34-1 Elements of Behavior



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Stimulus and Response

- Stimulus and Response
  - Biologists define **behavior** as the way an organism reacts to changes in its internal condition or external environment.
  - A behavior can be simple or complex.

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Stimulus and Response

- Behaviors are performed when an animal reacts to a stimulus.
- A **stimulus** is any kind of signal that carries information and can be detected.
- For example, hunger is an internal stimulus that may prompt you to eat. The sound of a ringing phone is a stimulus that may prompt you to answer the phone.

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Stimulus and Response

- A single, specific reaction to a stimulus is called a **response**.
- A behavior may consist of more than one response.
- For example, a shark may respond to the movement of prey by swimming toward the prey and attacking it.

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Stimulus and Response

- Types of Stimuli
  - Animals respond to many types of stimuli, such as light, sound, odors, and heat.

- What produces behavior in animals?
- How Animals Respond
    - When an animal responds to a stimulus, its body systems—including the sense organs, nervous system, and muscles—interact to produce the resultant behavior.

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Stimulus and Response

- Once the senses detect an external stimulus, information is passed along nerve cells to the brain.
- The brain and nervous system process the information, and direct the response.
- Animals with simple nervous systems have simple behaviors.
- Animals with complex nervous systems have more complicated and precise behaviors.

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Behavior and Evolution

- Behavior and Evolution
  - Animal behavior is important to survival and reproduction.
  - Many behaviors are influenced by genes and can be inherited.
- Behaviors may evolve under the influence of natural selection.
- Organisms with an adaptive behavior will survive and reproduce better than organisms that lack the behavior.
- After natural selection has operated for many generations, most individuals will exhibit the adaptive behavior.

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Innate Behavior



- What is an innate behavior?
- **Innate Behavior**
  - An innate behavior is an instinct, or inborn behavior.
  - Innate behaviors appear in fully functional form the first time they are performed, even though the animal may have had no previous experience with the stimuli to which it responds.

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Innate Behavior

- **Examples of innate behavior:**
  - the suckling of a newborn mammal
  - the weaving of a spider web

- Innate behaviors depend on internal mechanisms that develop from complex interactions between an animal's genes and its environment.

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Learned Behavior



Learned Behavior

- Many animals can alter their behavior based on experience. A change in behavior that results from experience is called **learning.**
- Learning is also called acquired behavior.

- **What are the major types of learning?**
- The four major types of learning are:
  - **habituation**
  - **classical conditioning**
  - **operant conditioning**

  insight learning

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Learned Behavior

- Habituation
  - **Habituation** is a process by which an animal decreases or stops its response to a repetitive stimulus that neither rewards nor harms it.
  - For example, a worm may stop responding to the shadow of something that neither provides the worm with food nor threatens it.
  - By ignoring a nonthreatening or unrewarding stimulus, animals can spend their time and energy more efficiently.

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Learned Behavior

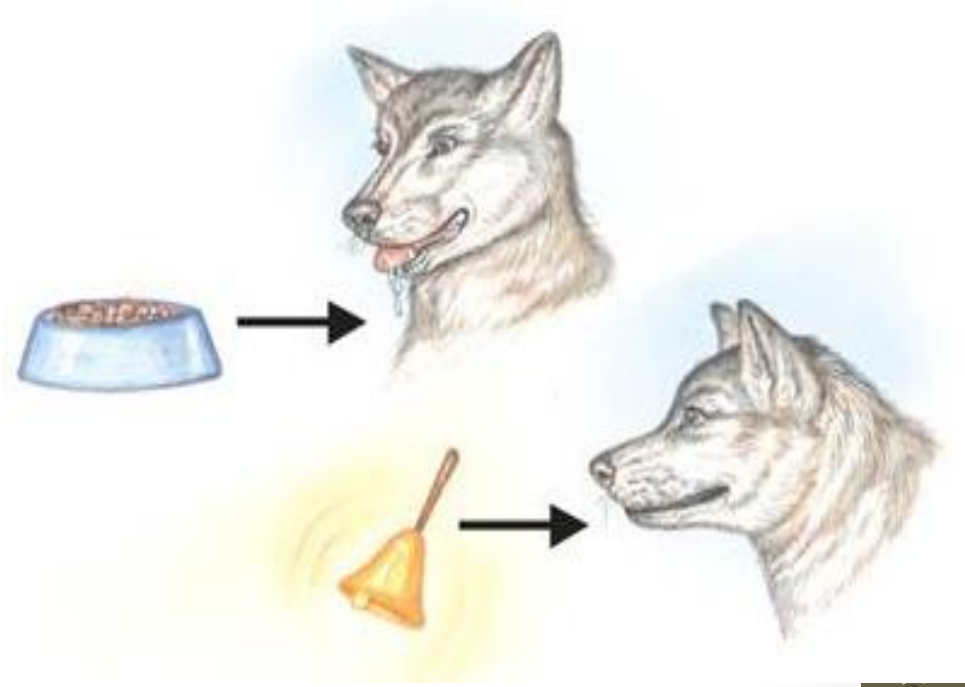
- **Classical Conditioning**
  - Any time an animal makes a mental connection between a stimulus and some kind of reward or punishment, it has learned by **classical conditioning.**
  - An example of classical conditioning is the work of Pavlov and his dog. (Pavlov's experiment is shown on the next few slides.)

