

# Anthro 101: Human Biological Evolution

## Lecture 11: Cooperation, Intelligence, Communication, Culture, & Human Behavior

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# Reminders

- Exam Next Monday

What do you do to help others?



# Many primates behave in ways that benefit others



Coalition formation



C. Stanford

Food sharing



Allo-maternal care



J. Manson

Territorial defense

# What is Altruism?

- **Altruism** is when we act to promote someone else's welfare, even at a risk or cost to ourselves.
  - Is this what primates do?
  - Can acts be altruistic?
  - Can our behaviors evolve?

# The costs & benefits of social interactions: It takes two

	Actor's Fitness	Recipient's Fitness
Selfish	+	-
Mutualistic	+	+
Altruistic	-	+
Spiteful	-	-

easily explained  
by natural selection

} cooperation

rare or absent in  
non-humans

# For altruism to evolve, must limit altruism to other altruists

- **Kin Selection**

- Limit altruism to kin



S. Alberts

- **Reciprocal Altruism**

- Limit altruism to those who help you



# 1. Predictions about Kin Altruism

**$C < rB$  (Hamilton's Rule)**

*C = Cost to the giver*

*B = Benefit to receiver*

*r = Relatedness (probability  
receiver carries identical copy of  
gene)*

1. **No altruism toward nonkin ( $r = 0$ )**

2. **Altruism biased toward close kin**

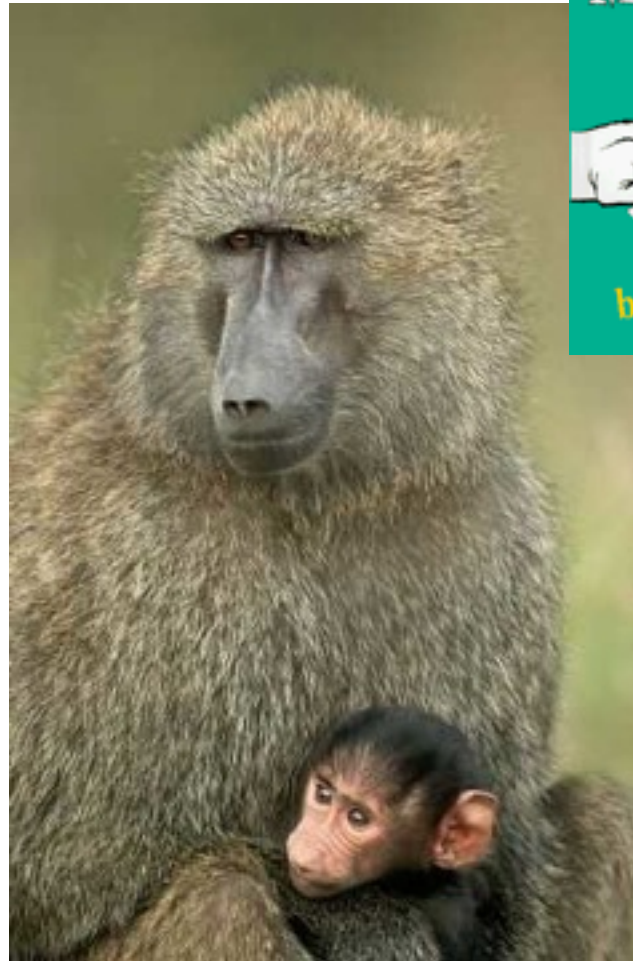




# How do we know who is kin?

## **Mothers**

- Learn via close contact  
= familiarity
- Learn about female kin  
via time with mom
  - Siblings, aunts,  
grand mom
- Fathers?



# Can primates recognize paternal kin?

Rules of thumb:

- Did you mate with the mom?
- What other males mated with the mom?

Will vary by type of social group

- Pair-bonded species
- One-male groups
- Multi-male groups

If one male does 100% of mating:

- = **father** of all kids conceived during his tenure
- = all kids born during his tenure will be **paternal half siblings**



## 2. Cooperation via Reciprocal Altruism

- Individuals take turns giving and receiving benefits
- Reciprocal altruism requires
  1. Frequent opportunities to interact
  2. Keep track of help given and received by specific individuals
  3. Stop helping if don't receive help in return
- ✓ Don't get cheated!!
- ✓ Primates likely to meet requirements



# Ted Talk



# Lets Talk About the Video

- What do you find interesting?
- Can we learn something about studying nonhuman primate altruism?
- Did you think nonhuman primates could understand fairness?
- Do we need to be taught morality?

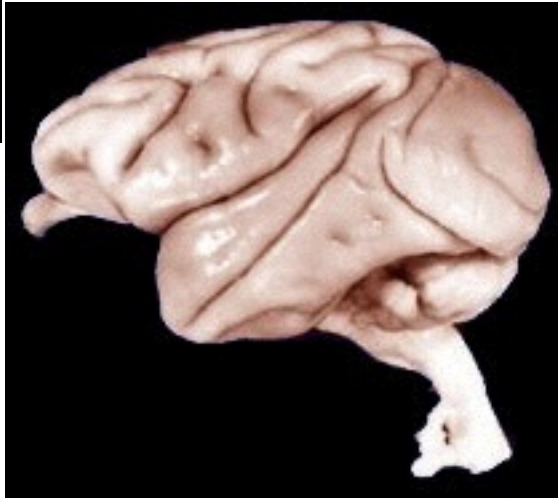
# Whats different about the Primate Brain?

- Hint:
  - its all about the neocortex

# Monkeys and apes have big & complex brains, particularly neocortex – why?



galago



rhesus



chimpanzee

- Cooperation
- Learning
- Complex behavior
- Problem solving

# Learning and problem solving skills may have evolved to function in specific contexts

## 1. Solving complex ecological problems

- Processing inaccessible food items
  - **Extractive Foraging**
- Locating and remembering food sources
- Navigating between food sources
  - **Cognitive Maps**



= **Ecological Intelligence Hypothesis**



# Extracted foods especially important to ape diets



Orangutans eat durian fruits



Chimps fish for ants in trees



Neesia fruit covered in spines



Chimps  
crack nuts  
with stones

# Ecological challenges play a role but are probably not the whole explanation for big brains

- Extractive foragers include:
  - Apes = big brain
  - Capuchins = big brain
  - Aye-eyes = not so big brain
    - Though large for a prosimian...
- Small-brained animals construct cognitive maps, navigate long distances, forage efficiently



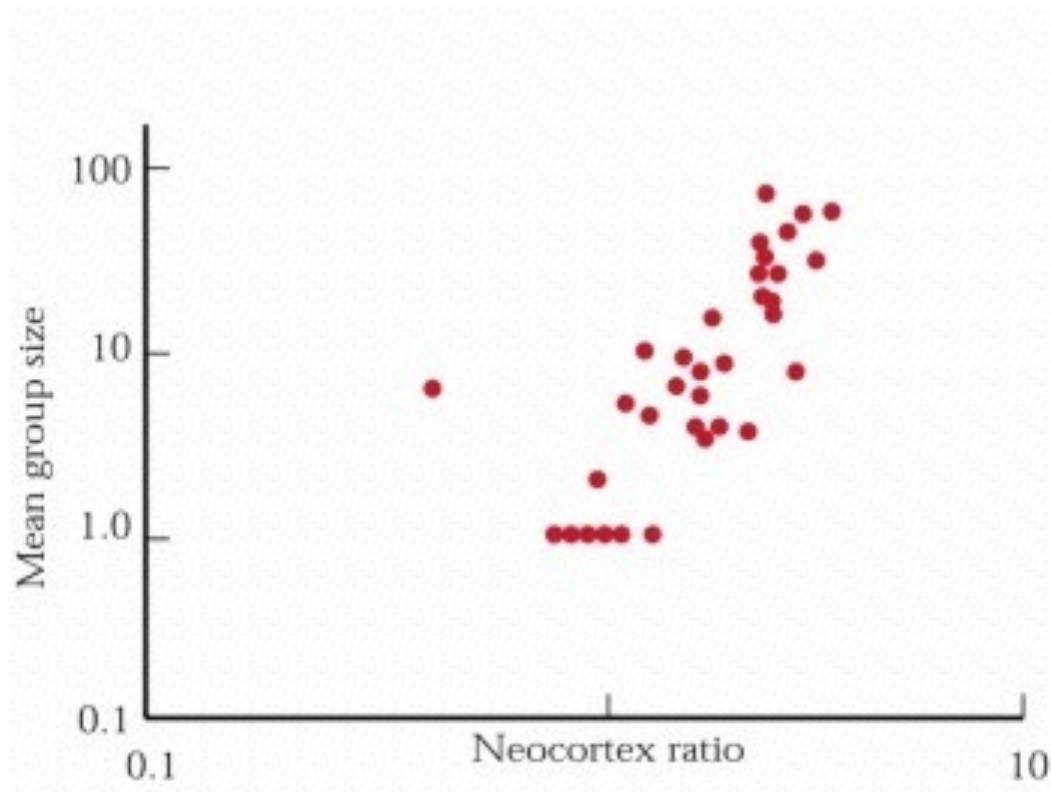
# Learning and problem solving skills may have evolved to function in specific contexts

- Solving complex **social problems**
  - Keeping track of kin
  - Keeping track of relative rank
  - Remembering benefits given & received
  - Manipulating rivals
  - Managing coalitions

All the joys of living in a large group!



# Comparative data DO link group size to cognitive development



But its not clear exactly what group size is measuring...

Dunbar  
1998

# So why are primates intelligent?

- Social complexity & group size not the whole story
  - Apes all live in relatively small groups
- Ecological skills quite advanced in apes
  - Apes do use lots of extractive foods
  - Some foraging skills take long time to learn
  - Big brain may be linked to foraging challenges
- Likely both played a role



# But, what about our Brains?

- What makes the human brain so different?

# Lets Look at One Possible Explanation



# How do we define culture in humans?

- Learned
- Patterned
  - Nonrandom
  - Inter-related
    - Systematic
- Transmittable
  - Learned
  - Stored
  - Accumulates
- Are humans unique?





# How do we define culture (protoculture?) among nonhuman primates?

- Information acquired via social learning
- Not a species typical behavior
- Not genetically inherited
- Presence/absence not only due to ecology
- Different patterns of behavior in different groups



# Culture, Behavioral Traditions, Protoculture

- Potato washing in Japanese macaques
- Chimps:
  - Ant fishing
  - nut cracking
  - Hand-clasp groom
- Still, a large difference from humans
  - Single behaviors
  - Limited domains
  - Little accumulation

