CONCEPT: ANIMAL BEHAVIOR

- ***Behavior*** – actions of an organism in response to stimuli, includes interactions with other organisms and its environment
- ***Behavioral ecology*** – study of animal behavior due to ecological pressures
- Proximate causation – how behaviors occur in mechanistic terms, like genetic and neurological factors involved
    - What causes a behavior?
    - How does the behavior develop?
- Ultimate causation – why behaviors occur, what function they serve, and how they evolved
    - How does the behavior affect fitness?
    - How did the behavior evolve?

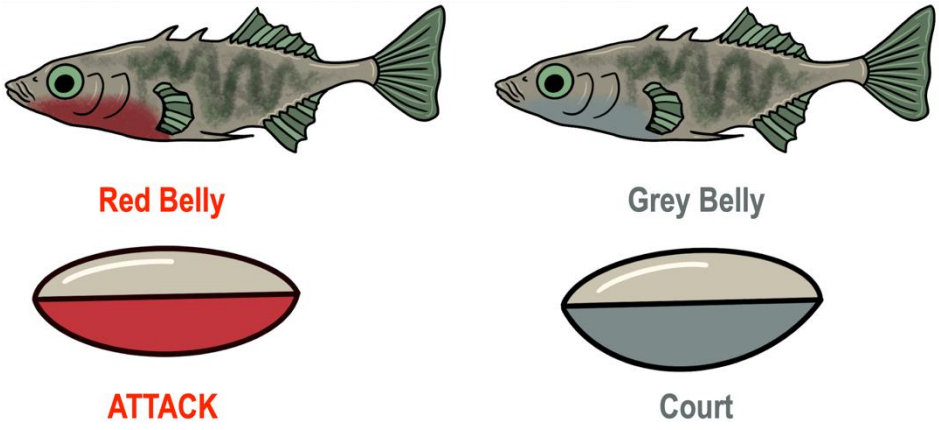
EXAMPLE:

- Behaviors exist on a spectrum from learned to innate
- ***Innate behavior*** – genetically programmed behavior, some require the organism to learn aspects of the behavior

EXAMPLE:

- ***Fixed action pattern*** – innate behavior with little variation in species that exhibit it
    - ***Sign stimulus*** – external cue that can elicit a fixed action pattern

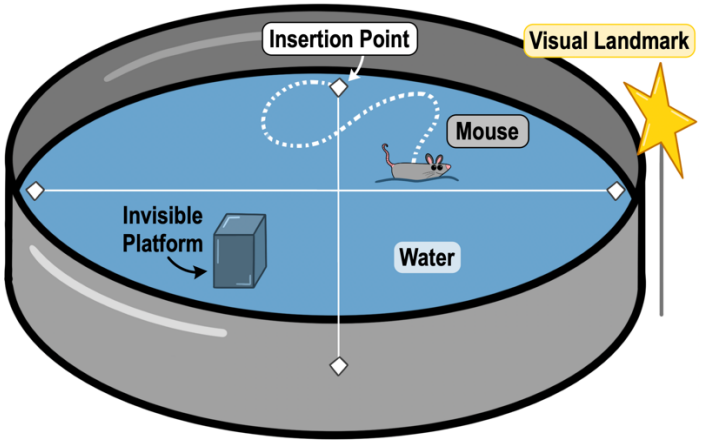
EXAMPLE:



