Lecture 6–
Behavior – ethology
Communication

• Rich history of behavioral studies of birds

• Birds display a wide range of innate and learned behavior patterns
Bird Flu Moves West, Spreading Alarm

Where does it stop? After circulating in Asia since late 2003, in February, the H5N1 avian influenza virus jumped to Africa and spread through Europe, affecting 13 countries in a single month. It’s unclear why the sudden jump has occurred.
Overview - Behavior

- Chapter 8 (Gill) – Vocalizations  
  – (Lecture 6)
- Chapters 9 – The Annual Cycle of Birds
- Chapters 10 – Migration and Navigation  
  – (Lecture 7)
- Chapter 11 – Social Behavior (Lecture 8)
Behavior – some basic ideas with examples from birds

• Innate behavior – responses that are highly resistant to modification; stereotyped, instinctive behavior; genetically determined and inherited; “nature” side of argument

• Learned behavior – adaptive modification of behavior through experience; “nurture side of argument
Classic Examples of Innate Behavior

- Championed by Konrad Lorenz
- “Legs move the animal” - reflexes
- “Fixed action patterns”
  - Migratory behavior
  - Courtship behavior
  - Food begging
  - Mobbing of predators
  - Brood parasitism
Time (varies)

Specific action Potential
“nervous energy”

Sign stimuli

Threshold

Consummatory Act
Fig. 6.1. Mutual Displays of Gannet (A), Adelie Penguin (B), Wandering Albatross (C), and Four Species of Grebes (D-G).
Figure 9-15

(A) Aggressive displays
Forward position
Forward position

(B) Meeting ceremony
Oblique posture and long call
Forward position
Facing away
Classic examples of “learned” behavior

• Championed especially by experimentalists studying man

• Examples
  – Parids sipping milk
  – Use of tools
  – Stone-throwing by vultures
  – Habituation
  – “Trial-and-error”
Box 7-5  From Gill – Alex the intelligent parrot
“Imprint” learning in the California Condor

-Chick learns to recognize its own species or
-“improper recognition” to obtain sperm for later artificial breeding
Habituation – a form of learning

- Animal learns not to respond to stimuli without significance

- Examples
  - Young bird learning that a butterfly is something to eat and not to be afraid of
  - Birds living near roads
  - Common loons habituated to canoeists, boaters
Combinations of innate and learned behavior – “learning by instinct”

- Process of learning is often initiated and controlled by instinct, predisposed to learning certain phenomenon
- Instinct – an inborn tendency to behave in a way characteristic of a species – e.g., a natural or acquired tendency, a “knack” or talent
- Example shown by song development
The Biology of Learning, 1984

HATCHING

ACQUISITION OF SONG MEMORY

SENSITIVE PERIOD

50 DAYS

STORAGE

100 DAYS

REHEARSAL AND STABILIZATION

150 DAYS

a)

WHITE-CROWNED SPARROW'S SONG

SONG SPARROW'S SONG

b)

SONG SPARROW'S SONG

SUBSONG

CRystallized SONG

c)

NO SONG

SUBSONG

CRystallized SONG

d)

YOUNG MALE DEAFENED

WHITE-CROWNED SPARROW'S SONG

SUBSONG

CRystallized SONG
Why do Birds Communicate?

- Resolve conflicts
- Cooperation
- Courtship
- Pair formation
- Pair maintenance
Types of Communication

- Visual displays
- Vocalizations
Visual Communication

• Concealment
  – Cryptic coloration

  – “Bright & Bold”
Visual Communication

• Species recognition
Displays

• Phylogeny of morphological & behavioral traits are often correlated

• Displays are usually ritualized (i.e., highly stylized)

• Used for
  – Mating / courtship
  – Aggressive encounters
Fig. 6.1. Mutual Displays of Gannet (A), Adelie Penguin (B), Wandering Albatross (C), and Four Species of Grebes (D-G).
Mating Display

Greater Prairie Chicken
Vocal Communication

1. Calls
2. Songs
3. Mechanical
Syrinx

• Unique vocal apparatus – 2 halves, can provide 2 independent voices (see Box 8-3)
• Located at the junction of the trachea and 2 primary bronchi
• Humans use approx 2% of air flow to produce speech
• Birds use almost 100% of air flow to produce sound
Cross-section of a generalized passerine syrinx. After V. Hacker 1909, as redrawn by Grenewalt 1968.
Types of Vocal Communication

1. Calls – brief, acoustically simple sounds
2. Songs – much longer in duration than calls, typically acoustically more complex
3. Mechanical sounds not produced in syrinx
FIGURE 11–3. Sound spectrograms of the two warning calls of the Chaffinch. The “chink” note is easily located because of its low frequency (long wave length), short duration, and sharp beginning and end. The “seet” note is difficult to locate because of its high frequency, long duration, and gradual beginning and end. After Thorpe, 1956a.
Common Yellowthroat

Call

Song
Figure 10-1

Oscillogram – amplitude modulation

Sonogram – distribution of energy

(A) Spruce Grouse

(B) Blackpoll Warbler – note in kilohertz
Song Types

1. Primary song
   1. Territorial defense, mate attraction

2. Secondary songs
   1. Whisper songs – quiet song, practice
   2. Duetting – simultaneous singing by 2 individuals, often male & female
Mechanical Sounds

1. Mandible rattling – storks
2. Drumming – grouse, woodpeckers
3. Whistling – ducks
4. Wings – woodcocks, nighthawks
5. Tail feathers – Common Snipe
6. Esophageal extensions
Song Ecology

• Song frequencies tend to be associated with vegetation
  – Low frequencies in dense vegetation
  – High frequencies in sparse vegetation, open

• Song perches used to enhance conspicuousness

• Birds of open areas often have elaborate aerial displays
Vocal mimicry – e.g., mockingbird ("Mimic thrush")
Song dialects in the Bewick’s Wren

Grand Junction, Colorado

Santa Barbara, California

Madera Canyon, Arizona
In Tune With the Animals

Wondering what a zebra or a silkworm sounds like? Check out Listen to Nature, which holds 400 samples from the British Library’s vast sound collection. Hear clips including a yipping Arctic fox, the chirps of a Namibian sand gecko, and the dawn chorus of creatures in an Australian rainforest.

In The Language of Birds, the site’s creators have scattered bird recordings within a review article packed with facts about bird communication. You can listen to a marsh warbler, which steals from other birds’ songs, or Alex, an African gray parrot who can reportedly identify colors and objects. Above, a sedge warbler, which stops singing when it finds a mate.