



# LEARNING

A Five-Day Unit Lesson Plan for  
High School Psychology Teachers

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## **LEARNING**

### **A Five-Day Unit Lesson Plan for High School Psychology Teachers**

This unit is aligned to the following content and performance standards of the *National Standards for High School Psychology Curricula* (APA, 2011):

#### **DEVELOPMENT AND LEARNING DOMAIN STANDARD AREA: LEARNING**

##### **CONTENT STANDARDS**

**After concluding this unit, students understand:**

- 1. Classical conditioning**
- 2. Operant conditioning**
- 3. Observational and cognitive learning**

##### **CONTENT STANDARDS WITH PERFORMANCE STANDARDS**

###### **CONTENT STANDARD 1: Classical conditioning**

Students are able to (performance standards):

- 1.1 Describe the principles of classical conditioning
- 1.2 Describe clinical and experimental examples of classical conditioning
- 1.3 Apply classical conditioning to everyday life

###### **CONTENT STANDARD 2: Operant conditioning**

Students are able to (performance standards):

- 2.1 Describe the Law of Effect
- 2.2 Describe the principles of operant conditioning
- 2.3 Describe clinical and experimental examples of operant conditioning
- 2.4 Apply operant conditioning to everyday life

###### **CONTENT STANDARD 3: Observational and cognitive learning**

Students are able to (performance standards):

- 3.1 Describe the principles of observational and cognitive learning
- 3.2 Apply observational and cognitive learning to everyday life

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# PROCEDURAL TIMELINE



## **LESSON 1: ATTRIBUTES OF LEARNING AND CLASSICAL CONDITIONING**

Activity 1.1: Classical Conditioning: An All-Purpose  
Demonstration Using a Toy Watergun

Activity 1.2: Salivating to Music

## **LESSON 2: CLASSICAL CONDITIONING** *(continued)*

## **LESSON 3: INSTRUMENTAL LEARNING AND OPERANT CONDITIONING**

Activity 3: Shaping by Successive Approximations

## **LESSON 4: OPERANT CONDITIONING** *(continued)*

Activity 4: Student Worksheet for Schedules of Reinforcement

## **LESSON 5: COGNITIVE LEARNING AND THE ROLE OF BIOLOGY AND CULTURE IN LEARNING**

# INTRODUCTION



**W**elcome to the complex, yet intuitive world of learning! Learning is defined in the lesson plan as a relatively permanent change in behavior that occurs as a result of experience. This unit allows us to expand upon the predominantly behaviorist perspective of psychology to understand the fundamental explanations behind the simplest human and animal behaviors. The learning unit explores some of the most famous researchers (e.g., Bandura, Köhler, and Tolman) and most classic experiments in psychology (e.g., Pavlov’s dog and Watson’s Little Albert). Throughout this unit plan, you will gain insight into the basic principles of learning, the two main paradigms of changing behavior, and the more modern modifications of these paradigms.

In addition to definitions and examples of each principle, this unit plan will provide resources, activities, and demonstrations to enrich the classroom experience. This lesson plan also provides several critical thinking activities to challenge students to think beyond the basic definitions and examples and to encourage students to relate these concepts to their own lives.

The learning unit provides high school students an opportunity to examine behaviors as simple as raising one’s hand or being attracted to a certain brand of cereal as evidence that we are products of our environment. Students can then recognize how to modify unwanted behaviors or introduce new behaviors based on principles of classical conditioning, operant conditioning, or cognitive learning. This behavior modification could be as immediate as the cessation of nail biting or could expand to a long-term change in study habits or relationship interaction.

Throughout this unit, teachers might challenge students to analyze their own behaviors and find real world examples that extend beyond those provided in the unit plan. Students can then find the best approach for analyzing behaviors no matter the situation they encounter.



# CONTENT OUTLINE



## LESSON 1

### Attributes of Learning and Classical Conditioning

#### I. Attributes of learning

**Learning** is defined as a relatively permanent change in behavior that occurs as a result of experience.

- A. **Change** includes either an increase or a decrease in the strength of a behavior. *Example:* You can learn to play a piano louder or softer, faster or slower.
- B. **Behavior** is any act that is observable.
- C. **Experience** depends on our interaction with the environment. Sometimes experiences do not lead to lasting changes in behavior. (*Example:* You may not be able to repeat a phone number even though you've called it many times.)

#### II. Classical conditioning

- A. **Associative learning** occurs when two or more things are paired together in time and/or space. *Example:* Salt and pepper are frequently paired so that seeing salt will trigger the thought of pepper. Classical conditioning is a special type of associative learning that requires using an unconditioned stimulus (see below).
- B. Definitions
  - 1. **Classical conditioning** is defined as learning that takes place when an originally neutral stimulus (one that doesn't elicit any particular reflex) comes to produce a conditioned response because of its association with an unconditioned stimulus.



2. An **unconditioned stimulus (UCS)** reflexively produces an **unconditioned response (UCR)** without requiring previous training. A good test for determining if a behavior is an unconditioned response is to ask if every member of the species would exhibit that reflexive behavior from birth. Examples of UCSs and their respective UCRs include:
  - a. A puff of air blown in the eye (UCS) produces blinking (UCR).
  - b. Placing food in the mouth (UCS) causes salivation (UCR).
  - c. A hot environment (UCS) causes sweating (UCR).
  - d. A loud sound (UCS) causes behavioral signs of fear (UCR).
3. A **conditioned stimulus (CS)** is a stimulus that has come to elicit a **conditioned response (CR)** because the organism learns to associate the conditioned stimulus with the unconditioned stimulus. *Example:* A neutral tone (UCS) can be paired with food that causes salivation (UCR). After several pairings with food, the tone (now a CS) will elicit salivation (CR). *Example:* If you repeatedly use a scented hand sanitizer (UCS) just before eating your lunch, the odor of the hand sanitizer (CS) can elicit salivation (CR). *Example:* If you experience a frightening event (UCS) at night, you can develop a fear (CR) of the dark (CS).
4. Note that the UCR and CR are typically the same but occur in response to different stimuli. There are rare cases in which the responses are different.

### C. Acquisition

1. **Acquisition** involves repeated pairings of the CS and the UCS. The greater the number of pairings (trials), the stronger the conditioned response. However, the first few trials produce the greatest rate of learning, which then starts to level off after many trials.
2. **CS-UCS Timing:** The timing of the CS and UCS is important in determining the strength of conditioning. Each of the variations in CS–UCS timing is illustrated on page 7 with a figure that shows the pairing of a tone (CS) with shock (UCS). In addition, each description includes a real-life example of classical conditioning with that particular CS–UCS timing. Trace and





delayed conditioning are types of **forward conditioning** (the CS is presented before the UCS), the most effective pattern of conditioning. Furthermore, conditioning is best when the interval between the presentation of the CS and the UCS is about a half second.

