Animal behavior

Chapter 51

keywords

- Fixed action pattern, Sign stimulus
- proximate and ultimate causes of behavior
- imprinting
- sociobiology
- sexual selection
- altruism
- kin selection

How do animals work - meeting functional demands

- Body plans and structure
- physiological mechanisms
- behavior

Causes for behavior

- “proximate” - environmental stimuli that trigger behavior, e.g., day length, visual stimuli
- “ultimate” - why does stimulus trigger behavior - generally believed to be due to natural selection (adaptive behavior)

Behavior results from both genes AND environment

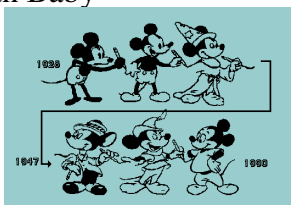
- Whether an animal CAN exhibit a particular behavior is determined by genes
- Whether an animal DOES exhibit this behavior can be dependent on environment.
  - An animal may not exhibit a possible behavior in certain environments

The “cute response”

- Lorenz theorized that certain "infantile features"—like big heads, large eyes, button noses, and round bodies—trigger a nurturing response in adults
- Evolutionarily, this makes us more likely to care for our offspring, but our preference for cuteness is so strong it spills over to other species.
- http://www.youtube.com/watch?v=3Ji0bvwXAvI&feature=player_embedded

Mickey's Transition from Rat to Human Baby

- His ears and head became much larger over time
- His nose became less sharp and pointy
- His eyes widened from two black dots to large, white, oval circles

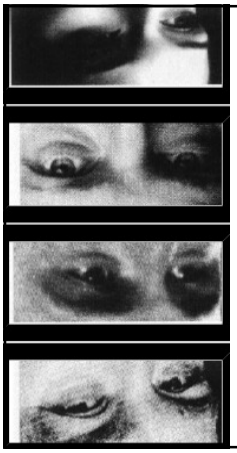


a. joking, b. insisting,
c. amused, d. relaxed

A. irritated, b. sarcastic
C. worried, d. friendly

A. aghast, b. fantasizing
C. impatient, d. alarmed

A. apologetic, b. friendly
C. uneasy, d. dispiritied



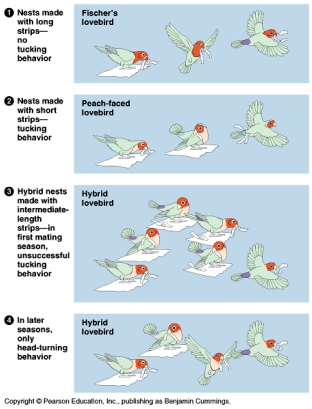
A. contemplative, b. flustered
C. encouraging, d. amused

A. irritated, b. disappointed
C. depressed, d. accusing

A. decisive, b. anticipating
C. threatening, d. shy

A. indifferent, b. embarrassed
C. skeptical, d. dispirited

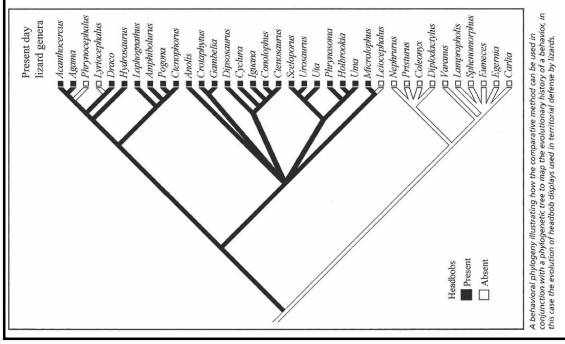
Figure 51.1 Genetic and environmental components of behavior: a case study



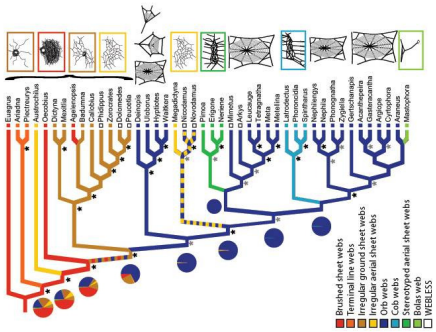
Lovebird study

- Genetic component - illustrated by intermediate strips and tucking behavior in hybrid
- Environmental component - illustrated by loss of ineffective tucking behavior by hybrids in later seasons.

