Animal Behavior and Reproduction

Types of Behavior

--- Before You Read ---

What do you think? Read the two statements below and decide whether you agree or disagree with them. Place an A in the Before column if you agree with the statement or a D if you disagree. After you've read this lesson, reread the statements to see if you have changed your mind.

<table>
<thead>
<tr>
<th>Before</th>
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<tbody>
<tr>
<td></td>
<td>1. Animals react to their environments.</td>
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<td>2. All animal behavior is instinctive.</td>
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--- Read to Learn ---

What is a behavior?

Dogs receive information about their surroundings by sniffing. Dogs have a much more developed sense of smell than humans have. A dog's nose has about 220 million scent receptors. A human's nose has only about 5 million.

The act of sniffing is a common dog behavior. A behavior is the way an organism reacts to other organisms or to its environment. Behaviors might be carried out by individual animals, such as a dog sniffing. Behaviors also might be carried out by groups of animals of the same species. When a flock of birds flies together, it is a group behavior. Recall that organisms' bodies work to maintain a steady internal state called homeostasis. Behaviors are a way to maintain homeostasis when the environment changes.

Stimuli and Responses

When an animal carries out a behavior, it is reacting to a stimulus (STIHM yuh lus; plural, stimuli), or change. A stimulus can be external or internal. The weather is an external stimulus. Hunger is an internal stimulus. Scents coming from the pavement or a tree are external stimuli for a dog. A dog's response to the stimuli is sniffing.
**Think it Over**

2. **Apply** Circle the internal stimulus.
   a. fewer hours of daylight
   b. a headache
   c. broken pavement on the bike trail

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**Stimuli**

Stimuli can come in many forms and result in different behaviors. Changes in the external environment, such as a temperature change or a rainstorm, can affect an animal's behavior. Hunger, thirst, illness, and other changes in an animal's internal environment are stimuli, too.

**Responses to Change**

Animals respond to changes and maintain homeostasis in different ways. For example, when the weather gets cooler, an organism might respond with a specific behavior. Birds must keep their bodies at the same temperature year-round. During warm weather, a bird's feathers are close to its body. When the weather gets cooler, a bird fluffs its feathers. This traps a layer of air around the bird's body. The air helps keep the bird warm. The cooler weather is the stimulus. The bird's feather fluffing is a response.

Animals also respond to internal stimuli, such as illnesses. If an animal is sick, its body might respond with a fever. The fever increases the animal's body temperature and might help the animal fight a disease. Vomiting is another response to an internal stimulus. If a dog eats something from the garbage, it might vomit to get the material out of its body. This behavior helps the dog maintain homeostasis by removing something that could cause an illness.

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**Stress**

Have you ever seen an animal run away when a human got too close? The human caused the animal to become stressed. The animal reacted by running away. Some animals, such as antelopes, will almost always run away when they feel threatened. When an animal senses a danger, its body prepares to either fight or run away from the threat. This behavior is called the fight-or-flight response.

Not all animals run away from danger. Some animals react in a different way. A wild male horse might attack another male horse in the same area to protect its herd. Some animals, like rats, will run from danger but will fight if cornered.
Innate Behaviors

As you have read, behaviors are responses to some type of stimulus. An animal's behaviors are a combination of those behaviors that are learned and those that are inherited. Inherited behaviors are not linked to past experiences. A behavior that is inherited rather than learned is called an innate behavior.

An innate behavior happens automatically the first time an animal responds to a certain stimulus. For example, when tadpoles hatch, they already know how to swim. They do not have to watch other tadpoles swim. Tadpoles can swim away from danger and find food as soon as they hatch.

Animals with short life spans have mostly innate behaviors. Insects are able to find food and mates and avoid danger early in their lives. A cricket's ability to chirp and a moth's attraction to light are innate behaviors. These types of behaviors make it possible for animals to survive without learning from another animal.

Reflexes

What happens to the pupils in your eyes when you go into a dimly lit room? Soon your pupils get larger. This happens automatically. You don’t have to think about it. This is the simplest type of innate behavior. It is called a reflex. A reflex is an automatic response that does not involve a message from the brain.

Animals have reflexes, too. For example, an armadillo will jump straight upward about 1 m when startled. The sudden movement of the jumping armadillo often startles predators, and the armadillo is able to escape.