- a. **Trace conditioning** occurs when the CS is presented and terminated before the presentation of the UCS (see figure below). *Example:* After seeing lightning flash (CS) and shortly thereafter hearing thunder (UCS) that startles you (UCR), you might fear (CR) the sight of lightning (CS).



- b. **Delayed conditioning** occurs when the CS is presented and continues at least until the UCS is presented. *Example:* Seeing a spray bottle (CS) shortly before (and during) getting cold water (UCS) sprayed in your face. Afterwards, you will likely squint (CR) at the sight of the water bottle (CS).



- c. **Simultaneous conditioning** occurs when the CS and the UCS are presented and terminated at the same time. This is an effective pattern, although it is slower than forward conditioning (a and b above). *Example:* At the exact moment you enter the cafeteria, you start eating food (UCS), which will cause salivation (UCR). Later, the cafeteria (CS) may trigger salivation (CR).



- d. **Backward conditioning** occurs when the UCS is presented before the CS. This timing is ineffective. *Example:* Giving food (UCS), then playing a short piece of music (CS) will not produce conditioning to the music.



- e. **Temporal conditioning** occurs when the CS is a fixed period of time between presentations of the UCS. *Example:* After being exposed to a frightening explosion (UCS) every hour, fear (CR) will start to increase near the end of every hour (CS) (Powell, Honey, & Symbaluk, 2013).



#### D. Extinction

1. **Extinction** is a procedure that leads to the gradual weakening and eventual disappearance of the CR.
  2. It involves repeatedly presenting the CS without pairing it with the UCS.
  3. *Example:* If a dog normally salivates to the sound of the can opener, you would present the sound of the can opener, but not give the dog food. Eventually, the dog would stop salivating to sound of the can opener. *Example:* If you are afraid of spiders, repeated exposure to spiders without subsequent harm can reduce your fear of spiders.
- E. **Spontaneous recovery** occurs when a previously extinguished CR suddenly reappears after a period of no training. It is important to emphasize that spontaneous recovery can only occur after extinction. The fact that it occurs at all suggests that extinction is not simply forgetting, but rather learning that the CS now signals the absence of the UCS. *Example:* If the sight of a dog is a CS that elicits fear (CR) due to a prior attack, then exposure to a dog alone (without another attack) during a therapy session will gradually weaken (extinguish) the fear. However, after extinction occurs, it is likely that the next time the person sees a dog, there may be a return of the fear, but it will be weaker than before and will extinguish more quickly than last time.



#### GO TO ACTIVITY 1.1

***Classical Conditioning: An All-Purpose Demonstration Using a Toy Watergun***



#### GO TO ACTIVITY 1.2

***Salivating to Music***



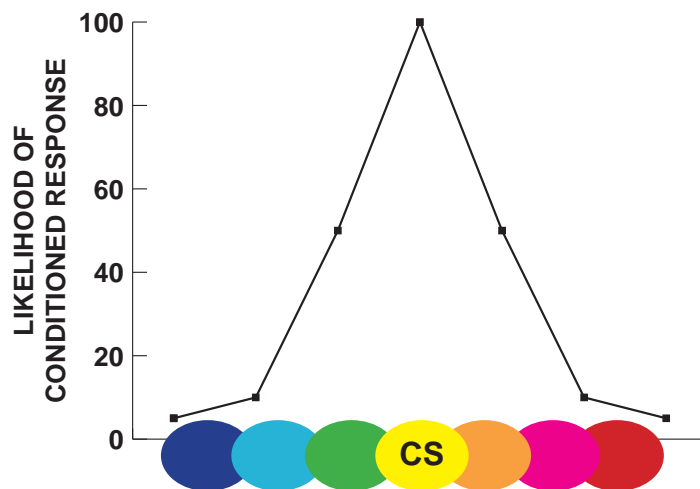
# LESSON 2

## Classical Conditioning (*continued*)

### III. Classical conditioning

#### A. Generalization

1. **Generalization** occurs when a CR results from stimuli that are similar to the CS, even though these stimuli may never have been associated with the UCS. *Example:* After developing a conditioned salivation response to the beat of a metronome at 60 beats/minute, salivation will likely occur to the beat of a metronome at 50 or 70 beats/minute.
2. The more similar the stimuli are to the CS, the greater the likelihood of generalization. *Example:* After developing a conditioned fear of a particular dog (poodle), a person might experience fear of other kinds of dogs similar to poodles.
3. The following figure represents the likelihood of a conditioned response based on similarity in color to the original CS (in this case, a yellow circle).



4. Watson's Little Albert experiment (see page 10) is a good example of how fear can generalize to other stimuli.

#### B. Discrimination

1. **Discrimination** occurs when stimuli similar to the CS do not result in a CR. This will happen only after repeated training in which the CS is paired with a UCS, but the similar stimuli are

not paired with the UCS. *Example:* To get an animal to salivate only to a yellow circle, but not an orange one, you would pair the yellow circle with food and the orange circle with nothing, repeatedly. *Example:* If a person develops a fear of a large dog after an attack by a large dog but continues to have good experiences with small dogs, the person may fear only large dogs.

2. The more similar the stimuli are to the CS, the greater the difficulty of discrimination. *Example:* Discriminating a circle from a square would be easier than discriminating a circle from an ellipse.

### C. Famous demonstrations of classical conditioning

#### 1. **Ivan Pavlov** and his dogs

- a. The sound of a metronome (CS) was paired with meat powder (UCS) until the CS alone produced salivation (CR).
- b. This demonstration established the basic components of classical conditioning: acquisition, extinction, generalization, and discrimination.

#### 2. **John Watson** and Little Albert

- a. To better understand the development of phobias, John Watson and Rosalie Rayner conditioned an infant (pseudonamed Little Albert) to fear a white rat.
- b. The sight of a white rat (CS) was paired with loud noise (UCS) until the CS alone produced crying and other responses indicative of fear (CR).
- c. This fear generalized to stimuli similar to the CS including a dog, monkey, rabbit, and fur coat.
- d. This demonstration showed that human emotional responses could develop as a result of classical conditioning and that most of our fears are learned rather than inborn.
- e. Psychologists are not sure what happened to Little Albert. Some researchers claimed to have solved the mystery (Beck, Levinson, & Irons, 2009), but there is still doubt about their conclusions (Powell, 2010; Powell, 2011).



