

9.20 M.I.T. 2013

Lecture # 28

“The Triumph of Sociobiology”

John Alcock, *The Triumph of Sociobiology*, ch 10:

Alcock's summary of a major argument: Is it an overstatement?

1. The first paragraphs of this final chapter are a beautifully concise summary of a major argument of the book. This short chapter is worth reading more than once.

Alcock argues that there is NO genetically determined behaviors. Is this too extreme? Use examples in your answer.

P 217

John Alcock, *The Triumph of Sociobiology*, ch 10:

Alcock's summary of a major argument: Is it an overstatement?

1. . . . No genetically determined behaviors... Is this too extreme? Use examples in your answer. P 217
 - First, behavior is only indirectly influenced by genes, as it is determined by the activity of the nervous system. That n.s. developed according to genetic information and with influences from the tissue and external environments.
 - Nevertheless, I think the statement is too extreme, because **some behaviors have very little variation attributable to learning** or other influences of the external environment: e.g., sneezing, yawning, withdrawal reflexes; grooming in mice; social signals in geese; various insect behaviors, etc. **These behaviors are reflexes and, on the output side, fixed motor patterns.**
 - Thus, we can say that some behaviors are largely “genetically determined.”

Trying to explain fitness-reducing behaviors

2. What explanations for fitness-reducing behaviors have been offered by sociobiologists? P 218-219

Many of these behaviors are altruistic ones. Most altruism has been shown to be adaptive, either directly (involving genetic relatives) or indirectly (reciprocal altruism). Maladaptive altruism also occurs, and has potential explanations, e.g.,

- **By-product hypothesis** (There are behavioral by-products of proximate mechanisms that evolved for adaptive reasons.)
- **Novel environment hypothesis** (Some behaviors were originally adaptive but the environment has changed and made them not so adaptive.)

Text removed due to copyright restrictions.

John Alcock, *The Triumph of Sociobiology*, ch 10:

Snubbing the field of sociobiology

3. Why have many social scientists and people in the humanities ignored sociobiology?

P 220-221

Why is sociobiology so “alien and disquieting”?

- Perceived conflict with ideology, including religious doctrines.
- Fear of a “takeover” of their field by sociobiologists
- Extreme environmentalism: rejection of nature with an exclusive emphasis on nurture.

John Alcock, *The Triumph of Sociobiology*, ch 10:

Extreme environmentalism in America (reviewed for emphasis)

4. What are the causes you can discern, or have learned about, for the extreme environmentalism in America? (It has been more extreme in America than in Europe.)

P 221

- Opposition to attitudes in European aristocratic society with its elitism based on inheritance. [Discussed in class in September]
- In America, ideals of democracy included the belief that “all are equal”, which should mean “equal opportunity under the law”, but is often taken to mean equal at birth, with everything possible to everyone who has the will and can find the opportunity.
- This was applied to the education system, with good outcomes despite the inaccuracy of the beliefs.

John Alcock, *The Triumph of Sociobiology*, ch 10:

Claiming a major weakness of sociobiology

5. Appendix ch 10, Q3 about *Ian Tattersall*. *Is he right?*

John Alcock, *The Triumph of Sociobiology*, ch 10:

Claiming a major weakness of sociobiology

5. Appendix ch 10, Q3:

- Individual awareness concerns proximate mechanisms, not evolved adaptations.
- There are fitness-enhancing advantages of spacing of offspring
 - Tattersall is wrong about fertility itself being the enemy.
- There are other benefits of breast feeding:
 - Mother-child bonding, which promotes the welfare of the child, thereby increasing its potential for reproduction.
 - Transfer of immunities when the infant's immune system is not yet mature

John Alcock, *The Triumph of Sociobiology*, ch 10:
Only immoral or amoral actions can evolve?

6. Appendix ch 9, Q2 about morality.

John Alcock, *The Triumph of Sociobiology*, ch 10:
Only immoral or amoral actions can evolve?

6. Appendix ch 9, Q2:

- Morality itself has evolved, with proximate causes.
- Sociobiologists have studied adaptive values of altruism and moral behavior, and have found explanations.
- We have evolved with multiple proximate systems of the CNS, each for adaptive reasons, but conflict is common among these systems. (We did not evolve to be happy!)

