Objectives

- ➔ Explain what influences animal behavior
- ➔ Describe how group behavior can increase the chances of survival for individuals
- ➔ Explain innate and learned behaviors in animals

Key Terms

Animal behavior
Stimuli
Hibernation
Migration
Learned behaviors
Innate behaviors
Instinct
Group behavior
Dominance hierarchy
Altruism

Animal Behavior and Survival

Have you ever noticed how your dog drools when it sees you eat? Or how the birds disappear in the winter? Or how ants are always found together? These behaviors are not coincidences. Animals behave for very specific reasons, such as survival or reproduction. Let's take a closer look at animals and why they behave the way they do.

Animal Survival

Animal behavior describes the ways animals interact with members of their own kind, with other animals, and with the environment. Animal behavior includes adaptations for survival for these four basic reasons: the need for food and water, the need to reproduce, the need for social interaction, and the need to avoid predators.

Animal behavior can also be described by reactions to various internal or external cues called **stimuli.** For example, with the change of seasons from fall to winter, bears go into **hibernation** or an extended period of sleep**.** With the harsh environment that winter brings, bears will find a den where they can hibernate in order to conserve energy and stay out of the cold. **Migration** is another example of animals responding to an external stimulus. Animals migrate with seasonal changes in response to food sources, day length, and external temperatures. Internal cues can include an internal clock where animals are only awake certain times of the day. It also includes hormonal changes that will cause an animal to mate. Reproduction, however, can also be triggered by the external stimulus of seeing a mate.

The Nature of Science in Action

Cause and Effect

Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.

Empirical evidence is obtained through observation. Scientists observe animal behavior as well as collect data to develop explanations on cause and effect.

Individual Behaviors

Some behaviors seen in animals are acquired from environmental influence and experience and are called **learned behaviors.** However, some are instinctive behaviors that are acquired through inheritance and these are called **innate behaviors.** Both of these types of behaviors help enable individuals to have a higher chance of survival. It is important to note that individual behaviors are closely intertwined with group behaviors and one will impact the other.

Learned Behaviors

Learning is a behavior change that results from interaction with the environment. For example, a newborn kitten has no prior experience. Its behavior after birth is based entirely on **instinct** (innate). As the kitten grows, it will acquire new behaviors based on what it has experienced through trial and error, observation of other individuals, or memory of past events. All animals learn certain behaviors. Individuals or groups learn behavior that proves to be beneficial to their survival, such as hunting strategies, using tools, and flight.

Sometimes a stimulus is repeated, and an animal will eventually learn to stop responding to the stimulus. This is called habituation. For example, if you buy a pet bird, you may notice the bird is often scared when you try to enter or come near its cage. However, if you repeatedly try to hold the bird, it will eventually learn that you do not pose a threat and will stop being scared when you try to hold it.

Figure 1

Imprinting is a type of learned animal behavior where an animal forms an attachment to another animal or object at a critical moment in its life. One of the best examples of imprinting is that of a duckling. You have probably seen ducklings following their mother wherever she goes, as shown in figure 1. When ducklings hatch from their eggs, they will become attached to the first moving object they see, which is normally their mother. However, it is known that these ducklings can also become imprinted by other species, even humans, if they are the first object that they see.

Classical conditioning happens when an animal associates two stimuli to build a learned response. If you adopted a cat, and you opened a bag of cat food, you may notice that it starts meowing when it smells the food. After many weeks, your cat will start meowing and running to you before you even finish opening the bag of cat food. The reason for this is that your cat has been conditioned to respond to the sound of the bag of cat food instead of just the smell of the cat food.

When animals are given rewards or consequences in response to learned behavior, they are undergoing operant conditioning. Teaching your dog tricks by giving them rewards is an example of this type of learned behavior. If you have ever been to the zoo or an attraction that has animal shows, such as the one shown in figure 2, you will see animals doing tricks that were all learned through operant conditioning.

Figure 2

Innate Behaviors

The innate behavior of an animal is part of its genetic programming. Just as organisms inherit physical traits, such as body color, they also inherit many different behaviors. Similarly, just as genes are subject to change, so is behavior since it is encoded in an organism's DNA. These changes can occur through mutation, recombination, and natural selection. Innate behaviors occur naturally in all members of a species whenever they are exposed to a certain stimulus. Innate behaviors are instinctive behaviors that do not have to be learned or practiced.