## D. Applications of classical conditioning

1. **Advertising:** It is suggested that consumer attitudes for advertised products are influenced by pairing the product with other pleasant things such as good music and pleasant photographs (see Stuart, Shimp, & Engle, 1987).
2. **Taste aversions:** In taste aversion conditioning, the CS is a novel taste, the UCS is typically a drug that produces nausea (UCR), and the CR is avoidance of the taste.
  - a. Garcia and Koelling's (1966) work on taste aversion first demonstrated that pairing radiation (UCS) with the taste of sweetened water (CS) caused rats to become nauseated (UCR).
  - b. Women undergoing chemotherapy for treatment of breast cancer were likely to develop a conditioned taste aversion to a lemon-lime flavor of Kool-Aid if they drank it prior to a chemotherapy session that caused nausea (Bovbjerg et al., 1992).
  - c. The tendency to develop taste aversions has been used to help overweight people lose weight by pairing their favorite foods (CS) with noxious odors (UCS) so they are less likely to eat them in the future (Foreyt & Kennedy, 1971).

## E. Theoretical models of classical conditioning

### 1. Contiguity model

- a. This model argues conditioning will occur whenever a CS and a UCS are paired closely in time and space, but later research showed that simply pairing two things together is not sufficient to account for many phenomena of classical conditioning (see below).
- b. It is based on the work of Pavlov.

### 2. Contingency model

- a. This model argues the CS must reliably predict the UCS for conditioning to occur.
- b. It is based on the work of Robert Rescorla and Allan Wagner. A full explanation of this model is beyond mention here. Briefly, Rescorla emphasizes the

contextual relationship between the CS, UCS, and other stimuli in terms of the information the CS provides (Rescorla, 1988).

### **3. Contiguity vs. Contingency**

The contiguity model would suggest that pairing a tone with shock closely in time would be effective in producing fear to the tone. However, the contingency model suggests that contiguity alone is not sufficient. Indeed, if shock (UCS) occurs as often with a tone (CS) as it does without the tone, it is not effective in producing fear to the tone because the CS is not a reliable predictor of the UCS.

# LESSON 3

## Instrumental Learning and Operant Conditioning

### I. Instrumental learning

- A. An organism's behavior is **instrumental** in producing an environmental change that in turn affects the organism's behavior. It is primarily based on the type of consequences that occur after the behavior.
- B. The concept of instrumental learning is based on the work of **Edward L. Thorndike** (1874-1949).
- C. The fundamental principle is Thorndike's **Law of Effect**, which states that behaviors are encouraged when they are followed by satisfying consequences and discouraged when they are followed by annoying consequences. His early research with cats showed that they were able to learn to escape a box by stepping on a lever to unlatch the door. This behavior was strengthened while the other behaviors that led to continued confinement in the box (e.g., clawing, chewing) were weakened (Powell, et al., 2013).

### II. Operant conditioning

- A. This system of instrumental learning was developed by **B. F. Skinner** (1904-1990). Operant conditioning can be used to influence the likelihood of an organism's response by controlling the consequences of the response (e.g., reinforcement and punishment). This type of conditioning is important for voluntary behaviors and can explain more of our behavior than classical conditioning. *Example:* Making the fastest time in a swim meet is a behavior that will likely be reinforced by the receipt of a medal and praise, leading to a greater likelihood of making a faster time in the future.
- B. Training procedures
  - 1. **Positive reinforcement** occurs when a behavior is followed by an appetitive (desired) stimulus. The follow-up with the appetitive stimulus (positive reinforcement) makes the behavior **more** likely to recur. *Example:* If a child picks up a toy (behavior) and is given praise (appetitive stimulus), the



child will be more likely to pick up the toy in the future.

*Example:* If a person performs a job (behavior) and then receives a paycheck (appetitive stimulus), that appetitive stimulus, a positive reinforcement, leads to the increased likelihood of that person performing the job in the future.

2. **Negative reinforcement** occurs when a behavior prevents or removes an aversive (undesired) stimulus. This procedure also makes the behavior **more** likely to recur. *Example:* If a child takes out the garbage (behavior) and her mother stops nagging (aversive stimulus), the child will be more likely to take out the garbage in the future. *Example:* You find that changing a baby's diaper (behavior) stops the crying (aversive stimulus). The next time the baby cries, you will be more likely to change the baby's diaper.
  - a. **Escape** occurs when a behavior terminates an aversive event. *Example:* A person can escape a headache (aversive event) by taking an aspirin (behavior). This reinforces the behavior of taking the aspirin and makes it more likely to occur in the future.
  - b. **Avoidance** occurs when a behavior happens in the presence of a signal that informs the organism that an aversive event is likely. *Example:* A person can avoid indigestion (aversive event) by taking an antacid (behavior) before eating a spicy dinner (a signal that indigestion is likely). This reinforces the behavior of taking the antacid and makes this behavior more likely to occur in the future.
3. **Positive punishment** occurs when a behavior is followed by an aversive stimulus. This procedure makes the behavior **less** likely to recur. *Example:* If a child pulls a dog's tail (behavior) then has his hand slapped (aversive stimulus), the child will be less likely to pull the dog's tail in the future. *Example:* After scratching at the couch (behavior), a cat is sprayed with water (aversive stimulus), making it less likely the cat will scratch the couch in the future.
4. **Negative punishment** (also known as omission training) occurs when an appetitive stimulus is prevented or removed following a behavior. This makes the behavior **less** likely to recur. *Example:* If a child grabs a toy from her sibling (behavior) and her mother denies the child access to television (appetitive stimulus) for a period of time, the child will be less likely to grab toys in the future. *Example:* After





driving under the influence of alcohol (behavior), a person loses his or her license, making it less likely he or she will drive under the influence of alcohol.

C. **Note:** Students often confuse these terms because they think “positive” means good and “negative” means bad. Simply put, positive means a stimulus or event is added after the behavior, and negative means a stimulus was avoided or removed. Reinforcement strengthens a behavior, and punishment weakens it. When you’re teaching, focus on behaviors that actually occur, not on behaviors that did not occur. That is, avoid examples about “not eating your dinner” or “not taking out the trash” because while someone was not doing these things, they were actually doing something else (lying on the couch), which is what they are being punished for. Also, don’t assume that punishment (which weakens a behavior) will strengthen other behaviors. Again, focus on a specific behavior and its consequence, and then ask the following two questions to identify the type of operant conditioning.

