

9.20 MIT 2013

Lecture #2
Ethology

- 1) Questions on Class 1
- 2) Video on the three-spined stickleback fish
- 3) Tinbergen on the study of gulls (Kittiwakes)

Review: Questions on Class 1

1. What two species of animal were primarily involved in spreading bubonic plague (the black plague) in medieval Europe? What animals were often blamed?
fleas, often living on rats
2. What were the hobbies of the two amateurs, one American man and one German man, whose discoveries in the early part of the twentieth century led to the establishment of ethology as a science within European zoology? What did they, independently, discover?
amateur ornithologists. An American, Whitman, studied pigeons and doves, Heinroth studied water fowl at Berlin zoo. Discovery: see Lecture 1, slide 16.
3. Contrast the attitudes of scientists in mid-twentieth century America with those in Europe towards the study of animal behavior.
Americans studied learning, believing that almost everything is learned. European zoologists stressed natural behavior patterns that were largely innate (inherited).

Review: Questions on Class 1

4. Edward O. Wilson, a professor at Harvard University, coined a word for a field of behavioral study in the title of a 1975 book – a monumental synthesis that generated much controversy. What was the word, and what caused the controversies?
*Sociobiology. His last chapter applies the ideas to humans**
5. How is animal behavior viewed by “behavioral ecologists”?
As part of a particular environment
6. Contrast “mammalogy” and “mammalian ethology”.

* Stressing inherited aspects of adaptive behavior

More on ethology of humans: see the book *Human Ethology*, by Irenäus Eibl-Eibesfeldt (1989)

From Konrad Lorenz (1981), *The Foundations of Ethology*:

- “As early as 1916, Oskar Heinroth wrote in the conclusion of his classic paper on waterfowl: ‘The study of the ethology of higher animals (still a regrettably neglected field) will force us more and more to acknowledge that our behavior towards our families and towards strangers, in our courtship and the like, represents purely innate and much more primitive processes than we commonly tend to assume.’”
- “...Charles Darwin, in his monograph, *The Expression of Emotion in Man and Animals* (1872), pointed out the homology of some human and animal motor patterns. The homology was convincing, but solid proof still remained necessary.”
- “Irenäus Eibl-Eibesfeldt (1973) was the first to afford this proof.”

What did Eibl-Eibesfeldt do?

- Approach 1:
 - Studied children born deaf and blind, using film analysis
 - Found that these children had a nearly unchanged repertoire of facial expressions, although they had never seen or heard such expression in others.
- Approach 2:
 - Used cross-cultural method to study social expressions in humans, using film analysis.
 - Filmed situations such as greeting, taking leave, quarreling, grief, enjoyment, courting, etc.
- He found the same motor patterns in the two studies

Video: “Questions about behavior”

from series, Biology, Brain, and Behavior

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*Encyclopaedia Britannica Educational Corporation ; a
production for the Open University ; BBC*

- Subject illustrated in video:
The behavior of the three-spined stickleback fish,
analyzed with the help of Tinbergen’s 4 questions
(see Scott, ch 1)

23-24 minutes

“Questions about behavior” [videorecording] 1993

Questions on the in-class video presentation concerning studies of the three-spined stickleback fish, a small fish used in many studies by ethologists, observational and experimental.

- 1) What is a “zig-zag dance” of a stickleback fish?

- 2) On causation: the sensory triggers of innate behavior: Describe how “dummy stimuli” were used to discover properties of females that attract male sticklebacks motivated for mating.

- 3) On the purpose of the above behavior: What quantitative analysis of female stickleback fish provided support for a major purpose?

- 4) How did a study of development show the importance of early experience of developing sticklebacks in shaping their escape behavior patterns.

- 5) How can one obtain evidence concerning the evolution of behavior patterns?

- 6) Why does a male stickleback fish drive the female away immediately after he inseminates her eggs in his nest?

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