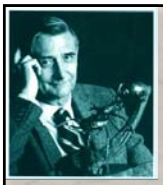
Sociobiology and Altruism



E. O. Wilson: *Sociobiology: The new synthesis* (1975)

- Most of the book deals with ants and ant social behavior
- Last chapter: Human Sociobiology
  - Human behavioral traits are adaptations
  - "Fashions in dress and speech.....are for the most part adaptive."
  - "The requirement for an evolutionary approach to ethics is self-evident."
- Reground the social sciences on evolutionary biology

Human Sociobiology

Traditional sociology and anthropology: account for the features of society in terms of environmental forces

"*The central tenet of human sociology* is that social behaviors are shaped by natural selection. In spite of perturbations due to time and lag, and random effect, those behaviors conferring the highest replacement rate in successive generations are expected to prevail throughout local populations and hence ultimately to influence the statistical distribution of culture on a worldwide basis" (Lumsden and Wilson)

The Sociobiology Gambit

If a trait is widespread in human culture, assume that it is a biological adaptation

Look for selection forces that would promote this trait

Propose (claim) that the trait is such a product of natural selection under those forces

Why do we like sugar?

Adaptationist account:

- Our ancestors needed to eat ripe fruit to meet their nutritional needs.
- When fruit is ripe, it is loaded with sugars.
- If our ancestor had a taste for sugar, he or she would be a little more likely to eat ripe fruit.
- His or her resulting good health would make him or her stronger and more attractive to potential mates.
- He or she might leave more offspring who, inheriting this taste for ripe fruit, would be more likely to survive to reproductive age.

Why do we have specific tastes in possible mates?

- To enhance the survival of our offspring, we want them to have the best genes
- If a mate is very healthy, vigorous, etc., his or her genes are probably better
- As Darwin noted, some animals develop bizarre traits so as to demonstrate their mate-worthiness

Differential parental investment

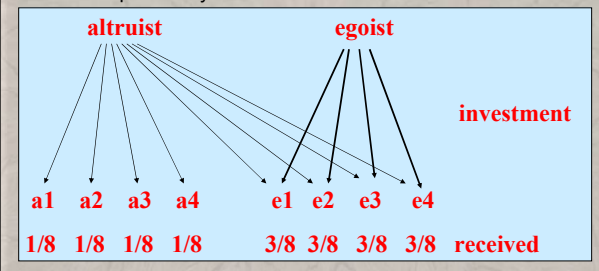
- David Barash: "Males tend to be selected for salesmanship; females for sales resistance [coyness]."
- Why? Differential costs:
  - females can carry limited offspring, face the risks of pregnancy, increased nutritional needs, etc.
  - males can, and do, walk away.
- It is in the female's interest to up the cost for males to enhance likelihood of long-term support. Males will try to get away with less, both before and after the birth of children.
- "It might not just be a cultural fluke that men bring flowers and candies, pay for dinner, and so forth." (C. George Boeree)

The Problem of Altruism

- Altruism characterized in terms of evolutionary consequences—any trait (esp. a behavioral one) that increases the fitness of others and reduces one's own fitness
- Puzzle—given that altruism apparently exists, how could it arise?
  - Wouldn't altruists tend to lose out to those who advance only their own evolutionary ends (selfish)?
- In any *quid pro quo* arrangement, a cheater (one who takes benefits but doesn't give back) should gain an advantage

Altruism

- Altruism *ought* to destroy itself
  - Benefits go to the genes of others, who then out reproduce you



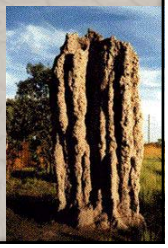
- So, why does altruism persist?

Kin Selection and Inclusive Fitness

- Hamilton's Rule: perform altruistic act when
  - rb > c
  - relatedness x benefits > costs of altruistic act
- You can gain direct fitness benefits through producing and raising your own offspring
- You can gain indirect fitness benefits through helping to raise offspring of related individuals (kin selection)
- Direct fitness + indirect fitness = total fitness

The social insects

- Worker castes do not reproduce—the benefits of their labor go to those who are fertile
- Why does selection not eliminate the sterile classes?
- Distinctive genetics of social insects:
  - Haploidy-diploidy
    - Females are diploid—have both a mother and a father
    - Males are haploid—only have a mother
    - Result: sisters are more closely related to each other than to their daughters
    - Raising their sister's children very likely to produce copies of their own genes



Altruism towards non-kin

- Reciprocal altruism—advantageous for an individual to perform actions that benefit another if they in turn do things that benefit that individual
  - I scratch your back if you scratch mine
- Problem: cheaters—receive the advantages of others helping them but don't do anything to help other
  - Rather, direct efforts to promoting own reproduction
- Cheaters would seem to be favored by natural selection

Reciprocal Altruism

- How to promote reciprocal altruism—create a sense of fairness that leads individuals to
  - Have a sense of guilt that keeps them reciprocating
  - Have awareness of cheaters and unwillingness to cooperate with them

Prisoners' Dilemma

	A Stays Silent	A Talks
B Stays Silent	Both serve 6 months	A goes free, B gets 10 years
B Talks	B goes free, A gets 10 years	Both get 2 years

- Single round prisoner's dilemma: no coordination possible
  - If you think the other person will stay silent, you gain by talking
  - If you think the other person will talk, you gain by talking
  - Seems to be no way to find the best outcome, hence the dilemma

Evolutionary Game Theory

	A Cooperates	A Defects
B Cooperates	A=5/B=5	A=8/B=0
B Defects	A=0/B=8	A=2/B=2

- Iterated Prisons' Dilemma
  - Challenge to figure out what the other party will do based on their previous play
- Play Prisoners' Dilemma against multiple players each for several rounds each
- If everyone cooperates, everyone makes lots of profit
  - But now imagine a defector joins in—and cleans up
- Now instead imagine a group of defectors, each making a small profit
  - Any cooperator who tries to join the game loses

Iterated Prisoners' Dilemma Winner

- In 1984 Robert Axelrod created a competition for computer algorithms that played iterated prisoners' dilemma against each other
  - Overall, greedy strategies fared less well than more altruistic ones
- Anatol Rapoport entered a program that employed the tit-for-tat strategy (4 lines of BASIC code)
  - Start by cooperating
  - In the future, do whatever your opponent did last
  - And won!
- Slightly better—Tit for Tat with forgiveness
  - With a small probability, do not retaliate immediately

Evolutionary Stable Strategies

- An ESS or evolutionarily stable strategy is a strategy such that, if all the members of a population adopt it, no mutant strategy can invade. –Maynard Smith (1982)
- A group of cooperators can easily be invaded by a defector
- A group of defectors cannot be invaded by a cooperator
- At first, it appears that a tit-for-tat player cannot invade a population of defectors
  - But if two or more tit-for-tat players get in, they can take over eventually
- Tit-for-tat seems not to be able to be invaded—it is evolutionarily stable

A Better Strategy?

- In 2003 a team from Southampton University beat tit-for-tat.
  - Its players followed a strategy to allow each program to recognize when it was playing against a teammate, and then one of the two would always defect
  - As a result, the other won big
  - The team took the top three positions, but also several near the bottom

The Trivers-Willard Hypothesis

- **"In species with a long period of parental investment after birth of young, one might expect biases in parental behavior toward offspring of different sex, according to the parental condition; parents in better condition would be expected to show a bias toward male offspring."**

Trivers, R.L., and Willard, D.E., 1973. Natural selection of parental ability to vary the sex ratio of offspring. *Science* 179: 90-92.

Valerie Grant's Extension

- Social status alters the physiology of women
  - Socially dominant women produce more testosterone
  - Physiochemistry makes them more active, assertive, and independent than others
  - These behavioral characteristics result in different child bearing strategies
  - Males raised by dominate women exhibit increased fitness
  - Females raised by subdominate women exhibit increased fitness

Making Room for Proximate Explanations

- "a more illuminating account of human behavior is possible when we distinguish between proximate and distal explanations for particular behaviors. Complicated processes involving the mind and culture are certainly involved in the 'proximate' causes of human behaviors, which likely have little to do with reproductive success (at least directly). Sociobiologists are instead interested in giving 'ultimate' explanations of *why* the relation between the behavior and the proximate factors exist" (Holcomb & Baker).

Normative Implications?

- OK, so men are naturally promiscuous
  - So you cannot blame them for having affairs
- Aggression among males is natural
  - Not much we can do about it, so accept it

- Naturalistic ethics: facts about the natural world, including biology, determine ethical rightness or wrongness
- "Naturalistic fallacy"?
  - Claim: cannot drive *ought* from *is*

Critiques of Sociobiology

- Assumes that behaviors are largely under genetic control when at best the evidence is that they are heritable
- Treats behaviors as atomistic, but in fact most behaviors are products of complex interactions
- Human minds (and animal minds) may do a lot more than calculate the best genetic outcome
- Minds and culture may both enjoy a large degree of autonomy from biology

Male aggression

An expected consequence of the competition for mates

"males engage in a great deal of head-butting. But one can't help but notice that these contests "over" females seldom end in death or even serious injury in most species. That is because these contests are just that: contests. They are a matter of **displays** of virtues, and they usually include actions that serve as sign stimuli to the opponent that the contest has ended in his favor: **surrender signals**. Continued aggression is of little advantage to either the loser or the winner. Even male rattlesnakes don't bite each other!

"Sociobiologists predict that animals that are poorly equipped for aggression are unlikely to have developed surrender signals. Man, they say, is one of these creatures. But we developed technology, including a technology of destruction, and this technology "evolved" much too quickly for our biological evolution to provide us with compensating restraints on aggression. Experience tells us that guns are more dangerous than knives, though both are efficient killing machines, because a gun is faster and provides us with less time to consider our act rationally -- the only restraint left us." (C. George Boeree)