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Learned Behavior

1. **Before Conditioning**

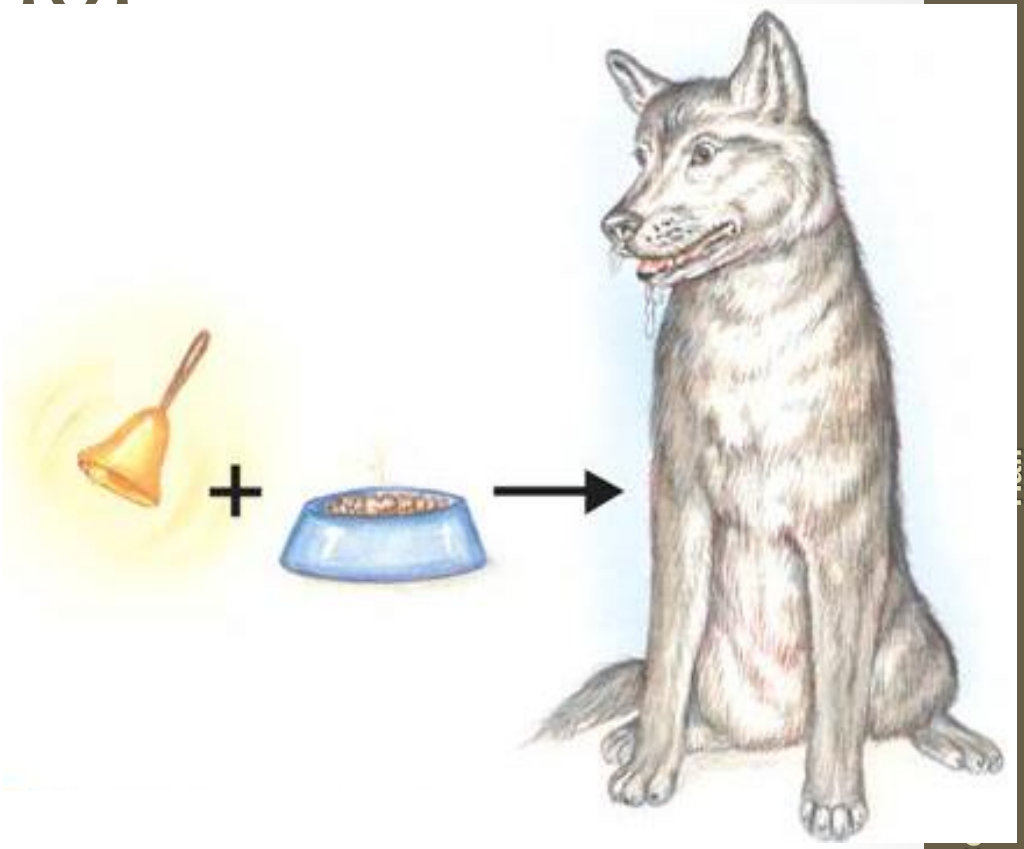
- When a dog sees or smells food, it produces saliva.
- Food is the stimulus and the dog's response is salivation.
- Dogs do not usually salivate in response to nonfood stimuli.