		Does the consequence strengthen or weaken the behavior?	
		Strengthen (Reinforcement)	Weaken (Punishment)
As a consequence of the behavior, is something added or removed/avoided?	Added (Positive)	Positive Reinforcement	Positive Punishment
	Removed (Negative)	Negative Reinforcement	Negative Punishment

#### D. Types of reinforcers

1. **Primary reinforcers** are stimuli that are biologically relevant to organisms and so capable of increasing the probability of organisms’ behaviors toward them. No prior experience is required for these stimuli to be reinforcing; they are innately reinforcing. *Example:* Water is a primary reinforcer for a thirsty person. *Example:* A treat given to a dog as the dog learns to sit is a primary reinforcer. This is an example of using primary reinforcement.

2. **A secondary (or conditioned) reinforcer** is neutral, but it has taken on the reinforcing properties of a primary reinforcer by being associated with it. *Example:* Money is a secondary reinforcer because people have learned that it can be used to purchase a variety of primary reinforcers. *Example:* Tokens earned for good behavior at school are secondary reinforcers because they can be exchanged for candy (a primary reinforcer).

#### E. Shaping

1. **Shaping** is a technique whereby successive approximations of a behavior are reinforced. In other words, behaviors that come closer and closer to the final target behavior are reinforced during the training.
2. This technique makes it possible to condition behaviors that are not likely to happen otherwise.
3. *Example:* Children are often reinforced when they first write a letter of the alphabet, then only when they can write it neatly. *Example:* When you are learning to parallel park, at first you're given reinforcement when far from the curb, but then only as you park closer and closer to the curb until you only get reinforcement for parking within 6 inches of the curb. *Example:* You can use shaping to teach a dog to catch a Frisbee by first reinforcing the dog's behavior of approaching the Frisbee, then only when the dog takes the Frisbee in its mouth, and then only when the dog catches the Frisbee, etc.



### GO TO ACTIVITY ACTIVITY 3

#### *Shaping by Successive Approximations*

- F. **Chaining** is an operant technique whereby an organism is required to perform several different behaviors in sequence before receiving the reinforcement. Complex strings of behaviors can be maintained by the use of a single reinforcement at the end of the sequence. *Example:* When operating a vending machine, you must first put in the money, then make the selection, then retrieve the item from the vending machine.
- G. **Extinction** occurs in operant conditioning when a behavior that results in a reinforcer no longer results in the reinforcer—so the behavior eventually ceases. Extinction is not caused by simply



preventing or avoiding the behavior. *Example:* A dog that begs at the dinner table is no longer reinforced with food for doing so (the behavior is ignored). As a result, the dog will eventually stop begging for food at the table.

#### H. Discriminative stimulus ( $S^D$ )

1. A **discriminative stimulus ( $S^D$ )** is defined as a stimulus that signals or informs the organism of the availability of reinforcement or punishment.
2.  $S^D$ s are valuable for determining when a particular behavior should or should not occur.
3. *Example:* The ring of a telephone is an  $S^D$  that indicates the behavior of answering the phone will likely be reinforced (someone will talk with you). *Example:* The electronic chime of a microwave is a discriminative stimulus that signals that the behavior of removing your food will be reinforced. *Example:* The presence of a scowl on a parent's face signals a teenager that the behavior of asking a favor of the parent is likely to be met with rejection.

# LESSON 4

## Operant Conditioning (*continued*)

### I. Schedules of reinforcement

#### A. Continuous reinforcement

1. Every target response is reinforced.
2. Continuous reinforcement is the quickest way to train new behavior.
3. *Example:* When a dog is being taught to sit, every time the dog performs the sitting behavior, the dog's behavior is reinforced with a treat.
4. A behavior that is continuously reinforced is easily extinguished if the behavior is no longer reinforced—extinction occurs.

#### B. Intermittent (or partial) reinforcement

1. Only some target responses are reinforced.

##### 2. Fixed-ratio (FR)

- a. There must be a fixed (unchanging) number of target responses before reinforcement is given.
- b. This schedule produces a high rate of responding following brief pauses by the organism after obtaining reinforcement.
- c. *Example:* A “Buy 10, get 1 free” offer maintains buying behavior on an FR schedule. *Example:* In a video game, every 100 coins you gather result in an extra life.

##### 2. Variable-ratio (VR)

- a. The number of target responses required for reinforcement varies around some average, and the organism never knows exactly how many responses are required for the next reinforcement.
- b. This is the gambler's schedule. *Example:* A gambler never knows how many lottery tickets must be bought before he/she wins. *Example:* A boxer is never sure how many punches are required to knock out an opponent.



- c. This schedule produces a consistent, high rate of response very resistant to extinction.

### 3. Fixed-interval (FI)

- a. The first target response after a fixed interval of time has passed is reinforced.
- b. Responses on an FI schedule increase toward the end of the interval. This pattern of responding is called “scalping” because of the notable scalloped shape of the line on a cumulative record.
- c. *Example:* When making toast, you must wait a fixed amount of time before you are reinforced for reaching your hand to remove the bread from the toaster. *Example:* Some hospitals allow patients to self-administer pain medication, but only after a fixed amount of time has elapsed since the last treatment.

### 4. Variable-interval (VI)

- a. The VI schedule is similar to the FI schedule, except that the length of the interval of time changes after each reinforcement, and the organism has no way of knowing how long the next interval will be.
- b. Responses on a VI schedule tend to be steady and at a moderate rate.
- c. *Example:* After taking a test, students have to wait a variable amount of time before the behavior of checking their grade is reinforced. *Example:* You have to wait a variable amount of time before checking your cell phone to be reinforced with a new text message.



## GO TO ACTIVITY 4

### *Student Worksheet for Schedules of Reinforcement*

## II. Aversive conditioning

### A. Punishment (see Lesson 3.II)

- 1. **Punishment** is most likely to be effective when it is intense and occurs immediately after the behavior.



2. Punishment may produce only temporary suppression of the undesired behavior or lead to aggressive behavior, among other things.
- B. **Learned helplessness**, a phenomenon described by **Martin Seligman**
1. **Learned helplessness** is defined as a decrease in an organism's responding that occurs after the organism's exposure to uncontrollable aversive events. *Example:* Dogs subjected to uncontrollable electric shocks were later unable to learn a routine avoidance task (Seligman & Maier, 1967).
  2. Seligman believes learned helplessness helps explain depression. *Example:* If a person experiences uncontrollable events such as the death of a loved one, a natural disaster, or unemployment, the person may believe there is nothing he or she can do about it. The person may give up and experience depression.