Instincts

Reflexes happen quickly and involve one behavior. Some innate behaviors involve a number of steps performed in a specific order. A complex pattern of innate behaviors is called an instinct (IHN stinght). Finding food, running away from danger, and grooming are some behaviors that are instincts in many animals.
Instinctive Feeding Pattern of an Egg-Eating Snake

The egg-eating snake first swallows the egg.

Muscles in the throat push the egg against small bones in the spine, crushing the eggshell.

The snake squeezes the liquid out of the egg and regurgitates the shell.

Instincts, such as web spinning in spiders, may take hours or days to complete and are usually made up of many behaviors. The figure above shows the feeding behavior of an egg-eating snake. The snake swallows the egg, crushes the shell, and regurgitates the shell pieces. Together, all of these behaviors that make up the snake’s eating pattern are an instinct.

Behavior Patterns

Many animal behaviors change in response to the change of seasons. In warm weather, there is plenty of food and water, and animals have no difficulty keeping warm. As the weather becomes cooler, food and water supplies might decrease. Animals might have difficulty surviving.

Migration Some animals move to other locations when seasons change. This instinctive, seasonal movement of animals from one place to another is called migration. Animals migrate to find food and water when the seasons change or to return to specific breeding locations. Many birds migrate long distances. The map on the next page shows where ruby-throated hummingbirds live and one migratory path they use. They fly about 805 km nonstop to reach their summer or winter territory.

Visual Check
6. Describe How does the snake crush an eggshell?

Reading Check
7. Differentiate Explain the difference between reflexes and instincts.
**Hibernation** Other animals do not leave an area when temperatures get colder. Snowy owls and snowshoe hares are able to search for food in winter because of their body coverings. Their feathers and fur provide protection from the cold. Other animals respond to cold temperatures and limited food supplies by hibernating. **Hibernation** is a response in which an animal's body temperature, activity, heart rate, and breathing rate decrease during periods of cold weather.

**Migration of Ruby-Throated Hummingbirds**

Chipmunks, some bat species, and prairie dogs are a few types of animals that hibernate. Hibernating animals live on the fat that was stored in their bodies before hibernation. In some hibernating rodents, up to 50 percent of their body weight is fat.

The internal temperatures of reptiles and other animals change with the environment. These animals do not hibernate. Rather, they enter a hibernation-like state. In areas such as deserts, many animals become less active when temperatures become high. This period of inactivity is called **estivation** (es tuh VAY shun).

**Learned Behaviors**

Service dogs help humans by opening doors or turning on light switches. How are these dogs able to do such amazing things? Dogs and all other mammals, birds, reptiles, amphibians, and fish learn. This means that these animals develop new behaviors through experience or practice. Invertebrates, such as mollusks, insects, and arthropods, also can learn. However, most of their behaviors are innate.
Imprinting

Young birds and mammals usually follow their mothers around. This helps protect them from danger and helps them find food. How do they learn to follow their mothers? **Imprinting** occurs when an animal forms an attachment to an organism or place within a specific time period after birth or hatching. Once a young animal has imprinted itself on an organism, it will usually not attach itself to another. For example, a lamb might become imprinted on a human who fed it from a bottle. Once the lamb is returned to the flock, it might have little interest in the other lambs.

Not all imprinting occurs on organisms. Turtles do not imprint on other turtles. Female sea turtles return to the beach where they were born to lay their eggs. These turtles have imprinted on the beach.

**Trial and Error**

Some learned behaviors, such as buttoning a shirt, take many tries. A child might try several techniques before finding one that works. This type of learning, called trial and error, happens in animals as well. For example, if a monkey is presented with food in a box, the monkey might try to open the box many ways before succeeding. The next time it encounters a similar box, it will remember how to open the box. It will not retry the techniques that did not work.

**Conditioning**

Another way that animals might learn new behaviors is through conditioning. In **conditioning**, behavior is modified so that a response to one stimulus becomes associated with a different stimulus. Some fish learn to come to the surface of the water when a hand is held over the water. They have learned that the hand often holds food. Some birds learn to avoid stinging wasps through conditioning.