Some examples of innate behaviors include dogs drooling when exposed to food, newly-hatched sea turtles automatically moving toward the ocean, and honeybees communicating by dancing in the direction of a food source. Without any prior, formal instruction, bees perform the waggle dance to inform other hive members where flowers can be found. The direction is given in relation to the sun, and the distance is indicated by the number of waggles that are danced. The faster the waggles happen, the more excited the dancer is about the food source. If there happens to be two or more waggle dancers performing at the same time, the bees dance even faster to convince the other bees about their flower selection. Some other examples of innate behavior include animal fighting, animal courtship behavior, internal escape functions, migration, and the building of nests.

Connect to Your World

How would the world be different if animals weren't born with innate behaviors?

Group Behaviors

Why do you think animals travel in packs? Are they just bored and want to be around friends, or is there something more to it? Behaviors that occur within or between groups of organisms are called **group behaviors.** Animals that live and work in groups increase their chances of surviving long enough to reproduce. Wolves are a perfect example of this. Teamwork for wolves is the secret to success. Despite individual differences, they will work out feuds for the common good of the pack. They would rather help each other and get less of what they want or need than risk working alone and not getting anything at all.

Safety in Numbers

Look at the picture of the stampeding zebras in figure 3. When one zebra begins to run, the rest of the group will follow. Why do you think they are running? Or rather, what do you think they are running from? The zebras are most likely stampeding to avoid predation, which means being eaten by a predator. Will every single zebra survive the hunt? Probably not; however, the zebra group as a whole will survive and its members will be able to produce new zebras in the future to maintain its population.

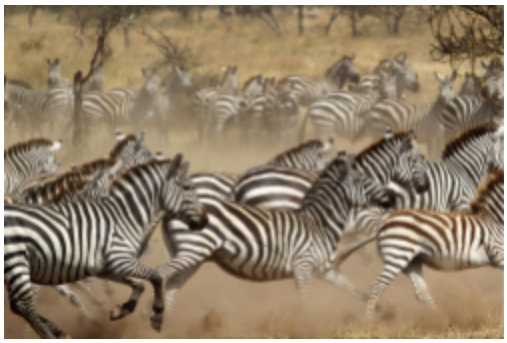

Figure 3

Groups of birds, such as geese, fly together in a large group called a flock. Geese do not have to hunt prey but they do have to travel often and fly long distances for food. The flock flies together in a V formation. The lead goose has to fly the hardest because of the air resistance pushing it back. The geese flying off the end of the wing tips of the goose ahead of them have an easier time because the air streaming off the wings of the lead goose helps give them a boost. This makes it a little easier for the group of geese to fly. Periodically, the lead goose falls back in the V and another goose takes the lead. This sharing of the work is a group behavior that allows the flock to travel farther.

Figure 4

What other animals do you think find safety in groups? Fish traveling in schools do this (see figure 4). Dolphins swim in pods. Dolphin pods are even known to drown sharks by taking turns ramming them in their sides, targeting their gills.

More Efficient Hunters

Prey tend to use group behaviors for protection, while predators use group behaviors to increase their success in the hunt. Wolves, for example, work together and hunt as a pack. The average size of a wolf pack is 5 to 11 members, but it can be larger. The pack travels constantly, looking for prey. Some wolves will lie in wait in front of the prey to set a perimeter, while others drive the prey from behind to surge in the direction of the trap (the waiting wolves). Once caught, the prey is shared among the wolves.

The Nature of Science in Action

Scientific Knowledge is Open to Revision in Light of New Evidence

Scientific argumentation is a mode of logical discourse used to clarify the strength of relationships between ideas and evidence that may result in revision of an explanation.

As scientists obtain new information and share it with colleagues, discussion is used to help understand and revise conclusions that explain the phenomena being studied.

Defined Roles

Because animals in groups rely so heavily on each other for safety or food, they have evolved to have more clearly defined roles. For example, how do you think lions act in a group? The male lion is most likely the only adult male member of his pride (pack) and exerts dominance over the females. Any male offspring are normally forced to leave the group around the age of two. It is important to note that most groups will also have a lead female member. Together, the lead male and female will be given preferential treatment to resources such as food and potential mates. This ranking system behavior is known as a **dominance hierarchy.**

What benefit would a dominance hierarchy have for the members of a group? For most members, this hierarchy actually affects them negatively (ex: increased competition for the remaining resources, lesser mating options, etc.). However, for the good of the entire pack, most carnivores operate this way to ensure the best genes are passed onto future generations.

Cooperative Behavior

Do all animals work together in a dominance hierarchy? Not at all. Instead, many animals work cooperatively to ensure the betterment of the whole. The success of the individual relies on the cooperative behavior of the other participating individuals in its group.

