9.20 MIT 2013

Lecture #14

Communication

Scott ch 4: ***D. Navigation, pp 76-86***

18. With reference to Q16 and Q17, for what abilities is the hippocampal formation in the brain most needed? (Read the boxes on p 86 and p 87.)

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18. With reference to Q16 and Q17, for what abilities is the hippocampal formation in the brain most needed? (Read the boxes on p 86 and p 87.)

Morris water maze: Learning is disrupted by damage to the hippocampus.

Homing pigeons. After lesions of hippocampus, compass information is spared. Map information is affected.

Also: Findings on two closely related bird species: Marsh tits and blue tits. The food hoarders must remember multiple locations. They have relatively larger hippocampi.

The marsh tits create food hoards. The blue tits do not.

Scott ch 4: ***E. Migration, pp 86-91***

19. Describe benefits and costs of long-distance migrations.

P. 86

Scott ch 4: ***E. Migration, pp 86-91***

19. Describe benefits and costs of long-distance migrations.

P. 86

Scott textbook mentions long-distance seasonal migrations by

- Green turtles
- Sockeye salmon
- Blackcap warblers
- Australian silvereyes (birds)

Benefits: reproductive success
Costs: Physical demands are huge.

Scott ch 4: ***E. Migration, pp 86-91***

20. How do you think evidence has been obtained that the stars are used to guide long-distance migrations of birds? Describe a practical method.

21. What cues besides the stars are used by such birds?

22. How do we know that migration behavior is innate?
    P 90-91

See next slide

Scott ch 4: *E. Migration, pp 86-91*

20. How do you think evidence has been obtained that the stars are used to guide long-distance migrations of birds? Describe a practical method.

    Initial flight directions in a planetarium, where star patterns can be varied independent of other factors.

21. What cues besides the stars are used by such birds?

    Sun, polarity of light, magnetic field of earth, olfactory cues

    (See next slide concerning the use of polarity of light—which has been particularly controversial.)

22. How do we know that migration behavior is innate?

    P 90-91: studies of European blackcap warblers (cross-breeding studies)

Please see:

Muheim, Rachel, John B. Phillips, and Susanne Åkesson. "Polarized light cues underlie compass calibration in migratory songbirds." *Science* 313, no. 5788 (2006): 837-839.

Video on Meerkats of the Kalihari Desert of southern Africa (Namibia, Botswana): George Page narrates for *Nature* on PBS, shown in class today *

Study questions based on the video have been posted:
Write answers as homework.

Horse communication

Reading assigned: Monty Roberts
Questions on the reading
Video available online

We may show this in class if there is time in class 15.

* A number of other videos or videoclips can be found on Google (search)

Homework due next class – posted separately on course web site

Questions on Meerkats

1. What inter-species interactions were indicated, not specifically involving predation?
2. Give at least two examples of communication among the meerkats.
3. Describe two examples of "altruistic" helping behaviors. For one of these, what evidence would support the conclusion that this behavior is a fixed action pattern?
4. Describe at least two behaviors that appear to be FAPs used in foraging by meerkats.
5. What is the major adaptation of this species to predators? One is stressed in the film, but there are others you can include.
6. There are some inaccuracies in the portrayal of meerkat behavior in the video and the narration by George Page. Describe one, using reports in the literature (use Google Scholar).

Scott (2005), ch 5, "Communication"
Introduction

1. Discuss with examples: adaptive and maladaptive effects of signals intended for communication.

- **Intention**: Scott's definition of the communication he is discussing is "intentional transfer of information" (voluntary or involuntary)
- **Honesty** can vary, so that a signal may be adaptive for one member of a species but not for others.
- **Detection by predators**: Not adaptive, and obviously not an intentional transfer of information.

Scott (2005), ch 5, “Communication”
B. Evolution and design of signals.

2. Most species of frog and toad communicate by auditory signals. However, one species of frog in Panama does not. **How** does the Panamanian golden frog communicate with its own kind, and **why** did this method evolve?

p 97

Scott (2005), ch 5, "Communication"
B. Evolution and design of signals.

2. Most species of frog and toad communicate by auditory signals. However, one species of frog in Panama does not. How does the **Panamanian golden frog** communicate with its own kind, and why did this method evolve?

p 97: **"frog semaphor"** – evolved because of the very loud noise of the fast-moving streams where they live.

cf. human communication: "body language". Non-verbal communication is mostly visual. Other species examples?

Panamanian golden frog

Scott (2005), ch 5, "Communication"
B. Evolution and design of signals.

3. Explain why the courtship display of the male water mite *Neumania pupillator* probably evolved. It involves his creating vibrations that resemble those of a prey animal.

p 98: the 2nd of two examples of "sensory exploitation"

1 **The first example is of particular species of orchid that resemble certain female insects.**

Please see:

Gaskett, A. C., C. G. Winnick, and M. E. Herberstein. "Orchid sexual deceit provokes ejaculation." *The American Naturalist* 171, no. 6 (2008): E206-E212.

Scott (2005), ch 5, "Communication"
B. Evolution and design of signals.

Back to the water mites:

3. Explain why the courtship display of the male water mite *Neumania pupillator* probably evolved. It involves his creating vibrations that resemble those of a prey animal. (2)

p 98: the 2nd of two examples of "sensory exploitation"

In the case of the water mites, it is the male that exploits the female's attraction to certain water vibrations.

Water mites

Photo removed due to copyright restrictions.

3

Another example of the same phenomenon:

Water-striders

"Deception does indeed sometimes pay. Male waterstriders use water-surface signals that trick females into approaching them as if they were prey, to a distance close enough for the male to forcefully initiate mating."

Photo removed due to copyright restrictions.

Scott (2005), ch 5, “Communication”
B. Evolution and design of signals.

4. Why do female swordtail fish prefer males with a long tail extension? (See box on pp 99-100.) Try to give at least one example of the same kind of thing in human behavior. (There are many.)

Swordtail fish

Male

Female

Scott (2005), ch 5, "Communication"
B. Evolution and design of signals.

4. Why do female swordtail fish prefer males with a long tail extension? (See box on pp 99-100.) Try to give at least one example of the same kind of thing in human behavior. (There are many.)

- We are talking about sexual selection. There are many examples.
- What limits sexual selection?
- Why are its effects so variable even within a single species like the humans?

Scott (2005), ch 5, "Communication"
B. Evolution and design of signals.

4. Why do female swordtail fish prefer males with a long tail extension? (See box on pp 99-100.) Try to give at least one example of the same kind of thing in human behavior. (There are many.)

- We are talking about sexual selection.
- There are many examples.
- What limits sexual selection?
  - *Answer*: Costs that reduce an individual's reproductive potential, e.g., by increasing the probability of predator attack.

Scott (2005), ch 5, "Communication"
B. Evolution and design of signals.

4. Why do female swordtail fish prefer males with a long tail extension? (See box on pp 99-100.) **Try to give at least one example of the same kind of thing in human behavior. (There are many.)**

Examples in humans:

- Physical characteristics of one sex are enhanced—characteristics not always directly related to reproductive abilities
- Young males drive fast, fancy cars
- Older males may wear Rolex watches
- Women in some areas wear gold bangles, diamond earrings, the most recent fashions, etc.
- There are many cultural and local variations.

Recent research on sexual selection

Nature 2007, vol 447,p 202-205

"Sexual dimorphism and adaptive radiation in *Anolis* lizards"

The males and females of certain species have differences that are greater than some inter-specific differences. The sexes can occupy somewhat different ecological niches. This raises questions about the consequences for behavior and for speciation.

9.20 Animal Behavior
Fall 2013