**Cognitive Behavior**

Thinking, reasoning, and solving problems are cognitive behaviors. Humans use cognitive behavior to solve problems and plan for the future. Experiments with primates, dolphins, elephants, and ravens suggest that these animals also might use cognitive behaviors. Studies done with ravens showed the birds could figure out how to get meat by pulling a string attached to the food. Other animals appear to show cognitive behaviors such as using tools to get food. For example, sea otters use rocks to crack the shells of clams and mussels.
**Mini Glossary**

**behavior:** the way an organism reacts to other organisms or to its environment

**conditioning:** modifying behavior so that a response to one stimulus becomes associated with a different stimulus

**hibernation:** a response in which an animal's body temperature, activity, heart rate, and breathing rate decrease during periods of cold weather

**imprinting:** the process in which an animal forms an attachment to an organism or place within a specific time period after birth or hatching

**innate behavior:** behavior that is inherited rather than learned

**instinct (IHN stingt):** a complex pattern of innate behaviors

**migration:** an instinctive, seasonal movement of animals from one place to another

1. Review the terms and their definitions in the Mini Glossary. Write a sentence that describes one behavior that conditioning produced in you.

2. Complete each stimulus-response pair in the diagram below with the terms provided.

   - **seasonal change**
     - Stimulus: hunger
     - Response: 

   - **look for food**
     - Stimulus: run
     - Response: migrate

   - **fever**
     - Stimulus: illness
     - Response: 

   - **danger**
     - Stimulus: 
     - Response: 

3. Write one question from your partner's quiz that you answered incorrectly. Then write the correct answer.

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**What do you think NOW?**

Reread the statements at the beginning of the lesson. Fill in the After column with an A if you agree with the statement or a D if you disagree. Did you change your mind?

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*Animal Behavior and Reproduction*
Key Concepts
- How do animals communicate?
- How do animals interact in societies?

Before You Read
What do you think? Read the two statements below and decide whether you agree or disagree with them. Place an A in the Before column if you agree with the statement or a D if you disagree. After you've read this lesson, reread the statements to see if you have changed your mind.

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<td>3.</td>
<td>Some animals give off light to communicate with each other.</td>
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</tr>
<tr>
<td>4.</td>
<td>Animals always fight to protect their territories.</td>
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Read to Learn

Communication
In the last lesson, you read about behaviors in individual animals. Animals have certain behaviors in groups as well. Ants swarm around a piece of food or a dead insect. How do all the ants know where to go? A foraging ant discovers the food. The ant then leaves a trail of chemicals for the other ants to follow. Chemical and other types of communication are important for animal group behavior.

Animals communicate for protection, to locate other members of their group, to warn others of danger, and to find mates. Animals communicate using sound, light, chemicals, and body language. An animal might communicate with other animals of the same species, or it might communicate with different species in the same area.

Sound
Birds, amphibians, reptiles, and mammals are some of the animals that communicate with sound. Dolphins make a wide variety of sounds, including whistles and grunts. Each sound has a different meaning to the other dolphins, such as excitement, play, or danger. Although many animals make calls, some animals produce sound in other ways. The male ruffed grouse uses its wings to beat the air. This creates a drumming noise to attract a mate. Many insects, such as cicadas and crickets, also produce sounds to attract mates.
Light

Some animals use a tool called bioluminescence (BI oh lew muh NE suhnts) to communicate in the dark. Bioluminescence is the ability of certain living organisms to give off light. Chemical reactions in the animal's body produce the light. You might have seen fireflies as they blink out a code to attract females in the area.

Most animals that use bioluminescence live in the ocean. In the dimly lit zone of the ocean, up to 90 percent of fish and crustaceans use bioluminescence. Some fish use bioluminescence to lure prey into their mouths. Others have pockets of bioluminescent bacteria in their cheeks. The light from these bacteria help the fish attract mates.

Chemicals

Many animals produce chemicals, called pheromones (FER uh mohnz), to communicate. A pheromone is a chemical that is produced by one animal and influences the behavior of another animal of the same species. When pheromones are released into the environment, they can signal the presence of danger, food, or mates. They can even communicate the borders of a territory.

Some moths release pheromones into the air that attract mates. Male dogs mark surfaces with pheromones that identify their territory to other dogs. Recall the ants that you read about in the beginning of this lesson. Ants leave a trail of one type of pheromone that leads other ants to food. They produce different pheromones that warn other ants of danger.