### III. Applications of operant conditioning

- A. **Educational strategies:** *Example:* Pop-quizzes can be used to motivate students to be consistently prepared for class (variable schedules). *Example:* Rewarding bonus points for timely submission of assignments can be a positive reinforcement.
- B. **Animal training:** *Example:* Shaping can be used to train a pig to step on a weighing platform (Lukas, Marr, & Maple, 1998).
- C. **Behavior modification techniques:** *Example:* A combination of punishment (painting fingernails with a bitter-tasting chemical) and reinforcement (free manicure) can be used to alter the frequency of nail biting. *Example:* Making access to TV/video games contingent upon physical activity increases activity levels of overweight and obese children (Goldfield et al., 2006).
- D. **Token economies:** *Example:* In return for completing chores, children can receive tokens that can be exchanged for treats, computer time, or a special evening with a parent.
- E. **Behavior therapy for psychological disorders:** *Example:* For patients with anorexia nervosa, weight gain can be reinforced.



# LESSON 5

## Cognitive Learning and the Role of Biology and Culture in Learning

### I. Cognitive learning emphasizes the role of mental processes.

- A. **Insight learning**, described by **Wolfgang Köhler** (1887-1967) in *The Mentality of Apes*, is the sudden awareness of a solution to a problem. *Example:* The chimp Sultan seemed to suddenly grasp the need to use a short stick to reach a longer stick, which in turn could be used to reach some fruit.
- B. **Latent learning**, described by **Edward Tolman** (1886-1959), is defined as learning in the absence of apparent reinforcement. *Example:* Rats given an opportunity to explore a maze will develop a cognitive map (a mental representation of a physical location) even when there is neither reinforcement nor motivation for learning. Later, when reinforcement is available, rats that had the opportunity to explore the maze performed better than those that did not have the opportunity (Tolman, 1948).
- C. **Observational learning**, described by **Albert Bandura** (1925), is defined as learning that takes place by watching another individual model the learning task. This has important implications for humans, ranging from the potential negative effects of violent television programming to the potential positive effects of providing children with appropriate role models. *Example:* In Bandura's famous Bobo doll studies (e.g., Bandura et al., 1961), children who watched an adult hit a Bobo doll were more likely to hit the doll themselves when presented with the toy.

### II. The role of biology in learning

- A. Learning is **adaptive** in that it enhances an individual's ability to survive. Behaviors that are important for food, shelter, and mating are usually reinforced, while behaviors that are potentially harmful are often punished. Operant conditioning of behavior is similar to the natural selection of physical characteristics, but behavior changes occur much more quickly (within the organism's lifetime).
- B. **Biological constraints** on learning include innate predispositions that influence the likelihood that conditioning can occur.



1. Rats and other species are predisposed to learn taste aversions (avoidance of a particular taste after it has been paired with something that produces nausea). In their research on taste aversion, Garcia and Koelling (1966) demonstrated that the time between tasting a novel food and illness can be long (up to 24 hours), and it only requires one pairing. It's also easier to condition a rat to avoid a solution with a novel taste by pairing it with a nausea-inducing drug than it is to condition a rat to avoid the same solution by pairing it with a shock.
2. Breland and Breland (1961) reported that it was difficult to train a pig to put a wooden disk into a piggy bank because the pig would drop the coin on the floor and "root" it. Of course this behavior interfered with completing the task (and reinforcement). Similarly, a raccoon would rub two coins together (as if it were washing food) instead of dropping them into a bank. Thus, **instinctive drift** occurs when an organism's instinctive behavior interferes with the process of conditioning.

### **III. Culture influences the kind of learning that can occur, and the environment may limit learning opportunities.**

- A. According to Skinner, language sounds generated by infants are reinforced through shaping by parents and caregivers, who determine the language children learn (Catania, 2007).
- B. Culture influences preferences for food choices, clothing styles, greeting customs, dance moves, music, and many other attitudes and behaviors.
- C. The environment can limit learning opportunities. *Example:* Feral children who grow up without proper language and socialization have severe deficits in these areas.





# ACTIVITIES



## ACTIVITY 1.1

### Classical Conditioning: An All-Purpose Demonstration Using a Toy Watergun

Developed by

**Joel I. Shenker**

University of Missouri, Columbia

In this popular in-class activity, students see human classical conditioning actively unfold in an entertaining, understandable, and memorable demonstration. This demonstration requires minimal preparation, is easy to execute, and reliably generates excellent student questions and observations. It is appropriate for class in introductory psychology, learning and memory, and cognition. It involves one or two student volunteers, usually takes 10 to 20 minutes, and can be used in most any class size.



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#### Concept

Students may find classical conditioning an overly abstract concept and may have difficulty understanding how it applies to humans and nonhumans. This demonstration is an easy and entertaining way to give students a concrete example of classical conditioning in people, and it is sure to be one of the most memorable activities you will do in your course. It serves as a vehicle for discussion by giving easily identifiable and readily understood examples of classical conditioning phenomena. It is best used after students have studied classical conditioning. The basic idea is to read aloud a list of random words that intermittently contains a single “key” word and splash a student volunteer with a giant squirt gun each time the key word is read. The volunteer soon starts to show conditioned responses to the word alone.



## Materials

You will need a large plastic garbage bag, scissors, a large capacity watergun or several water pistols (a bottle that squirts water is another option and possibly better in a school setting), a towel, and the stimulus word list (included under instructions).

## Instructions

Explain to the class that classical conditioning occurs in humans and nonhumans and is produced by a variety of different stimulus–response relationships. Ask for a volunteer, being careful to explain that participation will involve wearing a protective smock and being squirted in the face with water (it usually takes some good-natured coaxing to get a volunteer).

Cut a hole in one end of the bottom of the garbage bag so that the participant’s head can just pass through. Turn the garbage bag upside-down and use it as a kind of poncho, sliding it over the volunteer to expose his or her head but cover the rest of his or her body. Place the volunteer sitting in a chair facing the class. It is important that the volunteer’s eyes remain closed throughout the demonstration for safety reasons. As you proceed with the demonstration, tell the students to observe silently and carefully and to be ready to discuss what they have seen at the end.

