Anthro 101: Human Biological Evolution

Lecture 9: Primate Behavior - Ecology

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Homework
Why do primates live in groups?

- Benefits of group life
- Costs of group life
- Why do primates live in so many kinds of groups?
  - Balancing costs & benefits
- What is the influence of
  - Resources (diet), predators, climate, “conspecifics” on these groups?

= Socioecology
1. Why do primates live in groups?

- Most mammals are solitary
- Many prosimians solitary
- Why are diurnal primates social?
Major benefits of group life

- Protection versus predators
- Better access to resources
- Access to potential mates
Large cats prey on primates

Raptors prey on primates

Crocodiles eat primates

Snakes eat primates, too!
Primates prey on other primates

Chimps hunt red colobus monkeys

Baboons prey on vervets
Humans and domestic dogs kill primates

Local hunters with a duiker and two russet-eared guenons.

Hunter with gorilla head

Dog with langur infant
Predation is rarely observed, but can sometimes be inferred

drag marks
leopard paw print
baboon jaw & hair
Indirect evidence of predation

- Wound observed
- Healthy animals disappear overnight

Oryx, back wound

Juvenile, scalp wound
For **diurnal** primates, living in groups is an effective anti-predator strategy

= the **Predation Model**

1. Detection
2. Dilution
3. Defense
**Detection:** In larger groups, there are more eyes to watch out for predators.
Spider Monkey Detection

• http://video.nationalgeographic.com/video/monkey_spider
**Dilution:** In groups, any particular individual less likely to be caught by predator

Imagine chance of being caught = $1/n$, where $n =$ group size

risk = 1/2

risk = 1/12
Defense: Many strategies for diurnal primates

- Sleep in trees, cliffs
- Defensive weaponry
- Large body size
- Vigilance
- Alarm calls
- Mobbing
- Interspecific associations
Baboon Groups Defense

Two or more species may associate to reduce predator risk: **Interspecific Associations - 3D’s**

Diana monkey

Red colobus

Ground predators

Eagles
Nocturnal primates use different strategies

- Hide during day
- Park infants while feeding
- Solitary
- Quiet
- Cryptic
Living in groups also has costs

1. Competition
2. Contagion
3. Cuckoldry
4. Inbreeding
5. Cannibalism
6. Infanticide
Group Questions

• Why do primates live in groups?
• What are the cost/benefits of group life?
• What are the three parts of the Predation Model?
2. Natural selection shapes social organization to balance the costs & benefits of group living

- **Socioecology** = study of how ecological forces shape the size and structure of social groups
Solitary (but differentiated social relationships)

- each individual lives alone, occasionally meet up for mating
- may choose to neighbor with kin, meet more often
Monogamous (territorial pairs + offspring)

Titi monkeys

Gibbons
One-male, Multi-female groups (polygyny)

Black and white colobus
Mountain gorillas
One-female, two-male groups (Polyandry)
Multi-male, multi-female groups

Ring-tailed lemurs

Savanna baboons
Communities (fission-fusion social organization)

Spider monkeys

Chimpanzees
Going APE
Some argue that primates live in groups to better compete for resources

= Resource Defense Model

→ Between group competition

To understand competition you need to understand:

• **Diet** – How big is the species? How much space is needed to find enough food?

• **Food distribution** – Where & how does the food grow?

• **Female reproduction** – Timing & Frequency?

• **Protection** – Are males a threat to females & infants? Are males needed for protection?

• Affect what kinds of groups primates will form and when
Body size affects required quality & amount of food in diet

• Larger bodies need more food, but less energy per pound
  • can get enough by eating lots of lower quality leaves

• Smaller bodies need less food, but more energy per pound
  • To get enough need smaller amount of high quality insects, fruit
The distribution of food affects the type of competition

- **Dispersed --> scramble competition**
  - Food is distributed evenly
  - Food items not worth fighting over
  - Scramble to get enough food
  - no direct competition

- **Clumped --> contest competition**
  - Resources are scarce & valuable
  - Resources are worth fighting over
  - Contest access to particular resources
Groups will form based on the species’ diet

• Is a food defensible? If yes, then species will form groups that cooperate to defend food resources.

• Larger groups will defend more successfully than small groups
• Larger groups need more resources than small groups

• Defend territories
• Defend resources within homerange
Competition for food very important for females

- Food affects:
  - Ability to conceive
  - Viability of pregnancy
  - Lactation
- Male reproduction is more influenced by access to females than by nutrition
Contest competition can produce a dominance hierarchy

- If A always beats B & C, and B always beats C
  = dominance hierarchy
Food, competition, and social behavior are thought to be linked.

- Clumped Foods → Contest Competition → Dominance Hierarchy
- Value of Alliances
- Female Relationships
- Dispersal Patterns

Allies can help win rank!
If females benefit from alliances…

• Will develop relationships with allies
  → Hang out together
  → grooming

• May prefer kin as allies
  • Kin share genes = kin selection

• Will remain with allies/kin for life
  • Females will be philopatric
  • Matrilineal dominance hierarchies
  • Males will disperse to prevent inbreeding
If dominance does not affect access to resources, then…

Eg: gorillas & langur monkeys
+ little between group competition, too or its about defending females

Dispersed food → Scramble → Unstable hierarchy

- Weak bonds
- Male/female dispersal
- No alliances