John Alcock, *The Triumph of Sociobiology*, ch 10:

7. Read at least two articles (they may be online articles) on the field of evolutionary psychology. Write a brief review, including the definition and the origins of the term. Distinguish between sociobiology and evolutionary psychology. Also, describe a couple of the controversies that this field has generated.

Posted on course website as an EXTRA CREDIT project. Get your report ready first!

Please see:

Buss, David M. "Evolutionary psychology: A new paradigm for psychological science." *Psychological inquiry* 6, no. 1 (1995): 1-30.

Please see:

Buss, David M. "Evolutionary psychology: A new paradigm for psychological science." *Psychological inquiry* 6, no. 1 (1995): 1-30.

This is similar to what Alcock has stated in his book.

Text removed due to copyright restrictions.

Schedule

- This concludes the discussions about Sociobiology.
- Now we will review the various types of learning, using Konrad Lorenz' book: *The Foundations of Ethology*, Part 3: Adaptive Modification of Behavior
- In the next two classes, we will see videos of field studies of great apes.
- Student reports will begin after the review of Lorenz' book and the videos.
 - Each of you will go to one of three classrooms to hear reports, always in the same classroom, so each of you will hear a third of them.
 - A key point made in each student report should be learned, as they may be used in the final exam.

Key concepts in learning:

K. Lorenz, Adaptive Modification of Behavior
(Part 3 in *The Foundations of Ethology*, 1981)

Students should study these slides in order to have a good idea about an ethologist's approach to learning—an approach which is much more comprehensive than that taken in standard American classes in learning.

- Lorenz emphasizes that various specific forms of learning have each evolved in order to produce what are normally adaptive responses.
- One cannot reduce all learning to one or two types.

Major types of learning:

- A. Learning without association
- B. Learning through association without feedback reporting success
- C. Learning effected by the consequences of behavior
- D. Motor learning
- E. Exploratory behavior or curiosity (with resulting learning)

Major types of learning:

A. Learning without association

B. Learning through association without feedback reporting success

C. Learning effected by the consequences of behavior

D. Motor learning

E. Exploratory behavior or curiosity

A. Learning without association

- 1. Facilitation & sensitization**
- 2. Habituation [simple stimuli]**

A. Learning without association

1. Facilitation & sensitization

- Prey-catching response in newly hatched squid (Wells, 1962).
 - Performed with flawless coordination when it is released for first time, preceded by intention movements for several seconds.
 - **The response is slower at first, then speeds up.**
 - With maturation, improvements also occur, most likely due only to the maturation.
- Pecking by recently hatched chicks
 - Pecking at seeds is scattered at first, then becomes more and more focused (accurate)
 - **This does not depend on feedback, but only on repetition:** Prism experiments by E. Hess.
 - With a sideways shift of visual objects, the chicks never adapted to the deviation, but their pecking nevertheless became more focused.

Continued on next slide

A. Learning without association

1. Facilitation & sensitization (more examples)

- Escape response in the earthworm.
 - Escape response is triggered with **a lower threshold** after a blackbird has just taken a peck at it (and it escaped).
- "Feeding frenzy" in fish
 - Found in species preying on species occurring in swarms or schools
 - Seen in sharks and in tuna (and exploited by fishermen)
 - The lowered thresholds are also due to social facilitation and to specific key stimuli from the prey objects.

A. Learning without association

1. Facilitation & sensitization

2. Habituation or stimulus adaptation [simple stimuli]

- Reflex habituation in hydra
 - Responds to contact of various sorts (water movement, touch, shaking of substrate, etc.) by contracting its tentacles and body.
 - Movements of surrounding water cause the response, but hydra can live in a fairly turbulent brook: The stimuli of the flowing water lose their releasing properties.
 - The thresholds of all other key stimuli remain unchanged.
- Response to novel sounds in turkey: gobbling
 - Habituation with repeated presentations
 - Specific to sound frequency: one can plot a generalization gradient around the frequency of the presented sound
 - Gobbling re-appears even if the novelty is a reduction in amplitude of the sound—demonstrating that the habituation is not stimulus adaptation

A. Learning without association

1. Facilitation & sensitization

2. Habituation or stimulus adaptation

- Reflex habituation in hydra
- Response to **novel** sounds in turkey: gobbling
- Flight responses to aerial raptors in turkeys
 - Not very specific for particular stimulus configurations when novel (observations at Seewiesen by KL)
 - **Habituation to frequently occurring stimuli**: buzzards, a fly on a white ceiling, a balloon in the sky.
 - The least frequently occurring stimulus from a raptor is that provided by a bald eagle—the raptor that is normally the most dangerous to the adult turkey in the vicinity of Seewiesen, Germany.
 - The only stronger response was to something even more novel: a dirigible that flew over Seewiesen about twice per year.