CONCEPT: ANIMAL BEHAVIOR

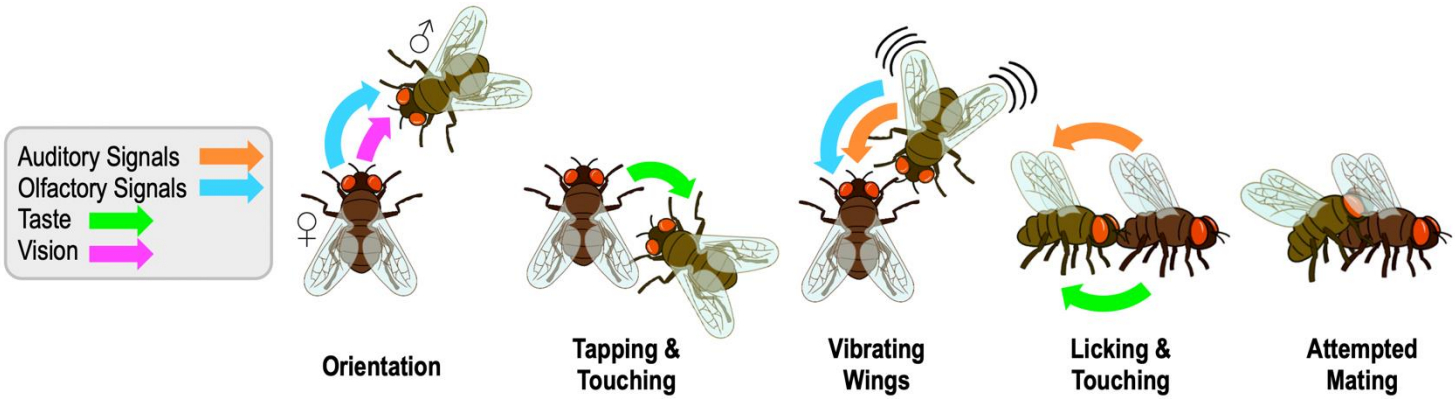
- ***Learning*** – acquisition or modification of a behavior as a result of experiences
    - Learned behaviors often involve choice, and a cost-benefit analysis
- ***Spatial learning*** – establishes a spatial memory of the environment
    - Cognitive map – mental representation of spatial information, usually involves relative space between objects
- ***Imprinting*** – time when an animal learns the characteristics of a stimulus, like a child imprinting the parent
    - ***Sensitive period*** – time when imprinting is possible, usually a very young age

EXAMPLE:



- ***Signal*** – stimulus transmitted from one organism to another
    - ***Pheromones*** – chemical signals released to the environment to communicate with other organisms
- ***Communication*** – transmission and reception of signals between animals
- Stimulus response chain – communication behavior in which each signal serves as the stimulus for the next response
- Some communication is deceitful, with the intention of fooling an organism, most effective within a species

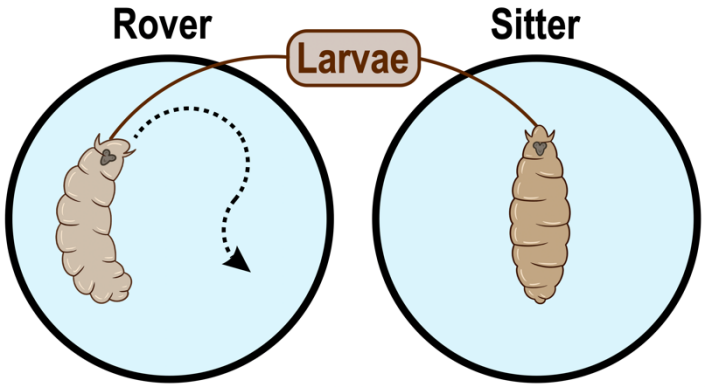
EXAMPLE:



CONCEPT: ANIMAL BEHAVIOR

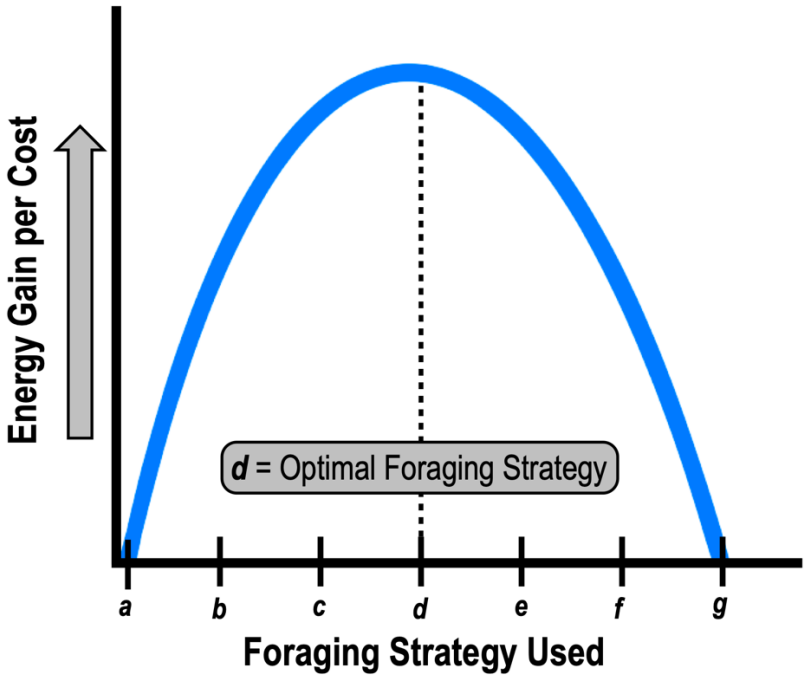
- ***Foraging*** – food seeking behavior that includes searching for, identifying, capturing, and eating food
  - Drosophila melanogaster larvae have a gene, *for*, that controls foraging behavior
  - for^R is the "rover" allele, and for^s is the "sitter" allele
  - Rovers will travel twice the distance sitters will for food
  - Low population densities favor for^s

