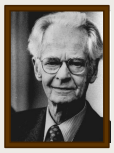
Animal Behaviour

What is Behaviour?

- Prior to 1860s
  - Emotions
  - Habits
  - Manners
  - Customs
  - Instincts

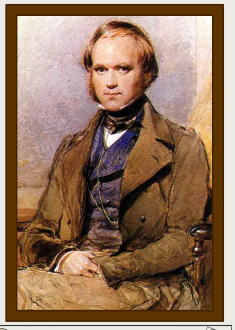
Skinner and Hebb

- All observable processes by which an animal responds to perceived changes in the internal state of its body or the external world

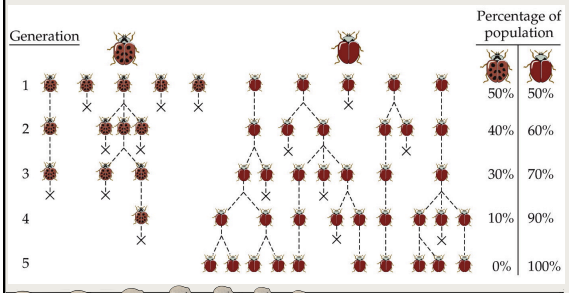


Charles Darwin (1859)

- Variation in phenotypic traits that are heritable
- Variation leads to differential survival and/or reproduction

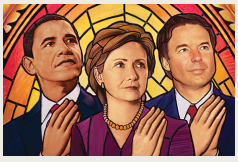


Natural Selection



Group Selection

- Wynne-Edwards (1962): Individual characters evolved to favour the survival of the group (family, population, species)



Human Behaviour

- Culture
- Date-rape
- Altruism
- Inter-male combats
- Promiscuity
- Compassion

Tinbergen's 4 Questions (1963)

- Mechanism (how is behaviour being achieved)
- Development (how does it take form?)
- Function (what is it for?)
- Evolution (where does it come from?)

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PROXIMATE

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- Evolution (where does it come from?)

ULTIMATE

Proximate Questions

- What is the link between the genes and the behaviour?
- Is the behaviour hereditary?
- How does the behaviour develop?
- What stimuli trigger the onset of the behaviour?

Ultimate Questions

- Has the behaviour evolved over time?
- What was the ancestral form of the behaviour?
- Why has the ancestral form changed?
- What is the adaptive value of behaviour?

Common Shrew
(*Sorex araneus*)

- 1) Sensory systems are most receptive to larger prey
- 2) Learned from previous experience cost/benefit of struggle/payoff
- 3) Maximize foraging efficiency
- 4) Offspring of a lineage of selective foragers (greater survival value)

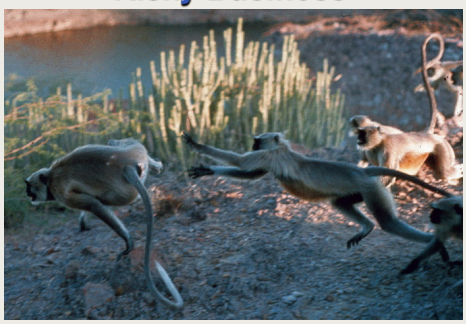
Theoretical Framework

- 1) Inclusive fitness (Hamilton, 1964)
  - Alleles affect social interactions to promote their transmission through generations
- 2) Evolutionarily Stable Strategies (ESS: Maynard-Smith, 1972)
  - Adaptive decision-making is frequency dependent (best thing to do may depend on what others are doing)
- 3) Optimality Theory (Charnov, 1976)
  - Cost/benefit analysis to decision-making

Behavioural Paradox

- Traits exist that don't seem to increase individual fitness

Risky Business

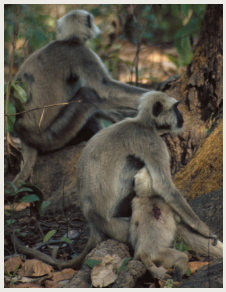


Why Infanticide?

- Psycho-social explanation
  - Abnormal pathological response to overcrowding
- Darwinian explanation
  - Males gain resources by eating infants
  - Males gain fitness because females re-mate quicker with them

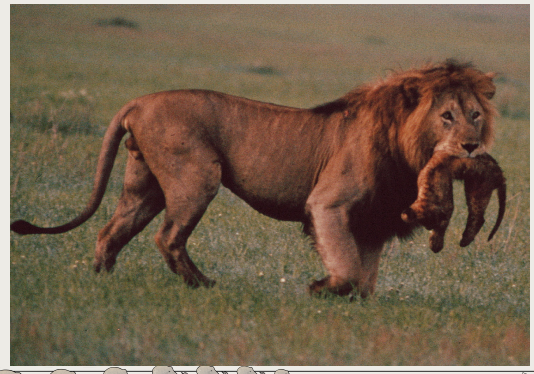
Group Selection

- If first hyp. is correct
- Beneficiary is not male but group to which he belongs
- Testing group selection hypothesis?



Darwinian Hypothesis

- 1) Do males kill more when food stressed? Do they always consume the infants?
- 2) Do females become sexually receptive faster than when nursing infant?
  - DNA analysis shows that the next generation offspring are all sired by new males



Sex Role Reversals

- Giant water bug (Hemiptera)
- Males offer protection of eggs
- Females may destroy clutch so he re-mates with her

Questions?