Body Language

You can often tell a person's mood by looking at his or her face or body position. The person is using body language to communicate his or her mood. Animals also communicate with body language. Some parrots bob their heads when they are content. They crouch with their heads down when they are sick or stressed. Wolves communicate excitement, aggression, and other moods through facial expressions. This body language helps an animal communicate with other members of its species. The figure at the top of the next page illustrates some wolf expressions.
Wolf Body Language

Aggression:
- ears forward
- narrowed or staring eyes
- body tense and upright

Playfulness:
- ears relaxed
- wide open eyes
- relaxed body

Fear:
- ears laid back
- narrowed eyes
- body crouched low

Visual Check
3. Interpret  If a wolf has narrowed eyes and ears laid back, what mood is it communicating?

Societies and Behaviors
Have you ever seen a flock of birds flying together? Animals live in groups for many reasons, such as for protection and obtaining food. A society is a group of animals of the same species living and working together in an organized way.

The societies of some animals have a strict structure. Members have specific roles. Spotted hyenas live in large groups of up to 90 members. The members work together to hunt and defend their kill. Other animal societies are less organized. Each member might serve different roles. Some species of animals stay close together only at certain times of the year, such as for breeding or migration.

Dominance and Submission
Dominance determines the organization of spotted hyena societies. This means that the members are organized according to their social status compared to the status of other members. The animal with the highest social status, the dominant animal, has power over the animals below it. Animals with a lower status than a dominant animal are submissive to that animal. In a spotted hyena society, females are most dominant, then cubs, and then males. Dominance also is important in groups of other animals, such as wolves, chickens, and some primates.
Dominant Behaviors  Dominance also might help reduce fighting among animals living in a society. For example, hyenas rarely hurt each other while fighting with other members of their society. Less dominant members usually submit to, or stop fighting, more dominant ones.

Submissive Behaviors  A submissive animal might mimic the behavior of a young animal to show that it is not a threat. For example, submissive wolves roll over or crouch. Less dominant hens move out of the way of the dominant hen.

Territorial Behaviors

Animals might set up and defend an area for feeding, mating, and raising young called a territory. Some insects and most vertebrates have a territory. Some animals identify their territories by making noises. Others establish their claim to a territory by making physical changes, such as by scraping bark off trees or marking their territory with pheromones, urine, or feces.

Animals defend the borders of their territory from other members of their species. If the borders are crossed, the animal first might attempt to scare or intimidate the invading animal. For example, cats puff up their fur and appear more threatening to intruders. If the animal does not leave, the defender might use aggression. Aggression is a forceful behavior used to dominate or control another animal.

When animals fight another member of the same species, they usually do not try to cause serious harm to the other animal. For example, giraffes have the ability to kick fiercely. They use this ability to defend against predators such as lions. These attacks can be deadly. However, when two male giraffes show aggression toward each other, they push at each other with their necks. This behavior is common and rarely fatal.

Courtship

Animals have specialized behaviors that help them find and attract a mate. They often compete with others of the same species for a mate. Some animals, such as female gypsy moths, release pheromones that attract males. Other animals, such as frogs and birds, use mating songs that gain the attention of mates. Some male birds bring the female a gift of food. A male tern brings a fish to a female tern. Male fiddler crabs wave their enlarged claws and skitter across the ocean floor to get the attention of a female fiddler crab. Male bowerbirds build elaborate nests during courtship. They add brightly colored objects to the nests to attract a mate.
Mini Glossary

aggression: a forceful behavior used to dominate or control another animal

bioluminescence (BI oh lew muh NE sunts): the ability of certain living organisms to give off light

pheromone (FER uh mohn): a chemical that is produced by one animal and influences the behavior of another animal of the same species

society: a group of animals of the same species living and working together in an organized way

territory: an area for feeding, mating, and raising young that animals set up and defend

1. Review the terms and their definitions in the Mini Glossary. Write a sentence that describes the organization of a spotted hyena society.

2. Identify ways that animals communicate and give an example of each method.

Animal Communication Methods

- sound
- Example: Dolphins whistle or grunt.
- Example:
- Example:
- Example:

What do you think NOW?

Reread the statements at the beginning of the lesson. Fill in the After column with an A if you agree with the statement or a D if you disagree. Did you change your mind?

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END OF LESSON