B. Learning through association without feedback reporting success

1. Habituation to associated stimuli (to the "background", "environment")
2. Adding stimuli to key stimuli: “becoming accustomed”
3. Conditioned Reflex = conditioning with stimulus selection (Pavlovian conditioning)
4. Avoidance responses acquired through trauma
5. Imprinting
6. Conditioned inhibition

B. Learning through association without feedback reporting success

- 1. Habituation to associated stimuli (to the "background", "environment")**
2. Adding stimuli to key stimuli: “becoming accustomed”
3. Conditioned Reflex = conditioning with stimulus selection (Pavlovian conditioning)
4. Avoidance responses acquired through trauma
5. Imprinting
6. Conditioned inhibition

B. Learning through association without feedback reporting success

1. Habituation to associated stimuli (to the "background")

- Taming = habituation to flight-eliciting stimuli associated with humans. The **tameness can disappear in novel environments.**
- *Cf.* mobbing in wild geese: Specific habituation occurs to particular dogs (p 270), but **mobbing can reappear if the environment is altered.**
- Some flight responses appear to habituate too much (an unexplained riddle mentioned on p.271): **This may be due to an unnatural constancy of the environment.**
 - Chaffinch to owls (studied by Robert Hinde)
 - Goslings to imitation of warning call of parents (studied by Lorenz).
 - [Hamsters in laboratory: Simulated natural environments –without exposure to humans--are necessary to get strong responses.]

B. Learning through association without feedback reporting success

1. Habituation to associated stimuli (to the "background") *continued:*

- Effects of moving a hamster cage across the room, or rotating it.
 - The novel positions of visual stimuli (with respect to cage stimuli) cause the hamster to rearrange its cage to re-gain the orientation of nest and food hoard with respect to visual landmarks.
 - It also may respond differently to humans.
 - This kind of “habituation” involves a kind of spatial learning—using visual landmarks for knowledge of place of the animal in the local environment.

B. Learning through association without feedback reporting success

1. Habituation to associated stimuli (to the "background", "environment")
2. **Adding stimuli to key stimuli: "becoming accustomed"**
3. Conditioned Reflex = conditioning with stimulus selection (Pavlovian conditioning)
4. Avoidance responses acquired through trauma
5. Imprinting
6. Conditioned inhibition

B. Learning through association without feedback reporting success

2. Adding stimuli to key stimuli: “becoming accustomed”

- Such stimuli do not become substitutes for the key stimuli.
- Human smiling response and social bonding (Rene Spitz) (p. 273): **The response becomes more and more selective.**
 1. At first: Responses to a simple dummy stimulus
 2. Then: Responses to live humans only
 3. Later: Responses to familiar humans only
- Emotional problems seen in children raised in hospitals: Caretaker changes interfere with bonding, which is crucial for formation of later bonds of friendship and love.
- Stimulus associations consequent to imprinting → individual recognition (geese, *cf.* humans) (p.275)
- Critical stimuli for human individual recognition are eyes, eyebrows and nose (the parts covered by a carnival mask).

B. Learning through association without feedback reporting success

1. Habituation to associated stimuli (to the "background", "environment")
2. Adding stimuli to key stimuli: "becoming accustomed"
3. **Conditioned Reflex = conditioning with stimulus selection (Pavlovian conditioning)**
4. Avoidance responses acquired thru trauma
5. Imprinting
6. Conditioned inhibition

B. Learning through association without feedback reporting success

3. **Conditioned Reflex = conditioning with stimulus selection (type S conditioning).**

- Comment re Pavlov's bell as CS: **Such regular sequences normally occur when there is a causal connection.**
- Pavlovian conditioning, first studied by Pavlov in a situation which does **not** fit this definition (see below)
- Note Hassenstein's specific definition of a "reflex" as not subject to changes in internal readiness. Based on inbuilt mechanisms. (Thus, reflexes are distinct from FAPs.)
- Some reflexes are impossible to connect with a conditioned stimulus, e.g., tendon reflexes.

MIT OpenCourseWare
<http://ocw.mit.edu>

9.20 Animal Behavior
Fall 2013

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.