Behavioral phylogeny



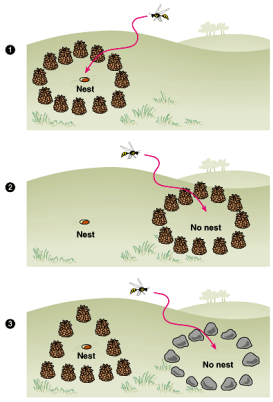
Behavioral phylogeny



Fixed action pattern

- Sequence of behavioral acts that is unchangeable and usually carried to completion once initiated
- Fixed action pattern is stimulated by a **sign stimulus**
- many animals only use a relatively small subset of sensory information to trigger behavior, humans are more complex

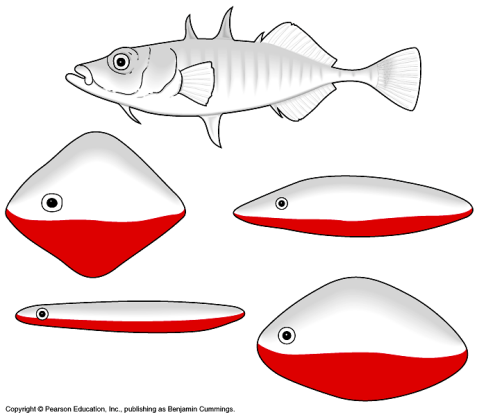
Figure 51.2 Niko Tinbergen's experiments on the digger wasp's nest-locating



Digger wasp study

- Fixed action pattern is cueing on visual landmarks to locate nest
- sign stimulus is pattern of landmarks around nest

Figure 51.3 Classic demonstration of innate behavior



Stickleback study

- Fixed action pattern = aggression twards other "males"
- sign stimulus = red belly

More complex fixed action patterns in courtship behavior

- Betta spawning http://www.youtube.com/watch?v=rK0m_awMOWQ

Imprinting

- A type of learning that is limited to a sensitive period of an animals life and is generally irreversible
- Work of Konrad Lorenz (nobel prize 1973)
  - great book to read: King Solomon's Ring

Figure 51.9x Geese imprinting

Imprinting in goose hatchlings

- Bonding occurs after hatching
- imprint of "mother"
  - important for eliciting care, developing species identity
- during sensitive period can be experimentally imprinted on the wrong mother.

Figure 51.9 Imprinting: Konrad Lorenz with imprinted geese

http://www.youtube.com/watch?v=eqZmW7uIPW4

Communication

- Pheromones
- chemical trails
- honeybee "dancing"

Figure 51.26 Fire ants following a pheromone trail

Figure 51.27 Communication in bees: one hypothesis

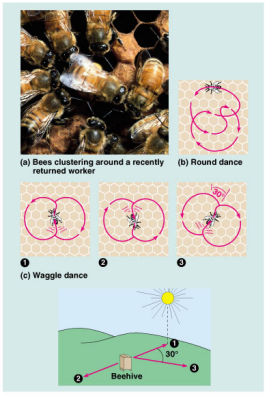
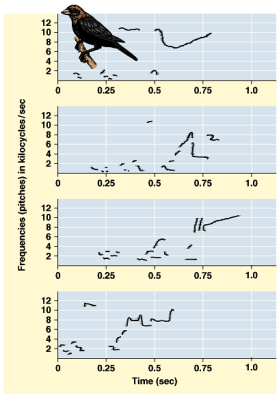


Figure 51.5 The repertoire of a songbird



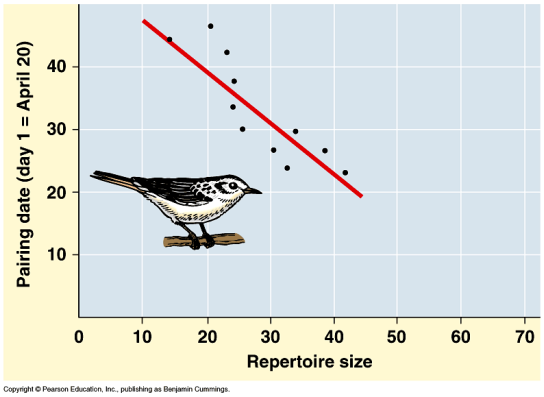
Why is there multisong behavior?

- Warning off enemies, attracting mates?

Attracting mates?

- What does song repertoire have to do with being a good mate?
- Postulate that repertoire increases fitness by making older more experienced males more attractive to females.
- Testable hypotheses:
  - males learn more song types as they get older
  - felames prefer males with large repertoires

Figure 51.6 Female warblers prefer males with large song repertoires



Dog communication

- recorded growls from 20 pet dogs in three different situations: a tug-of-war game with their owner, competing with another dog for a bone and growling at an approaching stranger.
- played the recordings to 36 other dogs that had each been left to gnaw on a bone. Only those that heard the food-guarding growls tended to back off from the bone and stay away.
- It seems that dog growls communicate context
- Faragóa et al. (2010) 'The bone is mine': affective and referential aspects of dog growls. Animal Behavior in press.

