

For control purposes, behavioral psychologists conduct much of their laboratory research on nonhuman animals.

**Shaping** occurs when an animal is trained to make a particular response by reinforcing successively closer approximations to the desired response. An example with humans is reinforcing children as they come closer to making their beds correctly each morning.

Responses in an operant conditioning experiment are noted in a cumulative record (see Figure 4.5). A **cumulative record** is a record of the total number of responses over time; it is a visual depiction of the rate of responding. The steeper the slope of a line in a cumulative record, the faster the response rate.

1. Acquisition, extinction, and spontaneous recovery
   a. **Acquisition** is the strengthening of the reinforced operant response.
   b. **Extinction** is the disappearance of the operant response when it is no longer reinforced. Extinction of the operant response looks different from extinction of classical conditioning. This is because the learning curve in operant conditioning is a cumulative response rate, whereas in classical conditioning, we are measuring the strength of the conditioned response (see Figure 4.6 and Figure 4.2 for this visual difference, paying close attention to the Y axis on each Figure). Specifically, the decreasing slope of the record indicates that the response is being extinguished; there are fewer and fewer responses over time.
   c. **Spontaneous recovery** is the temporary recovery of the operant response following a break during extinction training.

   For example, people are all generally familiar with vending machines. They learn that by putting money into a vending machine, they get something they want out of it, say, a bag of chips. They acquire the response of inserting money into a particular machine, but one day, they put money in and get no chips out. This happens again. Soon, they stop putting money into the vending machine. The acquired response is being extinguished. However, after a period of time, they go back and try again; if the machine has been repaired, they get their chips, and the response rate returns to its previous level. If not, they continue along the extinction trail.

2. Discrimination and generalization
   a. A **discriminative stimulus** is one that has to be present for the operant response to be reinforced. It “sets the occasion” for the response to be reinforced. For example, a rat learns that pressing a lever will result in food only when a light is on, not when the light is off. This is stimulus discrimination.
**Stimulus discrimination** occurs when an organism learns to produce the operant response only in the presence of the discriminative stimulus.

b. **Stimulus generalization** is the production of the operant response in the presence of stimuli similar to the discriminative stimulus (refer to Figure 4.3). For example, the rat learns to press the lever for food only when the light is a certain shade of red. Presentation of different colored lights following acquisition constitutes a test for generalization. The extent of responding to a generalization stimulus reflects the amount of generalization to that stimulus.

Table 4.2 summarizes all five of the general learning processes for operant conditioning.

### C. Partial-Reinforcement Schedules in Operant Conditioning

Reinforcing every response is called a **continuous schedule of reinforcement**. Partial schedules of reinforcement reinforce behavior only part of the time. The **partial-reinforcement effect** states that responses that are reinforced according to a partial schedule rather than a continuous schedule are more resistant to extinction.

*Worth Video Anthology for Introductory Psychology: B.F. Skinner Interview (4:05)*

This video demonstrates Skinner’s methodology and introduces the notion of schedules of reinforcement. This module provides an overview of partial schedules of reinforcement, illustrated with basic research done on pigeons and applied research done on human beings. At the end of the module, Skinner presents his views on the debate between free will and determinism as the cause of human behavior.

1. Before discussing the four partial schedules of reinforcement, it would be helpful for students to examine Figures 4.7 and 4.8, which show the rates of responding on ratio and interval schedules, respectively.
   a. A **ratio schedule** is based on the number of responses made (Figure 4.7).
   b. An **interval schedule** is based on responding after some amount of time has elapsed (Figure 4.8).
   c. In a **fixed schedule**, the number of responses required for a ratio schedule or the amount of time needed for an interval schedule is fixed.
   d. In a **variable schedule**, the number of responses required for a ratio schedule and amount of time for an interval schedule varies on each trial.

2. Ratio schedules lead to high rates of responding because the number of responses/behaviors determines reinforcement.
   a. In a **fixed-ratio schedule**, a reinforcer is delivered after a fixed number of responses are made (e.g., a rat has to press a lever exactly 10 times before receiving the reinforcer of food). Note the small pause following the delivery of a reinforcer. This is called the post-reinforcement pause.
   b. In a **variable-ratio schedule**, the number of responses it takes to obtain a reinforcer varies in each trial but averages out over trials to a certain number (e.g., slot machine payoffs). One example students are likely very familiar with is spam e-mailings. Spammers can’t tell who will fall for their phishing scam, but if they send out enough spam e-mails, some percentage of the people will take the bait.

