

KEY TOPICS:

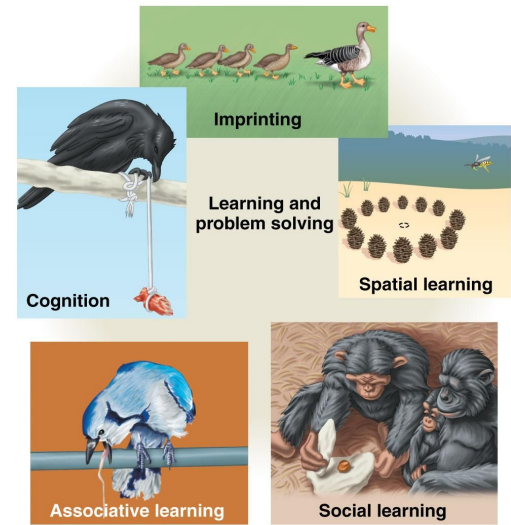
- Discrete sensory inputs can stimulate both simple and complex behaviors
- Learning establishes specific links between experience and behavior
- Both genetic makeup and environment contribute to the development of behaviors
- Selection for individual survival and reproductive success can explain most behaviors
- Inclusive fitness can account for the evolution of altruistic social behavior

READ:

- Chapter 51

SUPPLEMENTARY RESOURCES: Click the links below for more information to help you learn more about this lesson.

- Bozeman Biology's "[Animal Behavior](#)" video.
- Bozeman Biology's "[Behavior and Natural Selection](#)" video.
- Bozeman Biology's "[Information Exchange](#)" video.
- Crash Course Biology's video: [Animal Behavior](#)
- Joshua Klein's TED Talk: [The Intelligence of Crows](#)
- Kimball's Biology Pages: [Innate Behavior](#)
- Sparknotes: [Learning and Behavior](#)
- Human Genome Project Information: [Behavioral Genetics](#)
- PBS: [The Nurture of Nature](#)
- Science (journal): [From Genes to Social Behavior](#)
- UC Berkeley Understanding Evolution: [Natural Selection at Work](#)
- Brown University: [Evolution of Behavior](#)
- UC Berkeley Understanding Evolution: [Coevolution](#)



KEY TERMS: Here is a list of key terms you will hear and see during the podcast and reading the textbook. Get to know them! Be able to connect them to one another using a concept map.

| | | | |
|-------------------------------|---------------------------|--------------------------|-------------------------------|
| <i>Behavior</i> | <i>Kinesis</i> | <i>Pheromones</i> | <i>Associative learning</i> |
| <i>Ethology</i> | <i>Taxis</i> | <i>Innate behavior</i> | <i>Classical conditioning</i> |
| <i>Proximate causation</i> | <i>Migration</i> | <i>Learned behavior</i> | <i>Operant conditioning</i> |
| <i>Ultimate causation</i> | <i>Circadian rhythms</i> | <i>Habituation</i> | <i>Cognition</i> |
| <i>Fixed action pattern</i> | <i>Circannual rhythms</i> | <i>Imprinting</i> | <i>Problem solving</i> |
| <i>Sign stimulus</i> | <i>Communication</i> | <i>Sensitive period</i> | <i>Culture</i> |
| <i>Foraging behavior</i> | <i>Promiscuous</i> | <i>Altruism</i> | <i>Kin selection</i> |
| <i>Optimal foraging model</i> | <i>Monogamous</i> | <i>Inclusive fitness</i> | <i>Social learning</i> |
| | <i>Polygamous</i> | <i>Hamilton's rule</i> | |

RECALL AND REVIEW: Use the lecture in the video and your textbook to help you answer these questions in your BILL.

Introduction

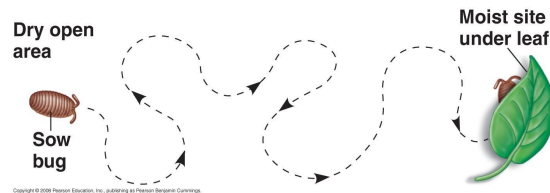
1. Define **behavior**.
2. **Explain** the difference between the **proximal** cause for a behavior and the **ultimate** cause for a behavior. How are each of these behavior categories affected by natural selection?
3. Distinguish between **innate** and **learned** behavior. Discuss the adaptive advantages for each type of these behaviors.

