

CHAPTER 51

ANIMAL BEHAVIOR

Learning objectives

Introduction to Behavior

1. Define behavior.
2. State Tinbergen's four questions. Identify each question as proximate or ultimate.
3. Ask a proximate question and an ultimate question about bird song.

Sensory Input as Stimuli for Animal Behavior

4. Define a fixed action pattern and give an example.
5. Distinguish between kinesis and taxis.
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. Explain courtship behavior in *Drosophila melanogaster* as a stimulus response chain.
9. Describe the information content in the round dance and waggle dance of a honeybee.
10. Define pheromone. Provide examples of pheromones that function in reproductive and nonreproductive behavior.

Learned Behaviors

11. Explain how habituation may influence behavior and why it may be selectively advantageous.
12. Define imprinting. Suggest a proximate cause and an ultimate cause for imprinting in newly hatched geese.
13. Describe Tinbergen's classic experiment on spatial learning in digger wasps.
14. Distinguish between landmarks and cognitive maps.
15. Explain how associative learning may help a predator to avoid toxic prey.
16. Distinguish between classical conditioning and operant conditioning.
17. Describe an experiment that demonstrates problem solving in non-human animals.
18. Describe the stages of song learning in white-crowned sparrows.

Genetic Contributions to Behavior

19. Explain how genes and environment both contribute to behavior.
20. Describe how cross-fostering experiments help identify the relative importance of environmental and genetic factors in determining specific behaviors.
21. Describe how the *fry* gene controls courtship behavior in male fruit flies.
22. Describe the evidence of a genetic basis for the willingness of garter snakes to eat slugs.
23. Explain how differences in expression of the vasopressin receptor gene explain differences in paternal behavior in meadow and prairie voles.

Evolution of Behavioral Traits by Natural Selection

24. Describe the selective benefits of the phenotypes associated with the two *forager* alleles under conditions of low and high *Drosophila* population density.
25. Describe optimal foraging theory.

26. Explain how behavioral ecologists carry out cost-benefit analyses to determine how an animal should forage optimally, using the example of crows feeding on whelks.
27. Explain how predation risk may affect the foraging behavior of a prey species.
28. Define and distinguish among promiscuous, monogamous, and polygamous mating relationships. Define and distinguish between polygyny and polyandry.
29. Describe how the certainty of paternity may influence the development of mating systems.
30. Explain why males are more likely than females to provide parental care in fishes.
31. Distinguish between intersexual and intrasexual selection.
32. Suggest an ultimate explanation for female stalk-eyed fly's preference for mates with relatively long eyestalks.
33. Agonistic behavior in males is often a ritualized contest rather than combat. Suggest an ultimate explanation for this.
34. Explain how game theory may be used to evaluate alternative behavioral strategies.

The Evolution of Altruistic Social Behavior

35. Define altruistic behavior, providing examples.
36. Define Hamilton's rule and explain the conditions under which altruistic behaviors will be favored by natural selection.
37. Relate the coefficient of relatedness to the concept of altruism.
38. Distinguish between kin selection and reciprocal altruism.

Social Learning and Sociobiology

39. Define social learning and culture.
40. Explain why mate choice copying by a female may increase her fitness.
41. State the main premise of sociobiology.