3. Interval schedules lead to steady responding because one never knows when the reinforcement will occur. So, an organism must continue to engage in the behavior and wait for a set period to pass before receiving the reinforcement.
   a. In a **fixed-interval schedule**, a reinforcer is delivered after the first response is produced following a set time that has elapsed (e.g., an academic exam [reinforcer] preceded by most of the studying [response] the day before).
b. In a **variable-interval schedule**, a reinforcer is delivered after the first response is produced following a time period that varies from trial to trial, but the time over trials averages out to a set time (e.g., pop quizzes). An example students are very familiar with is checking their phones for texts and other updates. Messages are received intermittently, so regularly checking their phones for recent updates (even during class) is reinforced on a variable interval schedule.

Ratio schedules lead to higher rates of responding than do interval schedules (steeper slopes on the cumulative record). Variable schedules lead to fewer breaks (no responding) after reinforcement than do fixed schedules.

It takes longer to extinguish a response with a partial reinforcement schedule than with continuous reinforcement because on a continuous schedule, the organism receives immediate feedback that responding is no longer being reinforced. On a partial reinforcement schedule, some responses are expected to occur without reinforcement, so behavior is likely to continue.

Table 4.3 summarizes the four types of partial-reinforcement schedules and their respective effects on response rate. It is a good idea to also review the information in Figures 4.7 and 4.8 to see the impact those types of schedules have on responding.

**Class Activity or Homework Assignment: Partial Schedules of Reinforcement**

You can use these examples in class or as a homework assignment to discuss the schedules of partial reinforcement.

Please label each of the following scenarios as to whether it contains a fixed ratio (FR), variable ratio (VR), fixed interval (FI), or variable interval (VI) schedule of reinforcement.

1. An office worker glances at his watch to see if it is 5 PM yet (i.e., going home is the reinforcer). ______
2. An employee is paid an hourly wage. ______
3. A charitable organization makes an average of 8 calls for each donation it receives. ______
4. A chef checks the oven to see if a casserole is done, when the baking time is known. ______
5. A hotel maid takes a break after having cleaned three rooms. ______
6. A person checks the front porch for a newspaper when the delivery person is extremely unpredictable. ______
7. There is a test in a class every three weeks (i.e., doing well is the reinforcer). ______
8. A professional baseball player gets a hit approximately every third time at bat. ______
9. A gambler at the slot machine receives a payoff approximately every 30th pull of the lever. ______
10. Buying lottery tickets and winning. ______

**Answers**

1. FI 6. VI
2. FI 7. FI
3. VR 8. VR
4. FI 9. VR
5. FR 10. VR

**D. Motivation, Behavior, and Reinforcement**

Motivation is the set of internal and external factors that energize our behavior and direct it toward goals.

*Worth Video Anthology for Introductory Psychology: What is Motivation? (5:40)*
This video provides an overview of a notion that can be hard to understand. Three characteristics of motivation—activation, persistence, and intensity—are presented with examples of an individual who went from being 41 pounds overweight to running in a marathon. The information in this module seems to be applicable to any of the theories presented in the text. Thus, the module can be used to preview the various theories of motivation.

1. There are three theories of motivation: drive-reduction theory, incentive theory, and arousal theory.
   a. Drive-reduction theory proposes that first, a bodily need (such as hunger) creates a state of bodily tension called drive; then a motivated behavior (seeking food) works to reduce the drive by obtaining reinforcement (food) to eliminate the need and return the body to a balanced internal state. People are “pushed” into action by unpleasant drive states. The theory explains biological needs, such as hunger and thirst. Although the Griggs text mentions hunger in the context of motivation, it does not discuss the psychology of hunger or how hunger is regulated by the brain. However, if you opt to extend coverage to include these topics, supplementary demonstrations and videos, described below, are available for doing so.

Scientific American Introductory Psychology Videos: Hunger and Eating (6:45)
This video describes how our body converts food into energy for immediate use and stores it for later use. The focus is on the psychology of eating behavior and the effects of modern diet and lifestyle on weight. The role of the hypothalamus in hunger is described, with engaging visual images combined with narration and interviews.

