

## Section

## 33.2

# Learned Behavior

**North Carolina Objectives** Objective 4.05 Analyze the broad patterns of animal behavior as adaptations to the environment: Learned behavior

## Before You Read

Have you ever seen a police officer patrolling on horseback? In many U.S. cities, horses play an important role in law enforcement. This is despite the fact that young horses often are afraid of cars, noisy streets, and sudden movements. After a while, the horses become used to the typical sights and sounds of the city and adjust to their work environment. How are horses able to do this? Write your thoughts on the lines below.

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## Read to Learn

### STUDY COACH

**Mark the Text****Identify Main**

**Ideas** As you read this section, circle the different types of learning. Highlight the paragraph that discusses what causes learning to happen more quickly.

### What is learned behavior?

Learning, or learned behavior, takes place when behavior changes through practice or experience. The more complex an animal's brain, the more complicated the patterns of its learned behavior. Innate behaviors are more common in invertebrates. Learned behaviors are more common in vertebrates. In humans, many behaviors are learned.

Learning has survival benefits for all animals. In changing environments, learning permits behavior to change in response to varied conditions. Learning allows an animal to adapt to change. Learned behavior has adaptive value. This ability is especially important for animals with long life spans. The longer an animal lives, the greater the chance that its environment will change.

### Kinds of Learned Behavior

Just as there are several types of innate behavior, there are several types of learned behavior. Some learned behavior is simple and some is complex.

### What is habituation?

Horses normally shy away from an object that suddenly appears from the trees or bushes, yet after awhile they disregard noisy cars with honking horns that speed by their pasture. This lack of response is called habituation. **Habituation** (huh bit choo AY shun) occurs when an animal is repeatedly given a stimulus. However,

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### Learned Behavior, *continued*

the stimulus is not associated with any punishment or reward. An animal has become habituated to a stimulus when it stops responding to the stimulus. ✓

#### What is imprinting?

You may have seen young ducklings following their mother. This behavior is the result of imprinting. **Imprinting** is a form of learning in which an animal forms a social attachment to another object. This occurs at a specific, critical time in the animal's life. Many kinds of animals do not innately know how to recognize members of their own species. Instead, they learn how to do this early in life. Imprinting takes place only during a specific period of the animal's life. It is usually irreversible. For example, birds that leave the nest immediately after hatching, such as geese, imprint on their mother. They learn to recognize her within a day of hatching. Imprinting also occurs in ducks. Ducklings quickly learn to recognize and follow the first highly visible moving object they see. Normally that object is the ducklings' mother. Learning to recognize their mother and following her helps ducklings survive. Their mother means that food and protection will be nearby.

#### Do animals learn by trial and error?

You may remember learning how to ride a bike. You probably tried it several times before you were able to do it successfully. Some animal abilities are acquired the same way. For example, nest building may be a learning experience. The first time a jackdaw builds a nest, it uses grass, bits of glass, stones, empty cans, old lightbulbs, and anything else it can find. With experience, the bird finds that grasses and twigs make better nests than lightbulbs and empty cans. The animal has used **trial-and-error learning** in which an animal receives a reward for making a particular response. When an animal tries one solution and then another in the course of obtaining a reward, in this case a suitable nest, it is learning by trial-and-error.

Learning happens more quickly if there is a reason to learn or be successful. **Motivation** is an internal need that causes an animal to act. In most animals, motivation often involves satisfying a physical need such as hunger or thirst. If an animal is not motivated, it will not learn. Usually, animals that are not hungry will not respond to a food reward. ✓

#### ✓ Reading Check

1. How do you know when an animal has become habituated to a stimulus?

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#### Think it Over

2. **Infer** What would happen if the first highly visible moving object that a newly hatched group of ducklings saw was a human?

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#### ✓ Reading Check

3. What usually motivates an animal to act?

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**33.2** Learned Behavior, *continued***Do animals learn by association?**

Suppose you have a new kitten. Each time it smells the aroma of cat food in the can you are opening, it begins to meow. After a few weeks, the sound of the can opener attracts the kitten, causing it to meow. The kitten has become conditioned to respond to a stimulus other than the smell of food. **Classical conditioning** is learning by association. You can see a well-known example of an early experiment in classical conditioning in the illustration below.



**A** Pavlov noted that dogs salivate when they smell food. Responding to the smell of food is a reflex, an example of innate behavior.

**B** By ringing a bell each time he presented food to a dog, Pavlov established an association between the food and the ringing bell.