After the student volunteer is in place, with his or her eyes closed, and everyone is ready, I usually say that I am going to be reading a list of words and ask everyone to watch the volunteer as I do so. Without any further explanation, I go to the word list below. I read each word aloud, in order, loudly enough so that the entire class can hear and at a rate of about one word every 2 seconds. You can have another student do this for you if you wish, but I have found that the whole thing works better if I do the reading. In the word list, note that the word *can* appears often, sometimes in uppercase bold letters (**CAN**) and sometimes in plain lowercase letters (*can*). Only after you read the uppercase bold *can*, squirt the volunteer in the face using a consistent delay of about one-half second or so. Do not squirt the volunteer when you see the plain lowercase *can*. These trials test the volunteer’s conditioned response to the target word. As I read the list, sometimes I pause, either strategically or to let laughter die down before proceeding with the rest of the list.



Here is the stimulus word list to be used for this demonstration:  
cup, can, lime, **CAN**, dish, girl, chalk, can, dish, **CAN**, key, screen,  
ran, **CAN**, desk, **CAN**, knob, bag, tape, **CAN**, dish, clip, **CAN**, air, ban,  
cheese, **CAN**, door, can, box, dish, hair, **CAN**, ring, nail, **CAN**, boat, cap,  
dish, **CAN**, crane, wheel, fire, **CAN**, dish, king, cape, apple, **CAN**, dog,  
blue, can, dish, **CAN**, take, call, brick, pair, **CAN**, spin, chair, **CAN**, camp,  
**CAN**, dish, **CAN**, bridge, scale, can, fan, board, **CAN**, cool, three, horn,  
disk, **CAN**, can, cast, test, pen, dime, **CAN**, dish, van, can, card, stand,  
meat, pad, can, dish, set, can, tree, ice, plum, can, cost, bird, glass, can,  
light, can, sword, juice, can, dish, rock, smoke grease, dish, keep, kid,  
tan, dice, hole, set, dish, eye, friend, wax, bill, bulb, dish, class, mine,  
mark, work, can, dish, can, bus, dish, phone, can, smart, first, can, crack,  
feet, can, tub, bowl, can, van day, can, rake, dish, **CAN**, bluff, risk, **CAN**,  
salt, dish, **CAN**, ball, stack, **CAN**, rain, hat, food, can, van, disk, tree, can

After the reading is finished, the volunteer can return to his or her seat. Be sure to give the volunteer a towel and a generous thank you. Ask your students to describe and discuss what they saw. On their own, they will probably bring up many of the important phenomena related to classical conditioning. You can name and expand on each of these as they arise in the discussion.

## Discussion

A number of topics that relate to classical conditioning can be tied to the demonstration:

1. The *unconditioned stimulus (UCS)* is the water squirted at the volunteer's face.
2. Examples of *unconditioned responses (UCR)* usually include the volunteer's flinching, squinting, or perhaps making a distinct facial expression.
3. The conditioned stimulus (CS) is the sound of the word *can*.
4. A *conditioned response (CR)* is usually a flinch, squint, or facial expression. Note that the volunteer will also often develop some *operant conditioned responses* (e.g., turns head or ducks out of the way). If so, this can serve as an interesting contrast for comparison to a CR, giving another topic for discussion.
5. *Acquisition* is demonstrated. At first, the word *can* by itself causes no special response. After repeated pairings of the word *can* and the water, the word by itself gradually becomes more likely to cause a CR.

6. *Stimulus generalization* occurs when words that sound like *can* (e.g., ban, ran, cap, cast) lead to a CR.
7. *Stimulus discrimination* occurs when different stimulus words produce differences in the CRs. In the demonstration, CRs are strongest and most likely to occur after the word *can*. They are weakest and least likely to occur after stimulus words that do not sound at all like *can* (e.g., dish, board, smoke).
8. *Extinction* has occurred when the word *can* is uttered several times unaccompanied by a squirt and so the CRs disappear or become less pronounced.
9. *Spontaneous recovery* has occurred after extinction when a long string of words in which *can* is not included is followed by the word *can*, and the word *can* again causes a CR. Such a string occurs near the end of the demonstration.
10. *Reconditioning savings* is demonstrated at the end of the list, where the word *can* and a squirt are again paired. At this point, fewer trials are needed to achieve strong, reliable CRs compared with the original acquisition at the beginning of the list.

This demonstration serves several useful purposes. First, it provides vivid and concrete examples of classical conditioning phenomena. When confronted with new material relevant to classical conditioning, students can draw from their memory of the specifics of this demonstration to piece together again the components of classical conditioning. Having such concrete examples is particularly useful to students who may not grasp this material in an abstract form.

Second, this demonstration shows how classical conditioning can affect humans as well as nonhumans, a principle that students often fail to glean from many other classical conditioning examples they are otherwise likely to read or discuss.

Third, the volunteer probably developed more than one CR to the CS; he or she may have developed a flinch, an eye squirt, a facial expression, an upper body movement, a particular breathing pattern, and so forth. Such observations are important because they highlight the extent to which classical conditioning in the real world (i.e., outside the controlled laboratory) allows for CSs to elicit a multitude of relevant CRs, not just one specific target response that an experimenter intended to create.



Fourth, and related to the last point, the demonstration illustrates the adaptive nature of classical conditioning. This viewpoint is especially useful to students who otherwise regard classical conditioning as trivial and unimportant when compared with operant conditioning. Thus, students discussing the demonstration may point to the utility of squinting just before water hits one's eyes, as opposed to waiting until after the moment of impact. It is easy to discuss why it makes sense for organisms to learn CRs to environmental events when such stimuli come to predict significant UCSs. Or students may observe the usefulness of extinction—why bother to continue to produce a squint response when the CS no longer predicts the water in the face? Students may see similar utility in spontaneous recovery or reconditioning savings.

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# ACTIVITY 1.2

## Salivating to Music

Developed by

**Jeffrey R. Stowell**

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### Concept

This activity allows all students to experience classical conditioning firsthand and tests students' understanding of classical conditioning principles. See also Cogan and Cogan (1984).

### Materials

You will need lemonade drink mix powder (one teaspoon per student), and each student will need a blank sheet of paper.

### Instructions

Have students fold up the edges of a blank piece of paper to be used as a container for a small amount of lemonade drink mix powder (about a teaspoon). Have them lick the tip of their finger and taste the lemonade powder (UCS), which will cause salivation (UCR). Instruct them to have some lemonade powder ready on their fingertip so they can lick their fingertip as soon as they hear the music begin playing. Play 3-4 seconds of a song and pair it with the lemonade powder 8-10 times, waiting about 20-30 seconds between pairings. Then, play the music only (without the lemonade powder) and have them note if they start salivating. Usually about two-thirds of the class salivates to the music.

