

# ANTH 42: Primates in Nature

## Lecture 5: Methods wrapup; lorisoids

Student-Run Workshops for Environmental Professionals Find your niche in the community!! Join us for a four-workshop series to connect with Student Organizations, Faculty, Government Officials, Non-profit, Corporate, and Social Service Community Leaders and more!!

1. Entering the Scene  
a. Reconstructing "Sustainability"  
b. Envisioning a Sustainable Future  
c. Build Your Community  
April 15th 2-3:30PM  
PC West Red Shoe Room
2. "Professional Engagement"  
a. Why Professionalism?  
b. Society and the Environment  
c. Enter into Dialogue  
April 22nd 5-6:30PM  
PC West Thurgood Marshall Room
3. Project Management  
a. Green Business Tools  
b. Project Planning Process  
April 29th 2-3:30PM  
PC West Thurgood Marshall Room
4. Creating Change  
a. Legal Frameworks  
b. Civil Engagement  
c. "Walking the Walk"  
May 6th 3:30-7:30PM  
Great Hall @ ERC

Students that attend this workshop series ( 4 class sessions) will improve their networking skills, create connections with San Diego area and be recognized with a certificate of completion. Any further questions e-mail [dminer@ucsd.edu](mailto:dminer@ucsd.edu) (626) 298-3838

## Quiz clock

Minutes remaining: **ONE**

30 sec ...

5 4 3 2

## LIFE HISTORY THEORY

"...natural selection favors organismic life cycles in which resources are allocated among **growth, maintenance and reproduction** in relation to age or size in a manner that maximizes the reproductive potential across individual life spans."

Pereira 1993: 17

"Nature has ensured" - shorthand for natural selection acting on *pattern of behavioral development*.



## Can genes *do* that?

- Talking about plant thorns as anti-monkey tactics, clearly genetic (doesn't mean fixed - feedback with grazing!).
- Talking about humans, hard to see how genes could handle the complexity of what we do; we figure out strategies and think tactics through.
- Other primates ... somewhere in between?
- But first - examples of 'genetic strategies'

To read

more: <http://neurophilosophy.wordpress.com/2006/11/20/brainwashed-by-a-parasite/>

## Just how complex?

Zombie snails [http://www.youtube.com/watch?v=EWB\\_COSUXMw](http://www.youtube.com/watch?v=EWB_COSUXMw)



### Parasite Transforms Ants Into "Berries"



Nematode worm

Email to a Friend National Geographic: News 1 of 4 Next >>  
January 16, 2008—Where's the ant? RELATED STORIES

## Idea of animal as strategist

But always mediated by development: *epigenesis*

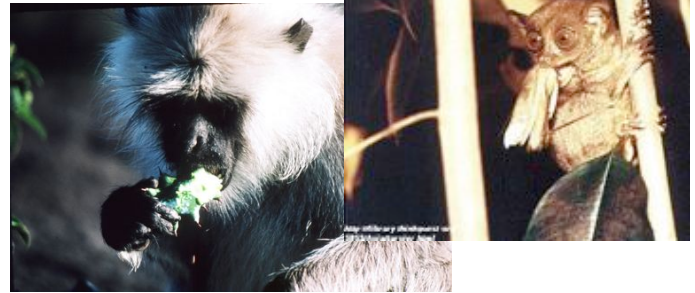


So you can find nasty labs, nice pit bulls...

## NOW: what's important to primates?

Diet quality key; tradeoff

### Food

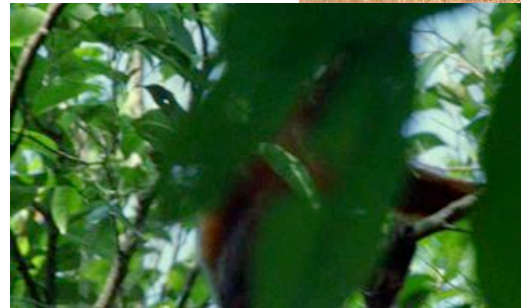
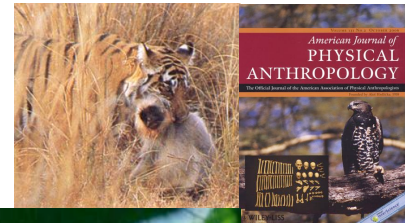


### Food: quality vs quantity



### Predation

Seldom seen - why not?



### Diet & predation: tradeoffs again

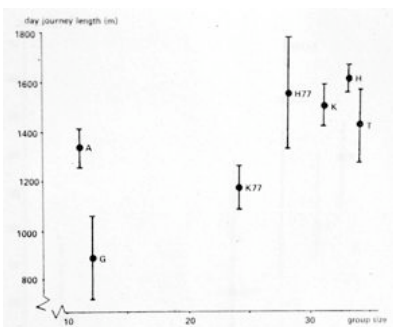
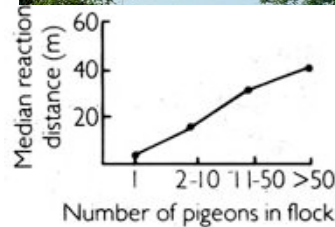
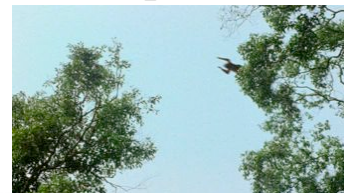


Fig. 2. Mean day journey length as a function of group size. Indicated are the 95% confidence limits for the mean. Sample sizes (days): A: 30; K77: 38; H77: 9; K: 54; H: 108; G:

Larger group: eat more, more competition, have to travel farther to find food.  
Bad.

