
The Development of Behavior

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READING ASSIGNMENT

Read this assignment. Though you've already read the textbook reading assignment that accompanies this assignment, you may want to refer back to your textbook.

Instinct and Adaptability

In recent decades, researchers have come to understand that animal behavior can't simply be broken down into instinctive or inherited patterns and learned activities. Inherited patterns affect an animal's ability to learn, allowing it to adapt more readily to certain situations. At the same time, studies demonstrate that environmental changes can modify genetically inherited behavior patterns.

Even simple organisms demonstrate adaptive abilities at various stages in their life cycles. Many ethologists speculate that the force of natural selection has coded the ability to learn and adapt into the inherited behavior patterns of most known species. In this assignment, you'll explore the various subtle ways instinct and adaptability interact to create complex patterns of animal behavior.

Inheritance

Inherited characteristics have huge effects on animal behavior. Laboratory experiments have shown that certain strains of mice are generally more placid than others. The enormous variety of dog breeds, each with its particular specialty, results from centuries of deliberate, selective breeding. Some dogs have been bred to refine their ability to hunt, others their ability to herd other animals. Some act as wary guards, protecting home and family; others, bred for friendliness and even tempers, welcome strangers quite readily.

Every species displays a range of behavior patterns typical of its members. Some patterns are unique to one species. The courtship songs of individual species of birds, for example, differ widely from one another. Such differences arise, in large part, because the courting mates need to recognize members of their own species quickly and easily.

Other types of behavior, however, may not differ quite so widely among related species. For instance, the majority of bird species fly. A wide range of species also feed their young by regurgitating food when the chick pecks at a certain spot on the parent's beak.



Many adult birds automatically regurgitate predigested food when chicks peck at a certain spot on the underside of the parent's beak.

Early ethologists referred to stereotypical and predictable behaviors as *fixed action patterns*. Such patterns were assumed to be the same among all members of the same species. Some early classical ethologists went so far as to propose that this behavioral consistency proved the hypothesis that certain behaviors were instinctive.

You'll recall from earlier in this lesson that inherited or genetically coded responses to environmental stimuli are also called instincts. Instincts enable members of a species to respond appropriately to a wide range of situations in the natural world. Instinctive behaviors are often characteristic patterns of feeding, mating, parenting, and displays of aggression. Natural selection develops and refines these behavior patterns in each species.

Instincts permit animals to perform very complex behaviors without learning them through trial and error. Honeybees, for example, have extraordinary navigational and communication instincts. A worker bee may fly a quarter-mile or more from the hive to find flowers that serve as a good nectar source. The sun usually directs its flight, but a worker bee can navigate accurately even on a cloudy day. When it finds a good source of food, the bee can calculate a precise course back to the hive, even allowing for wind and the apparent movement of the sun.



A honeybee has an innate capability to navigate from food sources to its hive.

Upon returning to the hive, the bee enacts a complex pattern of movements, often referred to as a *dance*, that tells the other bees how to go directly to the food. Though they learn the route from the worker bee's dance, the other bees rely on their genetic predisposition to such learning. Thus, instincts play an important role in developing unique or creative behavioral responses to the environment.

Imprinting

Konrad Zacharias Lorenz (1903–1989), one of the founding fathers of modern ethology, dedicated much of his research to identifying various kinds of fixed action patterns. Lorenz discovered that a young animal follows its parents because of auditory or visual cues the parents present. More remarkably, however, Lorenz realized that any object, including a human being, could elicit the same response by exhibiting the cues. This acquisition in the very young of these fixed action patterns is called *imprinting*.

Early research suggested that imprinting enables young animals to identify with their species. Later experiments, however, demonstrate that almost all chicks reared by human caretakers for the first few days after hatching actually prefer these caretakers to members of their own species. Experts now conclude that imprinting allows newborns to recognize one or both parents—or parental substitutes—as individuals.



Imprinting has created a bond between these young ducklings and their mother.

The distinction is especially crucial in the wild. The adult of some species may kill a young animal that's not its own child. To survive, an immature animal must recognize its own parent and escape from any noticeably different creature. Such rapid attachment to the first few creatures it encounters indicates that an animal's imprinting usually occurs during a specific stage early in its life, often called the *sensitive period*.



Most kittens or puppies exposed to caring human contact readily adapt to life in a human household.

Among cats and dogs, the sensitive period typically extends from the second or third to the twelfth week after birth. Animals adapt most readily to the humans and other animals they encounter during this period. Newborn cats and dogs exposed to caring human contact during this period adapt well to life in a human household. Scientists call this adapting process *socialization*.

Young animals who don't socialize with people—or who experienced cruelty or indifference at the hands of humans—often adapt poorly to human households. By the same token, a kitten or pup that has no contact with its kind during the sensitive period will often relate poorly to members of its own species.

Learning

More detailed research has shown that fixed action patterns don't necessarily eliminate the role of learning in behavioral development. The bill of a herring gull, for example, is marked by a red spot that the hungry chicks peck to make their parents regurgitate partially digested food. While this highly specific pecking behavior starts quite early in a herring gull chick's life, researchers have noticed that the chick first pecks at a great many objects. Herring gull chicks have pecked at wooden rods moved back and forth over their heads and at models of the heads and beaks of a great variety of birds. After a few days of trial and error, however, the chicks confined their pecking efforts to the red spot on the adult's beak, because only this behavior produces food.

Learning occurs on many levels and in many forms. Researchers have cataloged several basic types of learning common to a wide range of species. These forms are commonly referred to as:

- Habituation
- Instrumental learning
- Recognition of individuals
- Mapping the environment

Habituation is the process of learning that certain objects and events have little bearing on survival and can thus be ignored. A constant state of alarm or expectation would ruin an animal's mind and body, and raw or unfiltered experience would produce this constant readiness. Habituation allows an animal

to filter out the many sights, scents, and sounds that would otherwise overwhelm it.

Learning to distinguish objects or events useful for survival is usually a more complicated process of trial and error. Learning by trial and error, often called *instrumental learning*, unfolds as an animal discovers and repeats specific actions. The animal learns for itself that certain choices produce a reward, like pleasant-tasting food, and others avert punishment, like injury by predator or poisonous bait.

As you know, imprinting shapes the development of primary bonds between a young animal and its parent or caretaker. *Recognition of individuals* is a more complex process that allows animals to distinguish their place in a broader social context. In the wild, for example, young animals learn where they fit into the larger group by playing, grooming, feeding, and other common group interactions.



Young animals learn their place in the group through interacting with other group members.

Mapping, sometimes referred to as *spatial learning*, is the process an animal uses to assess a new environment. Mapping is essential for survival if an animal is to locate food and water or find its way back home. Upon entering or being thrust into a new environment, therefore, almost all animals thoroughly investigate the strange territory. This exploration combines sight and smell to locate such important landmarks as food and water, a safe place to sleep, and an appropriate place to deposit bodily waste.

Animals like dogs, cats, and rodents use the aforementioned glands on their paws and around the faces to deposit scent traces along their exploratory routes. These traces serve as scent maps that help the animal retrace its steps to its starting point. They also serve as an animal's claim to the territory—often a potent warning to other animals to keep their distance.

As you can see, learning and instinct both play crucial roles in the development of behavior.