Be sure to check with students about food allergies before introducing any substance to be tasted in a class demonstration.

### Discussion

Ask students to identify the UCS (lemonade powder), UCR (salivation), CS (music), and CR (salivation). You can also mention the timing of the UCS–CS was most likely delayed conditioning. You should then play the song until salivation no longer occurs (extinction). Play it again at the start of the next class period to see if spontaneous recovery occurs.

### Recommended Reading

Cogan, D., & Cogan, R. (1984). Classical salivary conditioning: An easy demonstration. *Teaching of Psychology*, 11(3), 170-171.



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# ACTIVITY 3

## Shaping Demonstration

Developed by  
**David Watson**  
University of Hawaii

From original *TOPSS Lesson Plan on Learning*

### Concept

This activity deals with shaping, that is, reinforcing successive approximations of one behavior to the exclusion of other behaviors. The exercise helps students learn the basic principles of reinforcement and makes it possible for them to compare the effects of positive reinforcement and punishment.

### Instructions

Start the exercise by showing students how shaping is done. Ask for a volunteer whose behavior you will shape. Send the volunteer out of the room while you and the class select a simple behavior to shape—for example, touching the chalkboard. Have the volunteer return. Explain the task as follows: “We’ve picked a particular act that we want you to do, but we won’t tell you what it is; you have to figure it out. It’s simple and not embarrassing. Each time you move in the direction of doing it, I will say ‘good.’ If you don’t move in that direction, I won’t say anything. When you get a little warm, I won’t keep on saying ‘good.’ I’ll wait for you to get a bit warmer before saying it. That way you will make progress. What I’ll be doing is called ‘shaping.’”

Begin shaping the volunteer’s behavior by saying “good” to any movement in the direction of the desired act. For example, if the volunteer is to touch the chalkboard, say “good” to any glance, turn, or step toward it. Then say “good” only to steps toward it, then to approaches of the hand toward it, etc. Eliciting the desired act takes about 10 minutes, on average.

Now divide the class into pairs. At the outset, one person in the pair should be the shaper, and the other, the person whose behavior will be shaped. The roles should be switched. Have the shapers select a target behavior—remind them that it should be a simple one, not embarrassing—and then have them proceed to shape their partner’s behavior. While they are working, circulate among them, coaching.



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On the same day, if time allows, or on another day, continue the exercise, but instead of having shapers say “good” when their partner gets warmer, have them say “bad” when their partner gets colder.

## **Discussion**

End the discussion with what students have learned. Bring out the following points: Reinforcers such as the word *good* guide behavior; reinforcement must come quickly if it is to have an effect; and shaping is an effective way to develop behaviors. Ask why some shapers did better than others. A shaper may have required too large an initial step, inadvertently reinforced the wrong move, or not given enough reinforcers. Also discuss the effects the change of approach from “good” to “bad” had. Typically, punishment (as represented here by the word “bad”) does not affect each new behavior effectively. There are also some typical side effects: The person on whom punishment is being used will become frustrated, may become aggressive, may show disrupted behavior, and may want to escape from the situation. Ask students for examples of shaping from real life. Point out that much shaping occurs without conscious intent. If you are really brave, you might ask your students how a class might conspire to shape the instructor’s behavior.

## **Suggested Background Reading**

Coon, D. (1977). *Introduction to psychology: Exploration and application* (Chapters 8, 9). New York: West Publishing.

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# ACTIVITY 4

## Schedules of Reinforcement

Developed by

**Alan Feldman**

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From original *TOPSS Lesson Plan on Learning*

The following is a useful activity for teaching students to distinguish among the four major schedules of reinforcement.

**Reinforcement**—an increase in the strength or frequency of a behavior due to its consequences

**Reinforcer**—any stimulus that, when made contingent upon a response, increases the probability of that response

### Instructions

In terms of delivering a reinforcer, one may: (a) deliver the reinforcer according to the first correct response after an interval of time (These are called interval schedules.) or (b) deliver the reinforcer after a certain number of responses. (These are called ratio schedules—time is irrelevant.) A schedule is fixed if it stays the same from reinforcer to reinforcer, or variable if it is allowed to vary within a certain range.



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## STUDENT WORKSHEET

Combine the four definitions to define the schedules listed below:

1. Fixed-interval schedule
2. Variable-interval schedule
3. Fixed-ratio schedule
4. Variable-ratio schedule

To determine the schedule of reinforcement being used, ask yourself: Is time the major factor that causes a favorable outcome after the first correct response or is it the number of responses? If time or the needed number of responses is constant, the schedule is fixed; if the time or number of responses varies around a certain average, the schedule is variable. Write fixed interval (FI), fixed ratio (FR), variable interval (VI) or variable ratio (VR) on the line to the left of the example.

1. \_\_\_\_ For every ten words spelled correctly a child gets a star by their name on a bulletin board
2. \_\_\_\_ Checking your mailbox for mail which comes daily at 3 PM
3. \_\_\_\_ An owl hunting for mice in a forest
4. \_\_\_\_ A sales clerk at a bakery waiting for the next customer to arrive
5. \_\_\_\_ A child is rewarded if they are sitting correctly after every two minutes goes by
6. \_\_\_\_ Selling cookies door to door
7. \_\_\_\_ Waiting for clothes to come out of washing machine that takes 32 minutes
8. \_\_\_\_ Trying to complete a telephone call when the line is busy
9. \_\_\_\_ Slot machines are based on this schedule
10. \_\_\_\_ Frequent flyer program in which one gets a free flight after a specific number of miles are flown
11. \_\_\_\_ Waiting for an elevator to arrive
12. \_\_\_\_ A dolphin is given a fish after it jumps through a hoop six times
13. \_\_\_\_ A writer is paid for every article completed
14. \_\_\_\_ A fisherman turning over rocks looking for worms
15. \_\_\_\_ A rat is rewarded for the first correct response after every 30 seconds
16. \_\_\_\_ Waiting for an important email