Worth Video Anthology for Introductory Psychology: Eating and Weight Gain: Genetic Engineering (3:05)
This video explains how metabolism can be altered by external agents or by manipulation of proteins in the body. The video recounts the story of the serendipitous discovery that 2,4-dinitrophenol (DNP), an ingredient in explosives, speeds up metabolism and prevents food from being converted to fat. However, DNP could not be used as a diet pill because it had dangerous side effects, such as sharply boosting overall body temperature. Subsequently, a researcher noted that the human body contains a natural protein that resembles DNP, but worked only in a subset of cells. Experimenting with mice, the researcher demonstrated that a genetic manipulation affecting this protein did indeed boost metabolism, creating a skinny mouse that remained thin despite eating considerably more than a sibling without the manipulation. Although not stated in the video, more work is needed before these findings are applied to humans.
Worth Video Anthology for Introductory Psychology: Eating and Weight Gain: A Role for Fidgeting (3:35)

This video illustrates how moving around quite a bit, without “formal” exercise, consumes a considerable number of calories. It begins with a young man, Jeff, describing how he generally eats fast food, seldom exercises, spends much time watching TV or a movie on DVD, and remains thin. Jeff participated in a study conducted by a Mayo Clinic doctor in which all participants ate large amounts of food and did not exercise. After two months, weight gain varied considerably among participants, ranging from 2 pounds (for Jeff) to 8 pounds. To the doctor’s surprise, all participants had a similar metabolism. Puzzled, the doctor scrutinized all data, ultimately concluding that although Jeff did not exercise, he was constantly moving or fidgeting (tapping his feet, moving his fingers). This continuous movement accounted for consumption of half of the calories Jeff burned.

b. Incentive theory proposes that people are “pulled” into action by incentives, external environmental stimuli that do not involve drive reduction. For instance, students may be motivated by getting good grades to work and study hard. Money is another classic example of an incentive that “pulls” people into behaving in certain ways.

c. Arousal theory contends that people are motivated to maintain an optimal level of arousal, which varies among people. When arousal is below the optimal level, people are motivated to raise it to the optimal level. When overaroused, people are motivated to lower arousal level to the optimal level. Arousal theory argues that the level of arousal affects performance level.

The Yerkes-Dodson Law suggests a relationship between arousal and performance (see Figure 4.9). Increased arousal aids performance up to a point, after which further arousal impairs performance.

Table 4.4 summarizes the three theories of motivation.

2. Motivation is described as extrinsic or intrinsic.

a. Extrinsic motivation is the desire to perform behavior to obtain an external reinforcer or to avoid an external aversive stimulus.

b. Intrinsic motivation is the desire to perform behavior effectively and for its own sake. Reinforcement is provided by the activity itself.

For example, why do students study for classes? An extrinsic motivator would be grades, whereas an intrinsic motivator would be enjoyment of the information.

The overjustification effect occurs when there is a decrease in an intrinsically motivated behavior after the behavior is extrinsically reinforced and then the reinforcement discontinued. In a study by Lepper, Greene, and Nisbett (1973), some children who enjoyed playing with felt-tipped pens (they did so during free-play periods and were therefore initially intrinsically motivated) were subsequently given prizes, an extrinsic incentive, for playing with the pens. Other children were not given prizes for playing with the pens. A week later, when no prizes were given for playing with the pens, the children who had not received prizes a week earlier still continued to play with the pens, but children who had been given prizes spent much less time playing with the pens, suggesting that the overjustification effect was at work.

The overjustification effect indicates that a person’s cognitive processing is influencing behavior and that this processing may lessen the effectiveness of extrinsic reinforcers. However, extrinsic reinforcement is not likely to affect intrinsic motivation if the extrinsic reinforcement depends on doing something well versus just doing it.

Lecture Enhancer/Supplement
You can use Scott Terry’s (2008) demonstration of approach and avoidance conflicts to supplement information in the text. Conflict is discomfort brought about by two or more goals that a person believes are incompatible. There are three such types of conflict:
1) **Approach-approach conflict** occurs when we must choose between two equally desirable outcomes (e.g., which of two delicious desserts to eat, which of two good job offers to accept).

2) **Avoidance-avoidance conflict** occurs when one must choose between two equally undesirable outcomes (e.g., do homework or clean the house). These types of conflicts are relatively stressful because one is tempted not to choose either option.

3) **Approach-avoidance conflict** occurs when an available choice has both desirable and undesirable qualities, rendering the person ambivalent and indecisive (e.g., whether to take a good job that requires relocating away from family and friends).