Learning

- Experience based modification of behavior

Figure 51.8 Vervet monkeys learn correct use of alarm calls

Vervet monkey alarm calls

- Different alarm calls for leopards, eagles, snakes
- Infant monkeys give indiscrimate alarm calls but eventually learn to give the right call at the appropriate time

Associative learning

- Classical conditioning - Pavlov's dogs, arbitrary stimulus related to reward or punishment
- Operant conditioning - trial and error learning, learn to associate own behavior to reward or punishment

Figure 51.11 Operant conditioning

Figure 51.13 Raven problem solving

Figure 51.13x Chimps making tools

Animal intelligence

Mirror self recognition

- humans and great apes show mirror self recognition

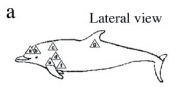
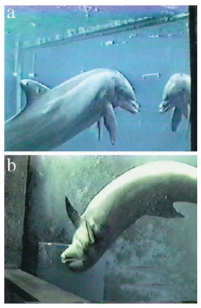


Fig. 2. (A) Locations of the nontoxic, temporary mark and the number of times the dolphins were marked in each location in mark and sham-mark sessions. Marks were applied to either side of the body. Subject 1: b, above eye (right, $n = 1$); c, above and posterior to ear (right, $n = 3$; left, $n = 4$); d, between ear and pectoral fin (right, $n = 2$; left, $n = 2$); e, above pectoral fin (right, $n = 2$; left, $n = 1$); f, posterior to pectoral fin (left, $n = 1$); g, below dorsal fin (right, $n = 3$; left, $n = 7$); h, between pectoral fin ($n = 2$); i, umbilical ($n = 1$); j, underside and tip of pectoral fin (right, $n = 1$). Subject 2: a, on melon (right, $n = 1$; left, $n = 2$); e, above pectoral fin (right, $n = 5$; left, $n = 2$); g, below dorsal fin (right, $n = 2$; left, $n = 1$; umbilical, $n = 2$); h, between pectoral fin ($n = 1$). (*B*) The dolphin marked above the right eye.



Ig. 4. (A) Mark-directed behavior by subject to a real mirror immediately ftar release from being marked. A narrow Plexiglas mirror, 41.9 cm × 101.6 m × 0.32 cm is affixed in a vertical orientation to the exterior of one of the effective walls (Wall 6). During this session, the mirror was the best reflective urface in the subject's environment. The faint white line on the wall indicates he location of mirror. (*B*) The dolphin at Wall 1, the best reflective surface in he session, exhibiting late sham-directed behavior: a continuous and repet- tive sequence of 12 dorsal-to-lateral-ventral flips exposing the location of the ham-marked area of his body, the underside and tip of the right pectoral fin, to he reflective surface. This unusual behavioral sequence continued for 32 sec.

Grey Parrot "Alex"

- Vocabulary of 150 words
- names of 50 objects- could describe their colors, shapes and the materials they were made from.
- He could ask for things—and would reject a proffered item and ask again if it was not what he wanted.
- He understood, and could discuss, the concepts of "bigger", "smaller", "same" and "different".
- He could count up to six, including the number zero (and was grappling with the concept of "seven" when he died).
- http://www.youtube.com/watch?v=ldYkFdu5FJk

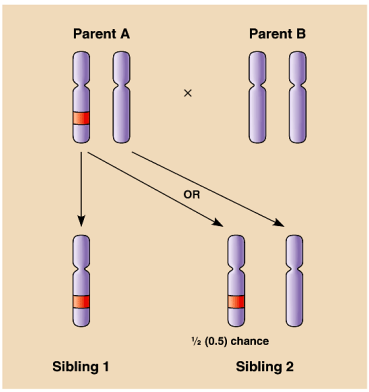
Altruistic behavior

- Behavior that does not immediately benefit the individual

Figure 51.28 Altruistic behavior in the Belding ground squirrel

- Giving alarm call increases chance of getting killed

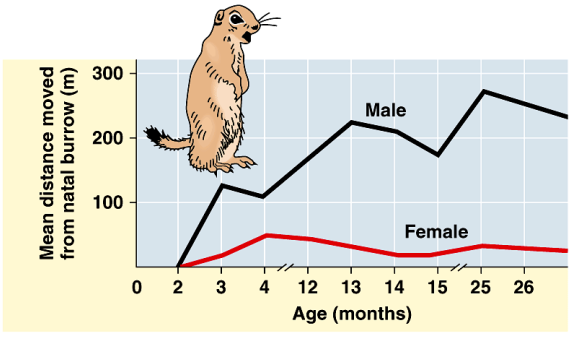
Figure 51.30 The coefficient of relatedness between siblings is 0.5



Kin selection

- Increasing reproductive success of relatives
- can be a cause of altruistic behavior
- Female ground squirrels make more alarm calls than males. Why?

Figure 51.31 Kin selection and altruism in the Belding ground squirrel



Cockatoo “snowball”

- http://www.youtube.com/watch?v=cJOZp2ZftCw
- research at Neurosciences Institute, La Jolla to determine whether truly synchronizing his body movements to the music
  - as opposed to simply mimicking or responding to visual clues from humans present in the room at the same time.
- Snowball's favorite piece of music was played to him at several different tempos and his reactions recorded on video for later analysis.
  - The results showed that Snowball was capable of spontaneously dancing to human music and also that he could adjust his movements to match the tempo of the music (albeit to a limited extent), a behavior previously thought only to occur in humans