### Diet & predation: tradeoffs again

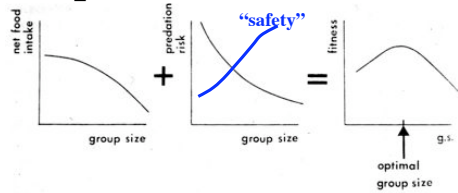


Larger group: more protection, more eyes to spot predators.

Good.

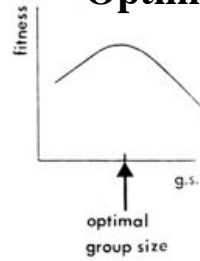
# Back to what's important to primates

## Diet & predation: tradeoffs again



Tradeoff yields optimum.  
(It's a great conceptual model; good luck measuring the variables...)

# Optimal group size: so what?



- Group size**
- Limits maximum # relationships
  - Constrains minimum # relationships
  - Determines the context in which behavioral tactics play out

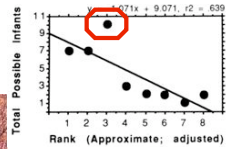
Value of optimum influenced by type of diet (leaves, fruit, insects); body size (locomotion & predation) & more...

Tradeoff yields optimum.  
(It's a great conceptual model; good luck measuring the variables...)

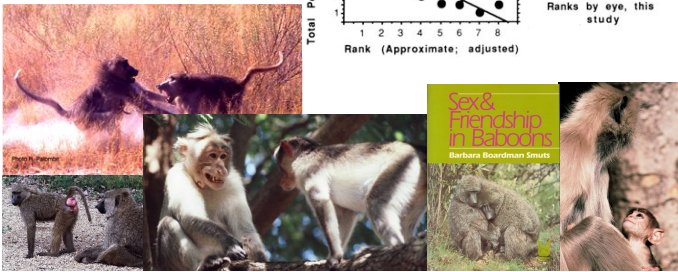
Important set of behavioral tactics critically depending on group size:

## Reproduction

No surprise; it's complicated...



Duvall et al. 1976; caged rhesus  
p = 0.02  
Ranks by eye, this study



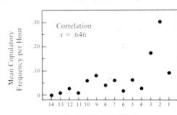
## Life history theory

1. Growth (food & other resources, safety)
2. Maintenance (ditto)
3. Reproduction (access to mates, plus the resources/safety needed to grow offspring)

So - those were problems; types of solutions?

## No problem understanding selfishness

FIGURE 5-4 Male mating success in a troop of yellow baboons



A male's copulatory frequency is related to his rank in the male dominance hierarchy. (Days D-7 to D-1 combined; data from Hausfater, 1975, Table XXIV [265].)



Joseph L. Pepp and Irven DeMee

Aggressive Competition and Social Dominance Theory: Synopsis

Synopsis

Discussions of the origin of the biological offers attributed to primate social aggression in the case under what circumstances this question we provide some insights, in terms of maximization of an individual's



## Big problem understanding altruism



Grooming certainly seems like it's "being nice" at any rate...

# Big problem understanding altruism



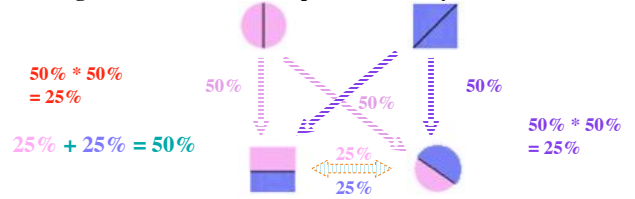
& 'nasty, brutish & short' suggests nice guys finish last. **What's up?**

# Genetic relatedness

Proportion of genes shared is predictable, though sharing of any specific allele is not.

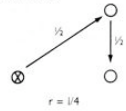
Parent-offspring 'coefficient of relatedness'  $r = 0.5$  (50%) shared 'directly' each parent

Sibling  $r = 0.5$  (50%) shared *probabilistically*



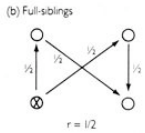
# Kin selection, nepotism, and inclusive fitness

(a) Half-siblings

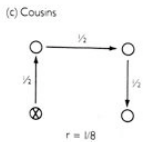


Insight of W. D. Hamilton in 1964:

From gene's perspective, parent-offspring is nothing special...