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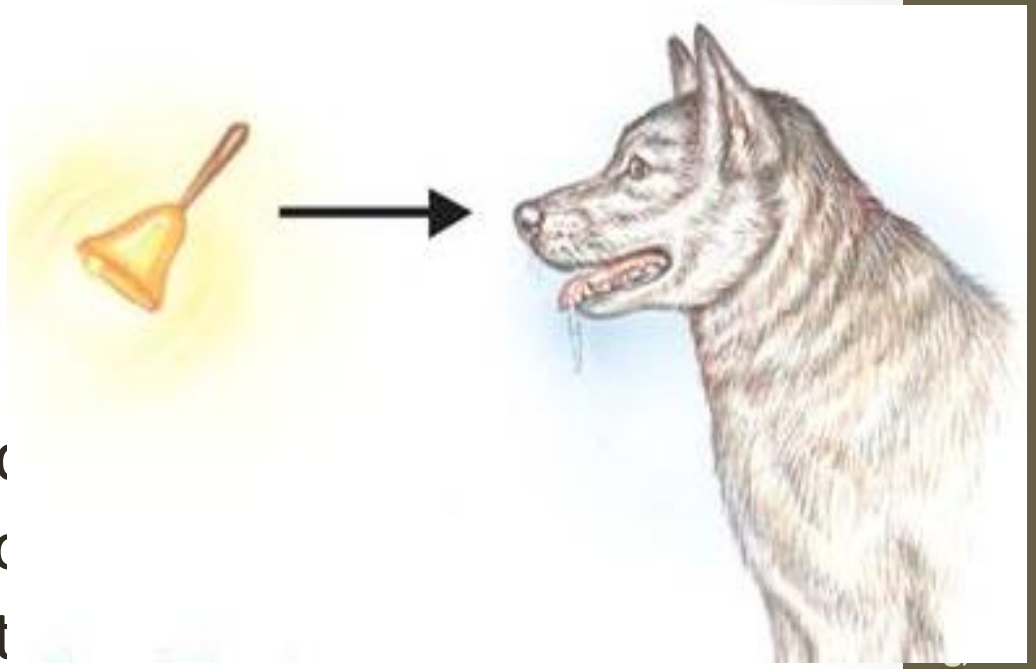
Learned Behavior

- **2. During Conditioning**
- By ringing a bell every time he fed the dog, Pavlov trained the dog to associate the sight and smell of food with the ringing bell.



Learned Behavior

- **3. After Conditioning**
- When Pavlov rang a bell in the absence of food, the dog still salivated.
- The dog was conditioned to salivate in response to a stimulus that it did not normally associate with food.



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Learned Behavior

- Operant Conditioning
  - **Operant conditioning** occurs when an animal learns to behave in a certain way through repeated practice, in order to receive a reward or avoid punishment.
  - Operant conditioning is also called trial-and-error learning.

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Learned Behavior

- Operant conditioning was first described by B. F. Skinner.
- Skinner invented a testing procedure using a "Skinner box."
- A Skinner box has a colored button that, when pressed, delivers a food reward.
- After an animal is rewarded several times, it learns that it gets food whenever it presses the button.

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Learned Behavior

- Insight Learning
  - **Insight learning**, or reasoning, occurs when an animal applies something it has already learned to a new situation, without a period of trial and error.
  - Insight learning is common among humans and primates.
  - If you are given a math problem on an exam, you use insight learning in order to solve it.

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Instinct and Learning Combined

- Instinct and Learning Combined
  - Most behaviors are a combination of instinct and learning.
  - Young white-crowned sparrows have an innate ability to recognize their own species' song. To sing the complete version, the young birds must first hear it sung by adults.

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Instinct and Learning Combined

- Some young animals learn to recognize and follow the first moving object they see during an early time in their lives. This process is called **imprinting**.
- Imprinting keeps young animals close to their mother, who protects them and leads them to food.
- Once imprinting occurs, the behavior cannot be changed.
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Instinct and Learning Combined

- Imprinting can occur through scent as well as sight.
- Salmon imprint on the odor of the stream in which they hatch. When they are mature, salmon remember the odor of the stream and return there to spawn.

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END OF SECTION