EXAMPLE:



- ***Optimal foraging model*** – natural selection favors foraging behavior that minimizes costs, and maximizes benefits
  - Risk-reward balance between energy expenditure and energy gain
  - Predation poses a great risk when foraging, and will influence behavior
  - Animals will seek to maximize their feeding efficiency, while balancing risk

EXAMPLE:



CONCEPT: ANIMAL BEHAVIOR

- Mating behavior includes attracting mates, competing for mates, and caring for offspring
  - ***Mating systems*** – way in which mating and sexual behavior is structured
    - Monogamy – one male mates with one female
    - Polygamy – an individual of one sex mates with many individuals of the opposite sex
- ***Sexual selection*** – type of natural selection in which members of one sex choose mates
  - Can involve one sex choosing a mate of the opposite sex, or competition between members of the same sex
  - Females tend to choose their mates based on signs of fitness and health
- Mate-choice copying – individuals in a population are more likely to mate with those who have previously mated

EXAMPLE:

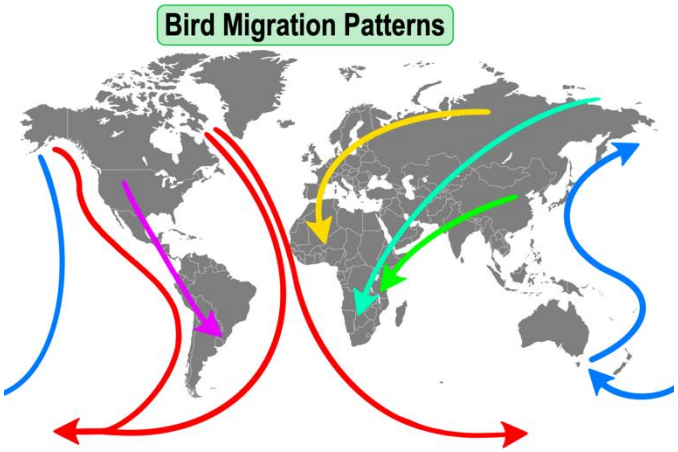
- Parental care can help improve the chances of raising viable offspring
  - Males will help with parental care in species that require a lot of attention, and help feeding
  - Certainty of paternity seems to affect male parental care, and is higher in species with external fertilization

EXAMPLE:

CONCEPT: ANIMAL BEHAVIOR

- Animals generally choose where to live based on food and mates
- ***Migration*** – long distance movement of a population associated with seasonal changes
    - Piloting – use of familiar landmarks
    - Compass orientation – movement oriented to a specific direction
    - True navigation – ability of animals to find their way, as if with a map

EXAMPLE:



- ***Altruism*** – behavior that has a fitness cost to the actor exhibiting it, and a fitness benefit to the recipient
- ***Kin selection*** – evolutionary strategy that favors reproductive success of an organism's relatives
- ***Hamilton's rule*** – altruistic behavior is more likely when certain conditions are met, represented as rB > C
    - B – benefit to the recipient is high
    - C – cost to the actor is low
    - Coefficient of relatedness (r) – average number of genes that are shared between the individuals
- ***Inclusive fitness*** – evolutionary success based on the number of offspring an individual produces, and how it helps it's relatives produce more offspring than they would otherwise be able to
- ***Reciprocal altruism*** – actor temporarily reduces its fitness to benefit recipient, assuming recipient will return the favor

EXAMPLE: