ANTH 42: Primates in Nature

Lecture 5:   Methods wrapup; lorisoids

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 doing; we figure out strategies and think tactics through.**

- **Other primates … somewhere in between?**

- **But first - examples of 'genetic strategies'**

Just how complex?

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

Zombie snails http://www.youtube.com/watch?v=EWB_COSUXMw

Parasite Transforms Ants Into "Berries"

Nematode worm

National Geographic News   1 of 4 Next >>
January 16, 2008—Where's the ant?

RELATED STORIES

Idea of animal as strategist

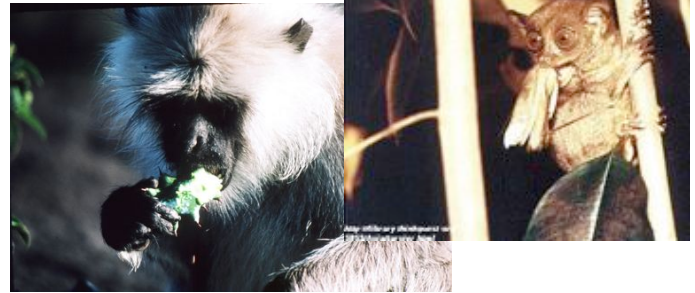**But always mediated by development:** *epigenesis*
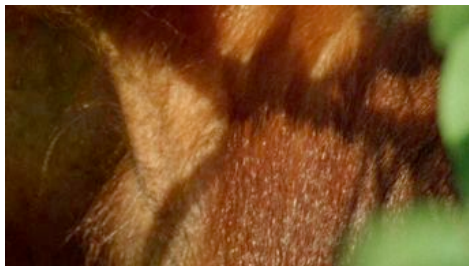

So you can find nasty labs, nice pit bulls...

NOW: what's important to primates?
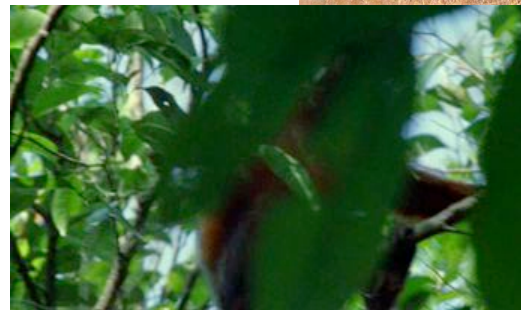
Food

Diet quality key; tradeoff

Food: quality *vs* quantity

Predation

Seldom seen - why not?

American Journal of PHYSICAL ANTHROPOLOGY

Diet & predation: tradeoffs again

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

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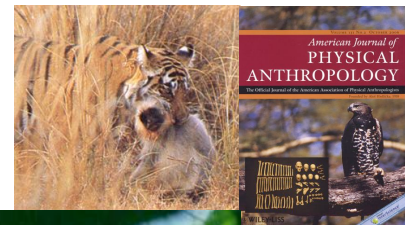
Fig. 2. Mean day journey length as a function of group size. Indicated are the 95% confidence limits for the mean. Sample sizes (days): A: 30; K77: 38; H77: 9; K: 54; H: 108; G:

Diet & predation: tradeoffs again

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

Good.

Median reaction distance (m)

Number of pigeons in flock

Back to what's important to primates

Diet & predation: tradeoffs again

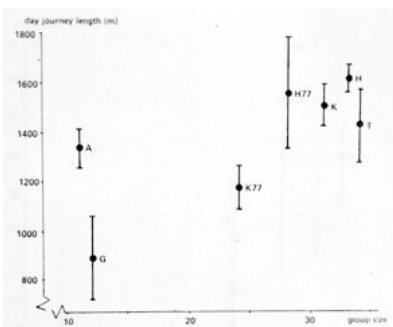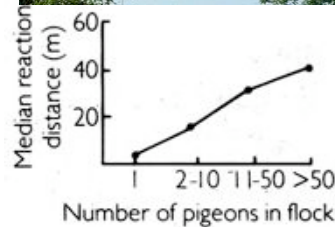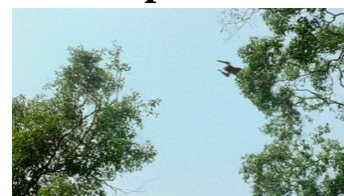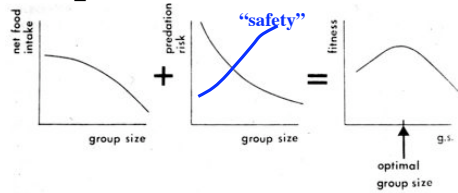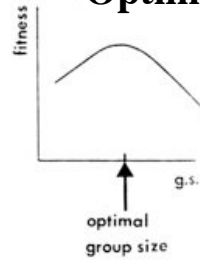
Tradeoff yields optimum.

(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...
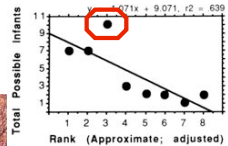
Duvall et al. 1976; caged rhesus

p = 0.02

Ranks by eye, this study
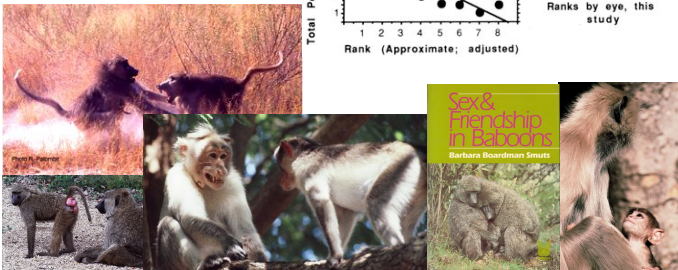
Life history theory

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

Joseph L. Popp and Irven DeVore

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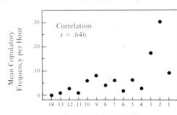
A male's copulatory frequency is related to his rank in the male dominance hierarchy. (Days D-7 to D-1 combined; data from Hausfater, 1975, Table XXIV [265].)

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*

50% * 50% = 25%
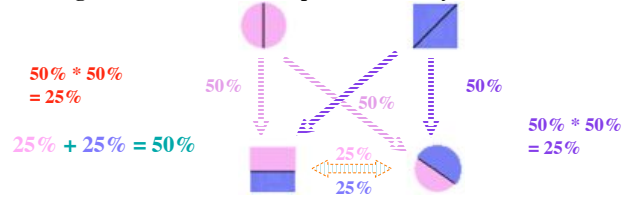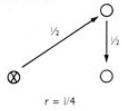
25% + 25% = 50%

50%

50%

50%

50%

50% * 50% = 25%

25%

25%

Kin selection, nepotism, and inclusive fitness

(a) Half-siblings

r = 1/4

(b) Full-siblings

r = 1/2

(c) Cousins

r = 1/8

Insight of W. D. Hamilton in 1964:

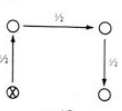**From gene's perspective, parent-offspring is nothing special...**
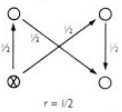
Egg & sperm each *haploid* (50% of parent's genome)

Hamilton, W.D. (1964). The genetical evolution of social behaviour I and II. *J. Theoretical Biology* 7: 1-16 and 17-52
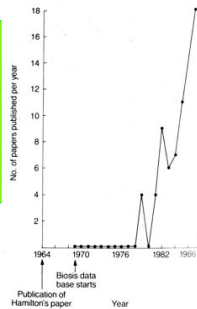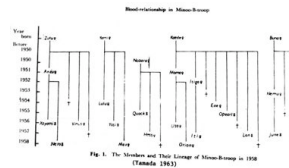
Fig. 1. The number of papers published on kin recognition each year from 1969 to 1986. Based on a computer search of the phrases 'kin recognition' or 'recognition of kin' found

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Kin selection, nepotism, and inclusive fitness

Long known kinship important to monkeys...

... and on looking, grooming is proportional to kinship
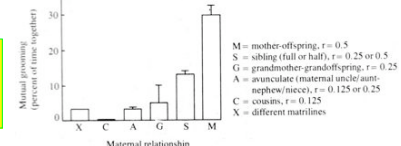
Mutual grooming as a function of the relationship between the two monkeys, in a troop of Japanese macaques (Macaca fuscata)

M = mother-offspring, r = 0.5
S = sibling (full or half), r = 0.25 or 0.5
G = grandmother-grandoffspring, r = 0.25
A = avunculate (maternal uncle/aunt-nephew/niece), r = 0.125 or 0.25
C = cousins, r = 0.125
X = different matrilines

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].)

Helpers

Callitrichids (marmosets & tamarins, NWM)

Tassel-eared marmosets, *Callithrix humeralifera*

… at the nest.

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

Reciprocal altruism

What about non-relatives?

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

Vampire bats and blood sharing

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.
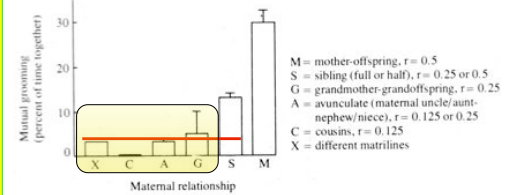
… or costly decisions?

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?

M = mother-offspring, r = 0.5
S = sibling (full or half), r = 0.25 or 0.5
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Helpers at nest

Callitrichids: Emperor tamarins (*Saguinas imperator*)

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

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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
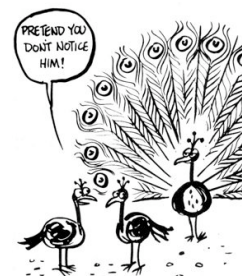
QUESTIONS?

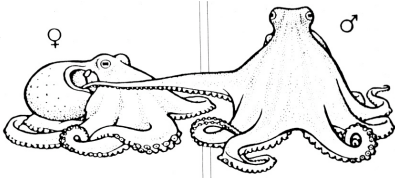## A last theoretical insight …

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

PRETEND YOU DON'T NOTICE HIM!

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.
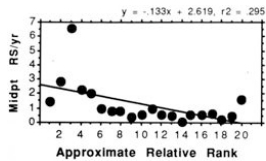

Jacana: male incubates; *polyandrous*

ESPECIALLY for mammals...

Why??

WIFE FEEDS DOG FOOD TO HUBBY 12 YEAR

Sun

World's champion stud: MAN FATHERS 1,262 BABIES

Why Charles and Di are splitting up

The day that Cher almost committed suicide

MEDICAL MIRACLE: Doctors separate Siamese twins

The man with electric eyes

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 (crypic female choice of gametes), etc. COMPLEX - as I said earlier.