**C** Eventually, the dog salivated at the sound of the bell alone. The dog had been conditioned to respond to a stimulus that it did not normally associate with food.

**What is the most complex type of learning?**

In a classic study of animal behavior, a chimpanzee was given two bamboo poles. Neither of the poles was long enough to reach some fruit placed outside its cage. The chimpanzee connected the two shorter poles to make one longer pole! The chimpanzee solved the problem of how to reach the fruit. This type of learning is called **insight**. **Insight** is learning in which an animal uses previous experience to respond to a new situation. It is the most complex type of learning.

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**33.2****Learned Behavior, *continued***

Much of human learning is based on insight. When you were a baby you learned a great deal by trial-and-error. As you grew older, you relied more on insight. Solving math problems is an example of insight. Most likely your first math experience was learning to count. Based on your understanding of numbers, you then learned to add, subtract, multiply, and divide. Years later, you continue to solve math problems based on your past experiences. When you encounter a problem or a situation you have never experienced before, you use insight to solve it. ✓

## The Role of Communication

When you think about interactions among animals, you realize that some sort of communication has taken place. **Communication** is an exchange of information that results in a change of behavior. Black-headed gulls visually communicate their availability for mating with instinctive courtship behavior. The pat on the head from a dog's owner after the dog fetches a stick signals a job well done.

### Do most animals communicate?

Animals have several ways to communicate. They signal each other by sounds, sights, touches, or smells. Sounds vibrate in all directions. They can be heard a long way from their sources. Sounds such as songs, roars, and calls communicate a lot of information quickly. For example, the song of a male cricket tells his location, his sex, and his social status. Communication by sound usually varies according to species, so the male cricket also communicates his species. ✓

Signals that involve odors may be spread over a wide area and carry a general message. Ants leave odor trails that are followed by other members of their nest. These odors are specific to each ant species. As you know, pheromones such as those used by moths may be used to attract mates. Because only small amounts of pheromones are needed, other animals, especially predators, may not be able to detect the odors.

Some communication combines innate and learned behavior. In some species of songbirds, males automatically sing when they reach sexual maturity. Their songs are specific to their species, and singing is an innate behavior. Sometimes members of the same species that live in different regions learn variations of the song. They learn to sing with a regional dialect. In other species, birds raised in isolation never learn to sing their species song.

### ✓ Reading Check

4. What is the most complex type of learning?

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### ✓ Reading Check

5. List four ways animals communicate.

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## Section

## 33.2

Learned Behavior, *continued* Reading Check

6. How do humans benefit from language?

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**Can animals use language?**

Language, the use of symbols to represent ideas, is present primarily in animals with complex nervous systems, memory, and insight. Humans, with the help of spoken and written language, can benefit from what other people and cultures have learned. Humans do not have to experience everything for themselves. People can use accumulated knowledge to build new knowledge. 

**► After You Read****Mini Glossary**

**classical conditioning:** learning by association

**communication:** exchange of information that results in a change of behavior

**habituation (huh bit choo AY shun):** learned behavior that occurs when an animal is repeatedly given a stimulus not associated with any punishment or reward

**imprinting:** learned behavior in which an animal, at a specific critical time of its life, forms a social attachment to another object; usually occurs early in life and allows an animal to recognize its mother and others of its species

**insight:** type of learning in which an animal uses previous experiences to respond to a new situation

**language:** use of symbols to represent ideas; usually present in animals with complex nervous systems, memory, and insight

**motivation:** internal need that causes an animal to act and that is necessary for learning to take place; often involves hunger or thirst

**trial-and-error learning:** type of learning in which an animal receives a reward for making a particular response

1. Read the terms and their definitions in the Mini Glossary above. Select two key terms that describe a type of learning and provide an example of each learning type.

2. Match the terms with the correct statements. Put the letter of the term in Column 2 on the line in front of the statement it matches in Column 1.

**Column 1**

- \_\_\_\_\_ 1. Takes place when behavior changes through practice or experience.
- \_\_\_\_\_ 2. Learning has survival benefits for animals in changing environments.
- \_\_\_\_\_ 3. This is the most complex type of learning.
- \_\_\_\_\_ 4. Communication that enables humans to benefit from what others have learned without having to experience it directly.

**Column 2**

- a. adaptive value
- b. insight
- c. language
- d. learning



Visit the Glencoe Science Web site at **science.glencoe.com** to find your biology book and learn more about learned behavior.