In Terry’s demonstration, he selected 40 personality descriptors from Anderson’s (1968) well-known list of traits. He arranged each pair from Anderson’s list as both an approach-approach choice, and as an avoidance-avoidance choice. For instance, one item that Terry included as an approach-approach conflict was “Would you rather be more popular or more articulate?” Conversely, the avoidance-avoidance conflict was “Would you rather be less popular or less articulate?” Although Terry used 40 traits presented as both approach and avoidant conflicts, you can use a smaller number of items (that you can create yourself if you don’t have access to Anderson’s work) to make the point that it is more difficult (and students will take longer) to make the avoidance-avoidance decisions than the approach-approach decisions. You can have students work in pairs and time each other with stopwatches, or after the demonstration is over, simply ask students which types of items were more difficult (i.e., which ones took longer) to decide.

As Terry suggested in his article, you might use “real world” conflicts, which should yield even greater differences between the two types of conflicts. For instance, political preferences, consumer choices, and financial decisions would likely take more time to decide because the implications are more “real” to students.


III. Biological and Cognitive Aspects of Learning

A. Biological Preparedness in Learning

The preparedness to learn to fear dangerous objects and situations (e.g., heights) and to avoid foods and drinks that lead to sickness has adaptive significance.

1. In researching taste aversion, Garcia and Koelling (1966) studied the effects of radiation on rats. After several radiation treatments, the rats would still go into their experimental cages where they had been radiated but would no longer drink the water in their experimental cages.

The researchers discovered that the water bottles in the experimental cages were made of a different substance than those in the home cages—plastic instead of glass. Thus, the water had a different taste in the two cages, and the rats quickly learned an aversion to the water in the bottles in the experimental cages even though the sickness did not come until hours after they were in the experimental cages.
Thus, taste aversion is a dramatic counterexample to the rule that the UCS (sickness) must immediately follow the CS (the different-tasting water) for learning to happen. In fact, with respect specifically to taste aversion, if the time interval between the CS and the UCS is not at least a few minutes, a taste aversion will not be learned. The rats did not learn taste aversion for any pairing of cue and consequence. The researchers examined two cues that were both paired with sickness through radiation: (1) sweet-tasting water and (2) normal-tasting water accompanied by clicking noises and flashing lights when the rats drank the water.

The rats that drank the sweet-tasting water easily learned the aversion to the water, but the rats that drank normal-tasting water while they experienced clicking noises and flashing lights did not do so. The rats couldn’t learn to pair the environmental auditory and visual cues that occurred during drinking with the later sickness; the pairing did not make any “biological sense” to the rats. As a topic for classroom discussion, students are often eager to share food aversions they have developed (e.g. fish, Chinese takeout).

2. **Instinctual drift** is the tendency of an animal to drift back from a learned, operant response to an object to an innate, instinctual response. Thus, biologically instinctual responses sometimes limit or hinder our ability to condition other less natural responses. Organisms learn certain associations (associations consistent with their natural behavior) more easily than others (associations less consistent with their natural behavior).

**B. Latent Learning and Observational Learning**

Two types of learning that emphasize cognitive process are latent learning and observational learning.

1. **Latent learning** is learning that occurs but is not demonstrated until there is incentive to do so. For example, students study for classes, but they do not openly demonstrate learning until an exam, for which the incentive is a good grade or feeling of accomplishment.

   Edward Tolman was a pioneer researcher on latent learning. Food-deprived rats had to negotiate a maze, and the number of wrong turns/errors was counted. For example, in a three-group experiment, food (reinforcement) was always available in the goal box at the maze’s end for one group but never available for another group. For a third group, no food was available until the eleventh day of the experiment. Interestingly, the performance for the group that began to get food reinforcement on the eleventh day improved on the twelfth day to a level equal to that of the group that had always gotten food reinforcement. Thus, it appears that the group had been learning the maze all along but did not demonstrate learning until the incentive was made available. Figure 4.10 highlights these results. Another relevant example for first-year students is to describe their own process of familiarizing themselves with buildings on campus even though it may be weeks before they actually need to visit a building such as the campus library. For a prey species (such as rats), the alleviation of anxiety that comes through becoming familiar with your surroundings is an excellent example of negative reinforcement.

*PsychSim 5 Tutorial: Maze Learning*

This relatively short module applies and extends text material by introducing the notions of chained association models and cognitive maps as explanations for how people learn to find the way from one place to another. In this module, students have the chance to be rats in a maze searching for cheese. After finding the cheese, the roles of chained association models and cognitive maps are explained. Then attention turns to the role of the hippocampus in these two processes, with applications to how the hippocampus is involved in Alzheimer’s disease.
Worth Video Anthology for Introductory Psychology: Cognitive Maps (2:35)
This video introduces the notions of cognitive maps and how rats can use such mental templates to find food in a maze, demonstrating that rats are capable of more than trial-and-error learning. More important, elephants use cognitive maps to find relatively small watering holes in the desert where, without cognitive maps, they would be forced to wander until they located this life necessity, perhaps dying before they found it.

