

**BIOLOGY STUDY GUIDE**  
**CHAPTER 3 – STUDYING ANIMAL BEHAVIOR**

- **Animal behavior** = what an animal does as it interacts with its environment
- Recall from chapter 2 that there are two ways to study life:
  - o Discovery science (observation and description)
  - o Hypothesis-based science (testing explanations with experiments)
    - *Most studies of animal behavior involve both discovery science and hypothesis based science.*
      - You observe and describe in writing how the animal circles a tall tree many times before lying under it (discovery science).
      - You then ask why the animal must circle the tree before lying under it. You form a hypothesis (“the animal circles only trees that are taller than ten feet”) and then design an experiment to test the hypothesis. (This is an example of hypothesis – based science.)
- **Observing behavior in natural environments:**
  - o Understand that it is *very* difficult to perform a controlled experiment in nature (an experiment where, for example, two animals are EXACTLY the same except that one is given only high fat food while the other hunts for its normal diet).
  - o Jane Goodall performed landmark studies about chimpanzee behavior using only a notebook to record her observations and binoculars.
- **Designing experiments on Animal behavior:**
  - o Experiments are designed to test hypotheses.
  - o How can you conduct experiments *in nature* (that is, NOT in the lab)?
    - See page 50 of your text for an example of an experiment in nature.
- **Immediate and Ultimate Causes of Behavior:**
  - o An **immediate cause** explains a particular behavior an animal has when it interacts with its environment *in the present moment*.
  - o An **ultimate cause** explains how an animal ever developed that certain behavior. Ultimate causes are explanations based on evolution and adaptations (natural selection).
- **Both genes (nature) and environment (nurture) affect behavior:**
  - o **Innate behavior** = a behavior that is performed correctly by all individuals of a species, even if they have no previous experience with the behavior.
    - Example: our reflexes can be considered innate behaviors; the gag reflex for instance, is an example of an innate behavior in a human

who does not have a nervous system disorder. (If you put your toothbrush too far back in your throat, you will gag.)

- A good way to remember innate behavior: **IN**nate behaviors are the ones you know even as an **IN**fant.
- *Important: Innate behaviors are not ONLY determined by the genes you get from your parents. Even the most innate, basic behavior is influenced somewhat by the environment.*
  - For instance, a baby can have the right genes to properly form his nervous system, but if he did not receive proper nutrition from his mother when she was pregnant, he may end up with nervous system disorders and therefore be unable to perform the gag reflex.
- **Fixed action pattern** = a type of innate behavior that always occurs as an unchangeable sequence of actions.
  - A fixed action pattern can **ONLY** occur from start to finish; an animal cannot begin the pattern in the middle. Also, an animal cannot stop a fixed action pattern before he reaches the end.
  - See p. 54 for example.
- **Rhythms of Behavior**
  - Rhythmic behaviors are simply regularly repeated behavior patterns.
  - Examples of rhythmic behaviors: sleep/wake cycle, migration patterns in the fall and winter, etc.
  - **Circadian rhythm** = an innate rhythm with a cycle of 24 hours; circadian rhythms are controlled by an organism's internal "biological clock".
- **Investigating the Interaction of Genes and Experience**
  - Remember that innate behaviors are inherited **BUT** the behaviors can be changed/modified based on the influence of the environment. (See beginning of this page.)
- **Learning is behavior based on experience:**
  - Learning = a change in an animal's behavior resulting from experience
  - **Habituation** = a simple form of learning in which an animal learns **NOT** to respond to a repeated, unimportant stimulus
    - Example: You get used to the sound of a clock ticking in a room and learn to disregard the sound entirely.
    - Habituation is helpful because it allows an animal to focus its energy on important changes in the environment.
  - **Imprinting** = learning that is limited to a specific time period in an animal's life and is usually irreversible
    - Example: baby learning to walk
    - Imprinting takes place during a specific time period in an animal's development known as the *critical learning period*.
  - **Conditioning** = learning that a particular stimulus or response is linked to a reward or a punishment

- Example: cat hears a can opener and knows it's time to eat.
- **Classical conditioning** = a meaningless stimulus is associated with a reward. (Pavlov's famous experiment where dogs were trained to associate a bell ringing with meal time; every time the bell rang, the dogs would drool, even if food was not right in front of them.)
- **Operant conditioning** = also known as "trial-and-error" learning
  - An animal learns that one of its own behaviors has a positive or negative effect. The animal will repeat the behavior if it is rewarded. The animal will avoid the behavior if it is harmed.
  
- **Insight** = the ability to respond to a new situation without previous experience.
  - Insight is a complex and sophisticated form of learning that requires the ability to analyze problems and test possible solutions.
  
- **Play behavior** = when animals engage in fun, harmless behaviors with each other
  - Why do animals play?
    - Practice behaviors necessary for survival
    - For exercise
  
- **Social behaviors are important adaptations:**
  - **Social behaviors** = interactions between two or more individuals of the same species
  - **Types of social behaviors** =
    - **Competitive behaviors** – competing for food, space, mates, etc.
      - **Aggressive behaviors** – any behavior involving actual threats or physical fights
      - **Dominance hierarchy** – a ranking of individuals in a group from strong to weak (often the leader in a pack of dogs is called the "alpha male", for example).
      - **Territorial behavior** – a **territory** is an area that individuals defend in order to keep out other members of the same species. Example of territorial behavior: an animal urinates on the ground to "mark" its turf.
    - **Courtship behavior** – courtship rituals are complex behaviors that let another animal know that the courting animal is ready to mate. Example: a male peacock showing a female its feathers.
    - **Communication** – signaling among animals (using sounds, smells, etc.)
    - **Cooperation** – when individuals work together in a way that helps the entire group.