

TOPIC - Behavior

Ethology:

science/study of animal behavior; the evolution of behavior is governed by genes

Ex. hygienic/unhygienic bees

Innate/Instinct: *inborn or present at birth*

Proximate causation: *the immediate sequence of physiological events that lead to the observed behavior*

Ex. startle behavior in fish and amphibians---stimulation of Mauthner cells

Ultimate causation: *the adaptive value and its evolutionary origins*

Ex. startle behavior in fish and amphibians---avoidance of predation

Fixed-action pattern (FAP): *a highly stereotyped, innate, behavior*

Ex. prey-capture of a frog

Sign stimulus: *an external sensory stimulus which triggers a fixed-action pattern*

Ex. a moving fly to a frog

I. Tinbergen

with the male three-spined stickleback fish, he noted that they responded aggressively to red trucks passing by their tank

Fixed-Action Pattern: Male sticklebacks attack other males that enter their territories

Sign stimulus: The red belly of an invading male. Sticklebacks attacked nonfish-like models with red on the ventral surface

II. Learning and Behavior

Nature vs. Nurture: The debate over whether instinct (nature) or learning (nurture) is of primary importance in animal behavior.

1. Maturation

a. development of body systems that allows behavioral improvement over time
ex. birds 'learning' to fly

2. Habituation

a. learning to ignore irrelevant stimuli of stimuli that do not provide proper feedback
Ex. ground squirrels ignoring of other ground squirrels ('cry wolf')

3. Imprinting

a. Lorenz

1. Greylag geese

Experiment: A clutch of goose eggs was divided between the mother and an incubator.

Results: Goslings reared by the mother behaved normally and mated with other geese. The incubator goslings spent the first hours of life with Lorenz and preferred humans for the rest of their lives. They even tried to mate with humans.

Conclusions: Greylags have no innate sense of "mother" or "gooseness". They identify with and respond to the first object with certain characteristics they encounter.

b. salmon returning to their birthplace to reproduce

4. Classical conditioning (Associative learning)

a. a process in which an animal learns to respond to an external stimulus which does not normally elicit that response (Pavlov's dogs)

5. Operant conditioning, 'trial and error' learning
 - a. a process where an animal learns to associate one of its behaviors with a reward or punishment and then tends to repeat or avoid that behavior (Skinner's lab animals and levers)
6. Insight, 'reasoning'
 - a. the ability of animals to perform appropriate behaviors on the first attempt in situations with which they have no prior experience (primates stacking boxes to reach fruit)
7. Movement
 - a. kinesis: undirected response to a stimulus
 1. lifting a rock/log
 - b. taxis: directed movement to a stimulus
 1. phototaxis, thermotaxis, thigmotaxis, geotaxis
 - c. migration: long distance, seasonal movement

III. Social Interactions

- A. Agonistic behavior
 1. contest of threat displays until one submits
 2. ritual: symbolic behavior that minimizes serious injury to antagonists (canines baring teeth, erect ears, make eye contact)
- B. Dominance hierarchies (pecking orders)
 1. a linear social organization within a group (wolves; hens)
- C. Territoriality
 1. area defended used for feeding, mating, rearing young, etc.
- D. Mating behaviors
 1. Courtship
 - a. fixed-action patterns
 - b. females more discriminating because they normally have a greater parental investment (eggs vs. sperm, time and energy of pregnancy)
 2. Mating systems
 - a. promiscuous (no pair-bonds or lasting relationships)
 - b. monogamous
 - c. polygamous
 1. polygyny: 1 male, many females
 2. polyandry: 1 female, many males
- E. Social Societies
 1. Altruism
 - a. a behavior that reduces an individual's personal welfare but benefit's others (unselfish behavior)
 - b. coefficient of relatedness

Effect of Social Behavior

Type of Behavior	The Donor	The Recipient
Selfish	Increases fitness	Decreases fitness
Cooperative	Increases fitness	Increases fitness
Atruistic	Decreases fitness	Increases fitness
Spiteful (only humans!)	Decreases fitness	Decreases fitness

2. Insect societies
 - a. eusocial: cooperation in caring for young; division of labor (sterile individuals working for reproductive ones)

3. Kin Selection

- a. different groups of related individuals reproduce at different rates
- b. inclusive fitness: the fitness of the individual plus the fitness of relatives (who share alleles with altruist)

IV. Behavioral Rhythms

- A. Circadian (daily): regulated by environmental cues; influenced by an internal biological clock, kept in sync by the environment (most common cue: light)