2. **Observational learning (modeling)** is learning by observing others and imitating their behavior.

In Albert Bandura’s pioneering research, one experiment involved children who were exposed to an adult model who either beat, kicked, and yelled at a Bobo doll or interacted with the Bobo doll in a gentler manner. After observing the model’s behavior, a child was taken to another room filled with appealing toys. However, the child was told that the toys were for other children and that he or she could not play with them. Later, the child was taken to another room with toys the child could play with, including a Bobo doll. Children exposed to the aggressive model tended to beat the Bobo doll in much the same way the adult model did. Children exposed to the gentle model tended to act more gently toward the doll than did children exposed to aggressive model. Thus, in general, the children’s behavior was guided by the behavior of the adult model the children observed. In many cases, children even adopted the same language as the adult model.

In another experiment, an adult was either rewarded for aggressive behavior, punished for aggressive behavior, or was given no consequences at all while children watched. The children who saw the adult being reinforced for aggressive behavior acted more aggressively toward the Bobo doll than did those who had seen the model act with no consequences. In addition, the children who had watched the adult be punished were less likely to act aggressively toward the doll than were children who had not been exposed to any consequences for acting aggressively toward the doll.

Additional supplementary videos are available to illustrate Bandura’s research and the role of mirror neurons.

Worth Video Anthology for Introductory Psychology: Bandura’s Bobo Doll Experiment (5:06)
This video is narrated by Albert Bandura and presents his research on learned aggression. Almost the entire video is original footage from one of his well-known “Bobo doll” experiments, with Bandura narrating throughout the footage. We have used this video in different ways. However, we find that it seems to be particularly effective when sandwiched between a verbal description of the experiment and a discussion of the causes of and conditions under which observational learning can occur. Throughout this module there is a lot of time in which Bandura is not talking; thus, you can easily interject your own comments.

PsychSim 5 Tutorial: Mind-Reading Monkeys
This relatively brief module primarily focuses on the role of mirror neurons in observational learning in primates and in humans. Students can simulate experimental conditions that led researchers to discover the “monkey see monkey do” neurons. The tutorial summarizes research into the role of mirror neurons, the evolution of language, and the experience of empathy.

It is estimated that the typical American child views 8,000 murders and 100,000 other acts of violence on TV before finishing elementary school. According to leading aggression researcher Craig Anderson (2003), “Research on violent television and films, video games, and music reveals unequivocal evidence that media violence increases the likelihood of aggressive and violent behavior.”
Worth Video Anthology for Introductory Psychology: Do Video Games Teach People to be Violent? (4:30)

This video features reports on a court case in which the manufacturer of a violent video game has been sued for teaching an adolescent to commit murder. Psychologist David Walsh discusses this potential example of observational learning in relation to brain development. He reports that the prefrontal cortex, which enables people to “think ahead, consider consequences, and manage urges,” is not fully developed during adolescence. Although Dr. Walsh acknowledges that playing violent video games does not cause people to act out violent scripts, he argues that prolonged playing of violent games, when coupled with other risk factors (e.g., a disrupted childhood), does enhance the probability of an adolescent mimicking the actions in the game. To supplement this video, you may wish to access and discuss portions of an article by Gentile, Lynch, Linder, and Walsh (2004), which is mentioned in the segment. The video is also suitable for use when discussing the functions of the frontal lobe (Chapter 2, Neuroscience) and introducing developmental psychology (Chapter 7).


Recent research has also identified neurons in the human brain that fire both when we engage in a behavior and when we watch others engage in a behavior. These neurons, known as mirror neurons, fire when an organism performs an action and also when an organism observes another organism performing that same action. When you observe someone engaging in an action, similar neurons are firing in your brain and in the other person’s brain. Thus, the neurons in your brain are “mirroring” the behavior of the person you are observing. Mirror neuron systems provide a means of converting observation into action. Mirror neurons may also play a role in empathy and understanding the emotions of others. An excellent 14-minute segment about mirror neurons is available at http://www.pbs.org/wgbh/nova/sciencenow/3204/01.html.