## ANSWER KEY FOR TEACHERS

1. \_\_\_\_ For every ten words spelled correctly a child gets a star by their name on a bulletin board (FR)
2. \_\_\_\_ Checking your mailbox for mail which comes daily at 3 PM (FI)
3. \_\_\_\_ An owl hunting for mice in a forest (VR)
4. \_\_\_\_ A sales clerk at a bakery waiting for the next customer to arrive (VI)
5. \_\_\_\_ A child is rewarded if they are sitting correctly after every two minutes goes by (FI)
6. \_\_\_\_ Selling cookies door to door (VR)
7. \_\_\_\_ Waiting for clothes to come out of washing machine that takes 32 minutes (FI)
8. \_\_\_\_ Trying to complete a telephone call when the line is busy (VI)
9. \_\_\_\_ Slot machines are based on this schedule (VR)
10. \_\_\_\_ Frequent flyer program in which one gets a free flight after a specific number of miles are flown (FR)
11. \_\_\_\_ Waiting for an elevator to arrive (VI)
12. \_\_\_\_ A dolphin is given a fish after it jumps through a hoop six times (FR)
13. \_\_\_\_ A writer is paid for every article completed (FR)
14. \_\_\_\_ A fisherman turning over rocks looking for worms (VR)
15. \_\_\_\_ A rat is rewarded for the first correct response after every 30 seconds (FI)
16. \_\_\_\_ Waiting for an important email (VI)

To see if students really understand schedules of reinforcement, you can add “An animal getting food every 45 seconds” to the list above. In this case, no schedule of reinforcement is implied because no behavior has occurred.



# CRITICAL THINKING AND DISCUSSION QUESTIONS



## CRITICAL THINKING QUESTIONS

For exercises A—C, you may want to have your students read articles and/or book chapters on the topic before stating their opinions. For example, the book *Taking Sides: Clashing Views on Controversial Psychological Issues* (11th edition) (Slife, 2000) has an article on spanking and TV’s influence on aggression that may be relevant to Exercise C. Corresponding lessons are listed with each exercise below.

### Exercise A (Lesson 2)

Develop pro and con arguments regarding this statement: It was ethical and justifiable for John Watson to use classical conditioning to establish a fear of white rats in “Little Albert.” Students can then use these arguments to write a paragraph presenting their personal belief. They may also analyze whether Watson’s research would be allowed under current APA guidelines.

### Exercise B (Lesson 4)

Hold a discussion on the use of punishment as a parenting technique. What are its advantages? Its disadvantages? Under what circumstances is it appropriate? Inappropriate? Are there effective alternatives? What general principles can be developed to govern the use of punishment? See Forehand & Kotchick (1996) for a brief summary of parenting values and behaviors characteristic of different ethnic minority groups.

### Exercise C (Lesson 4)

Have students develop their own behavior modification plan using the principles of operant conditioning. They could choose a target behavior such as biting their nails or exercising more and explain how reinforcement or punishment could change these behaviors.



### **Exercise D (Lesson 5)**

Have students research the statement: Children learn to be more violent from watching television violence. Students should gather evidence, analyze its weight and relevance, and prepare to defend their opinion either in a written paper or in class discussion.

### **Exercise E (Lesson 5)**

Have two panels of students discuss how to structure a proposed new elementary school. One panel should advocate for a reliance on the principles of cognitive learning, especially observational learning, to establish appropriate student behavior and learning. The other panel should advocate for a reliance on the principles of operant conditioning. You may also want to have the students present these two approaches to reducing young students' prejudice and discrimination (based on race/ethnicity, culture, gender identity and expression, sexual orientation, disability, religion, socioeconomic status, national origin, and/or aging).

## **DISCUSSION QUESTIONS**

1. Speculate on what may have happened to Little Albert. How might his fear have been de-conditioned?
2. For both Pavlov's and Watson's demonstrations of classical conditioning, identify the unconditioned stimulus, the unconditioned response, the conditioned stimulus, and the conditioned response.
3. How can spontaneous recovery be explained? Is there such a thing as absolute extinction?
4. Describe the relationship between trial and error and Thorndike's Law of Effect.
5. How can an individual's use of alcohol or other drugs be explained as positive reinforcement? How can it be explained as negative reinforcement?
6. How could a high school student use principles of operant conditioning to train his or her parents to set a later curfew? Consider the effectiveness of positive reinforcement, shaping, and the use of schedules of reinforcement in your answer.



# RESOURCES, REFERENCES, AND RECOMMENDED READING



## RESOURCES

### Websites

- Education Portal: Learning

<http://education-portal.com/academy/topic/learning.html>

This site contains short video clips, transcripts, and quizzes on most topics in the learning unit.

- Learning in the News

<http://topix.teachpsych.org/w/page/23075923/Learning%20in%20the%20News>

This page is from the APA Division 2: The Society for the Teaching of Psychology (<http://teachpsych.org>) Teaching of Psychology Idea Exchange (ToPIX).

- Pavlov's Dog

<http://www.nobelprize.org/educational/medicine/pavlov/>

Play the game "Pavlov's dog" to see how well you can condition Ivan (Pavlov's virtual dog) to salivate to a sound.

### Videos

- Annenberg. (Producer). (1990). *Discovering psychology: Learning* [Video]. Available from <http://www.learner.org/series/discoveringpsychology/08/e08expand.html>

This program discusses the basic principles of how we learn; classical, instrumental, and operant conditioning; and the role that stimuli and consequences play in learned behavior and habits.



- Prentice Hall. (Producer). (2006). *Classical films for introductory psychology*. [DVD]. With instructor's guide by Dennis Thompson, Georgia State University. Available from <http://www.pearsonelt.ch/HigherEducation/PrenticeHall/>

This DVD contains original film footage of John B. Watson and the Little Albert Experiment, Ivan Pavlov and Experiments in Conditioning, Wolfgang Köhler and Experiments in Ape Intelligence.

- Society for the Teaching of Psychology. (2013). *Teaching of psychology idea exchange: Learning videos*. Retrieved from <http://topix.teach-psych.org/w/page/19981016/Learning%20Video>

Find several online videos on learning compiled by the Society for the Teaching of Psychology (APA Division 2).

- Williams, C. (Writer), & Whittingham, K. (Director). (2007). Phyllis's wedding [Television series episode]. In G. Daniels (Executive producer), *The office*. Universal City, CA: NBC Universal.

In *The Office* episode titled "Phyllis's Wedding" (Season 3 episode 16), Jim uses Pavlov's theory to make Dwight want an Altoid. Teachers may be able to find a clip on YouTube or elsewhere online to show students.

- Worth Publishers. (Producer). (2013). *Video anthology for high school psychology* [DVD]. Available from <http://www.highschool.bfwpub.com/Catalog/>

The "Learning" chapter includes the following short video clips that highlight classical conditioning: clips 119 and 120 (classical conditioning), clip 125 (operant conditioning), and clip 128 (cognitive mapping). The DVD comes with a faculty guide that includes a description, interpretive comments, and discussion questions.





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