Egg & sperm each *haploid* (50% of parent's genome)



Hamilton, W.D. (1964). The genetical evolution of social behaviour I and II. *J. Theoretical Biology* 7: 1-16 and 17-52

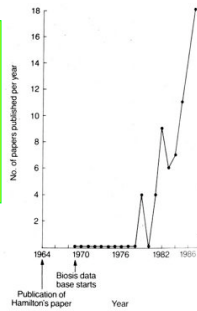
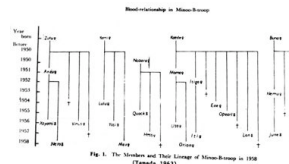


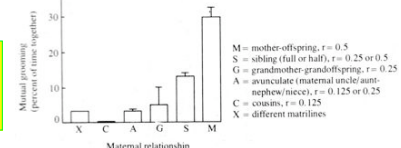
Fig. 1. The number of papers published on kin recognition each year from 1969 to 1980. Based on a computer search of the phrases 'kin recognition' or 'recognition of kin' found

# Kin selection, nepotism, and inclusive fitness

Long known kinship important to monkeys...



... and on looking, grooming is proportional to kinship



The data represent the percentage of the total time a pair spent together, during which either groomed the other. Relationships are reckoned through maternal links only, since paternity is unknown. (After Kurland, 1977, Figure 6 [251].)



Tassel-eared marmosets, *Callithrix humeralifera*

... at the nest.

Not just primates; e.g., Florida scrub jays. Dynamics similar (later lecture).



# Helpers

Callitrichids (marmosets & tamarins, NWM)

# Reciprocal altruism



Vampire bats and blood sharing

What about non-relatives?

Trivers, R. L. (1971) The evolution of reciprocal altruism. *Quarterly Review of Biology*. 46: 35-57

## Problems



The small, insect-eating evening bat is an altruistic creature. Nursing females have been known to give their milk away to the pups of other mothers.

Mexican free-tailed bat mothers sometimes nurse unrelated pups.

*Altruism?*

They roost in colonies of up to 20,000,000 individuals, at densities of hundreds per square foot.

... or costly decisions?



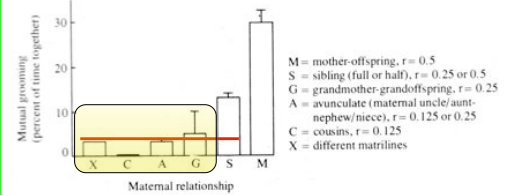
## Problems

Mutual grooming as a function of the relationship between the two monkeys, in a troop of Japanese macaques (*Macaca fuscata*)

First, is it "altruism"?

(or does groomer gain directly)

Second, how good is that fit, really?



The data represent the percentage of the total time a pair spent together, during which either groomed the other. Relationships are reckoned through maternal links only, since paternity is unknown. (After Kurland, 1977, Figure 6 [351].)



Callitrichids: Emperor tamarins (*Saguinas imperator*)



## Helpers at nest

Not always kin...

so why do non-kin help? And if non-kin help (for some non-kinship reason), do kin help for the same reason[s]??

## New class of ideas ...

Cooperation, mutualism - common interests

Bartering, "biological marketplace" -- reciprocal altruism with an edge



## Exciting times in primatology...

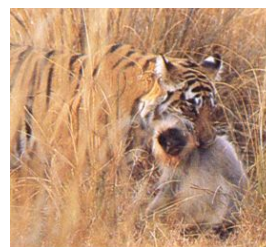
Goal today was to establish the case for "animals as strategists" and to think about patterns of behavior and demography as adaptations that we can explain.

We can understand *function*, not merely describe patterns

QUESTIONS?

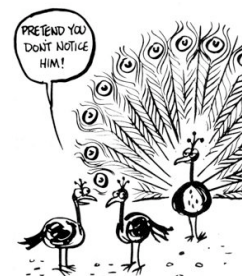


## A last theoretical insight ...

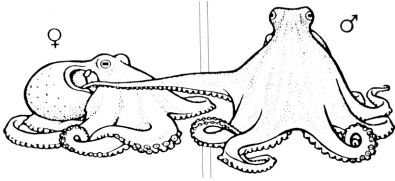


"Natural selection" in narrow sense easy to understand: carnivores eat (smaller) herbivores, inefficient foragers starve - the metrics are "obvious"

Sexual selection not so clear: who selects whom, and why?



## Parental investment and sexual selection



**Tends to be choosy females, less-choosy males...**

Trivers, R.L. (1972). Parental investment and sexual selection. In B. Campbell (Ed.), *Sexual selection and the descent of man, 1871-1971* (pp. 136-179). Chicago, IL: Aldine.

**Members of the sex that invests most in the young becomes a limiting resource for the other, so can be choosy. The other sex competes to be chosen.**



Jacana: male incubates; polyandrous

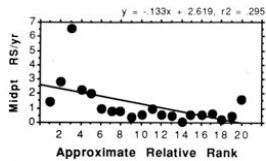


**ESPECIALLY**  
for mammals...

**Why??**



## Sexual selection not just mate choice; competition & control



Curie-Cohen et al. 1983; caged rhesus

$p = 0.01$

Ranks by eye, this study

**i.e., dominance and power**

**“Power is the ultimate aphrodisiac”**  
- Henry Kissinger

**BUT, choosiness can manipulate competition, choice can be internal (cryptic female choice of gametes), etc. COMPLEX - as I said earlier.**