Discrete Signal Input Can Stimulate Both Simple and Complex Behaviors

4. When a male robin is ready to reproduce, it has bright red breast feathers. It will aggressively attack other male robins, but it will also attack a tuft of red feathers attached to a stick. **Describe** how this seemingly

maladaptive behavior relates to concepts of fixed action patterns and releasers. **Describe** another organism which exhibits such behavior, and the behavior it displays.

5. **Draw** a Venn Diagram that explains similarities and differences between *taxis* behaviors and *kinesis* behaviors.
6. Explain how *migrating* animals may track their position relative to the sun, the North Star, or Earth's magnetic field.
7. Distinguish between *circadian* and *circannual* behavioral rhythms.
8. Why does behavior require communication?
9. **Draw** a table that lists at least one advantage and one disadvantage of visual, acoustic, and chemical communication. Describe at least one example for each.

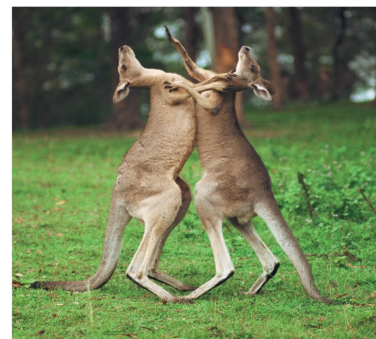


Learning Establishes Specific Links between Experience and Behavior

10. Some learned behavior is time-sensitive, such as *imprinting*. What is the *sensitive period*? Describe what imprinting is and give an example of imprinting taking place in nature.
11. Distinguish between the different types of learned behavior and provide an example of each.
 - a. **Associative learning**
 - b. **Habituation**
 - c. **Spatial learning**
 - d. **Cognition and Problem Solving**
12. Distinguish between the two types of associative behavior and provide an example of each.
 - a. **classical conditioning**
 - b. **operant conditioning**

Selection for Individual Survival and Reproductive Success Can Explain Most Behaviors

13. What is *foraging behavior*?
14. Explain how predation risk may affect the foraging behavior of a prey species.
15. Distinguish between the two types of sexual selection: *intersexual selection* and *intrasexual selection*
16. Explain what *sexual dimorphism* is and why it exists.
17. Why does the mode of fertilization correlate to a large degree with the presence or absence of male parental care?
18. Explain what *agnostic behavior* is and discuss the role it plays in mating.
19. Explain what a *dominance hierarchy* is and what role it plays in mating.
20. **Describe** how sexual selection illustrates natural selection at work, and give an example.



Inclusive Fitness Can Account for the Evolution of Altruistic Social Behavior

21. Define *altruistic behavior* and provide a few examples.
22. Discuss the role of altruism and *inclusive fitness* in *kin selection*.
23. Define *Hamilton's rule* and explain the conditions under which altruistic behaviors will be favored by natural selection.

Summary

24. **Describe** an example of each one of the following types of behavior and **explain** why it is an adaptive behavior for the organism performing it:
 - a. Imprinting
 - b. Migration
 - c. Classical conditioning
 - d. Operant conditioning
 - e. Altruism
 - f. Fixed action pattern
 - g. Innate behavior
25. How does organismal behavior demonstrate an emergent property of an organism's physiology?

THINGS YOU SHOULD MAKE SURE YOU UNDERSTAND:
(Feel free to ask questions about them in class)

- How behaviors are the result of natural selection.
- How innate behavior and various types of learning increase fitness.
- How organisms use communication to increase fitness.
- Various forms of animal communication.
- The role of altruism and inclusive fitness in kin selection.

LEARN MORE: For more examples of animal behavior, use the links below:

Learn.Genetics at the University of Utah: [Lick Your Rats](#) (epigenetics and behavior)

Nobelprize.org: [Pavlov's Dog](#)

Mississippi State: [Operant Conditioning Simulation](#)

Nobelprize.org: [Niko Tinbergen](#)

Nobelprize.org: [Konrad Lorenz](#)

Nobelprize.org: [Ivan Pavlov](#)

Youtube: [Honeybee Waggle Dance](#)