Figure 5

Bees display this perfectly. Each bee has a specialized role to play in the production of honey and maintenance of the hive. Some bees, such as the hive's guard bees, will even give their lives to protect the whole. This behavior of fully committing to the group at the expense of an individual member's needs is called **altruism**. Altruism is very prevalent in insect colonies and other invertebrates. Figure 5 shows a colony of bees working toward a common goal in the hive.

Invertebrate social behavior refers to the interaction that invertebrates have with other members of the population. This type of social group interaction has its advantages as well as its disadvantages. A society is described as a group of organisms of the same species, organized in a cooperative manner, which extends beyond sexual contexts and parental care. Examples of invertebrates that live in social groups are ants, bees, termites, wasps, snapping shrimp, spiders, and parasitic flatworms.

More Complex Interactions

Not surprisingly, vertebrates have more complex interactions. The chimpanzees in figure 6 are demonstrating this more complex social behavior by helping to groom each other. Chimps also cooperatively rear the group's young. Other examples of more complex interactions include animals with overlapping generations living in a permanent location (as opposed to a seasonal one), cooperative foraging or hunting together, cooperative defense from predators and competitors, and social learning, such as a young chimpanzee learning by observation to use a twig to fish for termites.

Figure 6

Even though some animals might be similar organisms, there are many environmental stimuli that can change how animals interact. Wolves, for example, are prime examples of animals that would rather participate in a pack than alone. Even though dogs are similar to wolves, they would rather avoid conflict and work alone. Could this be due to the fact that dogs are now domesticated by humans? This is a great example of the complexity of animal behaviors and how they have evolved over time. Animal behavior continues to be studied and evaluated by humans so we can have a better understanding of animal interactions.

Beyond the Classroom

Animal Behavior Hunt

Animal behaviors may seem far removed from human behavior but are they really? Have you ever noticed that when someone near you yawns, you tend to yawn as well? Have you noticed that when a dog yawns, other animals in the room yawn as well? This is one way animals are thought to show empathy. We know as humans we have to teach our young things that will keep them safe. Animals are thought to do the same. For example, meerkats eat scorpions, but before a young meerkat is allowed to hunt scorpions, older animals in the group will bring back dead ones and let the young practice so they can learn how to avoid a deadly mistake when trying to hunt a live one. Have you ever been at a crowded place and seen a group of people start to hurry in one direction and before long more people are heading that same direction? You can ask why or where they are going and most will not know, they are just following the crowd, assuming there is something to see. The same is true of a flock of birds. Have you ever noticed how a large flock will head one direction, then another, and then suddenly land? The birds are not believed to have any knowledge or reason to do this, they just do.

So are human and animal behaviors so different? Try going on a people-and-animal-watching walk. During your walk, look for specific behaviors that you see humans doing and then watch the animals. Are there any behaviors you see that are being mirrored?

During your outing, focus on animals that are interacting as a group. Discuss what benefits they have for behaving that way. Also, note any animal that seems to not be a member of a pack. Discuss what benefits, if any, these animals have for not participating in a group.

After you have made your observations, write an article explaining your findings.

Here are some questions to discuss in your article.

- How do animals interact in a group?
- What benefits does membership in a group give animals?
- Do all members of the group interact the same way? Explain your thinking.
- Do animals tend to focus on individual members within their group or on the group as a whole?

Animal Behavior and Survival Review

Reviewing Key Terms

Use each of the following terms in a separate sentence.

1. Hibernation
2. Group behaviors
3. Cooperative behaviors
4. Schooling
5. Innate behaviors

Use the correct key term to complete each of the following sentences.

1. _____ is when the lead male and female are given preferential treatment to resources such as food and potential mates.
2. The behavior of fully committing to the group at the expense of an individual member's needs is called _____.
3. Some behaviors seen in animals are acquired from environmental influence and experience which are called _____.

Reviewing Main Ideas

1. When animals work together for the betterment of the group, this is known as–
   a. group behavior.
   b. cooperative behavior.
   c. innate behavior.
   d. social behavior.

2. When a group of organisms from the same species work together cooperatively, this is known as which of the following?
   a. Society
   b. Cooperative behavior
   c. Learned behavior
   d. Altruism

3. Which of the following is an example of a learned behavior in animals?
   a. Dogs drooling when exposed to food
   b. Birds migrating
   c. Spiders catching food in their webs
   d. A baby bird taking flight for the first time

Making Connections

1. Describe the relationship between group and individual behaviors in animals.

2. Compare and contrast defined roles and cooperative roles in animal behavior.

Open-Ended Response

1. Explain the benefits of animals working together in groups.

2. Describe innate behaviors and provide an example.

3. Describe learned behaviors and provide an example.