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[17] Evolution and Ethics

0. Outline

1. Introduction
2. Evolution and altruism

1. Introduction

- The idea that evolutionary theory may be somehow relevant to moral theory has been around since Darwinism's inception.
- Indeed Darwin *himself* appeared to hold that his views on the origins of the living world had a profound relevance to ethics (see Lewens [2007:159-171] and the far more detailed Richards [1987]).
- This view has anything but disappeared, as sociobiologist E.O. Wilson's bold comments testify:
 - ‘...the time has come for ethics to be removed temporarily from the hands of philosophers and biologicised.’ (Wilson [1975:562])
 - ‘The time has come to turn moral philosophy into an applied science’ (Ruse & Wilson [1986:555])
- So how exactly might one ‘biologicise’ ethics?

1. Introduction

- Kitcher [1994] suggests a number of possibilities. The most pertinent:
 - [1] *The explanatory project*: to provide a natural-selectionist explanation for the presence of our moral proclivities.
 - [2] *The normative ethics project*: to bring evolutionary theory to bear on the formulation of primitive normative ethical principles (e.g.: Should we maximise utility? Should we act ‘for the good of the species’? Etc.).
 - [3] *The metaethics project*: to appeal to evolutionary theory to settle disputes in metaethics (e.g.: Are moral statements truth-evaluable? If so, are they sometimes true or are they systematically false? Etc.).

1. Introduction

- All three projects are associated with their fair share of controversy.
- Due to time considerations, I'll have to restrict my focus to [1] and [3],
- I shall start with [1], because, as we shall see, some take the view that the success or failure of [1] would have repercussions on the success or failure of [3].

2. Evolution and altruism

- So: *can* evolution account for our moral proclivities?
- Folk-wisdom has long had it that it cannot...
- There is a deeply-held view that altruism is a central component of our moral behaviour:
 - ‘Moral behavior is, at the most general level, altruistic behavior, motivated by the desire to promote not only our own welfare but the welfare of others.’ (Rachels [2000])
 - ‘I take altruism... to be a necessary feature of morality.’ (Williams [1973:250])
 - ‘...certain important moral principles state rational conditions on desire and action which derive from a basic requirement of altruism.’ (Nagel [1970:3])

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- There is also a deeply-held feeling that natural selection should, on the face of it, favour the selfish over the altruistic.

‘It is extremely doubtful whether the offspring of the more sympathetic and benevolent parents, or of those who were the most faithful to their comrades, would be reared in greater numbers than the children of selfish and treacherous parents belonging to the same tribe. He who was ready to sacrifice his life, as many a savage has been, rather than betray his comrades, would often leave no offspring to inherit his noble nature. The bravest men... who freely risked their lives for others... would on average perish in larger numbers than other men. Therefore, it hardly seems probable that the number of men gifted with such virtues... could be increased through natural selection.’ (Darwin *The Descent of Man*)

2. Evolution and altruism

- The living world, of course, also abounds with apparent *non-human* cases of ‘altruistic’ behaviour, in which actions seem to benefit a third party at a cost to the behavior:
 - *Virulence*: some wild strains of viruses are less virulent than laboratory counterparts (e.g. Myxoma virus). Puzzlingly, decreased virulence of those strains (associated with lower reproduction rates) would seem to comparatively benefit other more virulent mutant strains in the same host (who enjoy the extra host longevity without the cost to their reproductive output).
 - *Food-sharing*: vampire bats famously regurgitate some of the blood they obtained during hunting to feed other members of the group (not necessarily relatives).

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- *Alarm-calling*: vervet monkeys issue alarm calls that alert other members of the group to the presence of predators, but thereby draw predator attention to themselves.
- These have been long thought to pose prima-facie puzzles for evolutionary theory...
- Why so?
- Well the feeling seems, on the face of it, to be borne out by the following kind of scenario:
 - Population of individuals, with either trait A (frequency = p) or trait S (frequency = $(1 - p)$).
 - At each generation, each individual pairs up at random with some other individual and interacts with it .

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- A = altruistic trait - the bearer donates $b > 0$ units of fitness to the organism it has paired up with, at a cost of $c > 0$ units to itself.
- S = selfish trait – the bearer donates nothing to the other member of the pair, at no cost.
- The baseline fitness of each organism (i.e. the fitness prior to interaction) = x
- Payoff matrix (payoffs for interacting with column, given that one is row):

	A	S
A	$x - c + b$	$x - c$
S	$x + b$	x

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- Conditional probability distribution (probability of interacting with column, given that one is row):

	<i>A</i>	<i>S</i>
<i>A</i>	p	$(1 - p)$
<i>S</i>	p	$(1 - p)$

- This gives us:
 - $w_A = (x - c + b)(p) + (x - c)(1 - p)$
 - $w_S = (x + b)(p) + (x)(1 - p)$
- It is easy to show that from this (and the fact that $c > 0$), it follows that $w_S > w_A$

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- In other words: altruism will gradually decline in frequency when pitted against egoism in a population in which members interact at random.
- Hence (the thought goes): evolutionary theory cannot explain our moral behaviour.
- To recap:
 - [1] Altruism is a central component of our moral behaviour.
 - [2] Altruistic behaviour is selectively disadvantageous.
 -
 - [3] There can be no evolutionary explanation of our moral proclivities.

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- Response: deny [2] (i.e. that altruistic behaviour is always selectively disadvantageous).
- But didn't we say that altruism will always decline in frequency within a population??!
- Actually we didn't *quite* say that: we said that altruism will decline in frequency within a population *if* population members interact at random.
- If they don't, altruism can actually *increase* in frequency, given the obtaining of certain further conditions.
- The fitnesses in our model a few slides up were calculated by plugging in the relevant particular values for the conditional probabilities in the following general formulae: $w_A = (x - c + b) \Pr(A|A) + (x - c) \Pr(S|A)$ and $w_S = (x + b) \Pr(A|S) + (x) \Pr(S|S)$.

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- Payoff matrix (payoffs for interacting with column, given that one is row):

	<i>A</i>	<i>S</i>
<i>A</i>	$x - c + b$	$x - c$
<i>S</i>	$x + b$	x

- Conditional probability distribution (probability of interacting with column, given that one is row):

	<i>A</i>	<i>S</i>
<i>A</i>	$\Pr(A A)$	$\Pr(S A)$
<i>S</i>	$\Pr(A S)$	$\Pr(S S)$

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- The upshot of this turns out to be that, in general:
 $w_A > w_S$ iff $\Pr(A|A) - \Pr(A|S) > c / b$.
- The quantity on the LHS of the second inequality measures the degree of correlation between altruistic acts.
- In the case discussed earlier, interaction was random (i.e. correlation = 0), and *that*, given the (positive) values of b and c , guaranteed poor prospects for A .
- But interaction needn't be random and the prospects for altruism needn't be poor...
- For instance: if like always interacts with like (i.e. correlation = 1), then we can get $w_A > w_S$, namely iff $b > c$ (i.e. if the beneficiary gains more than the donor loses).

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- Note: if $c > b$, then for it to be the case that $w_A > w_S$, we would need $\Pr(A|A) - \Pr(A|S) > 1$, which is impossible.
- In other words: if the cost of a donation to its donor exceeds the benefit gained by the recipient, then altruism cannot evolve.
- Ok, but how might it be the case that we *get* this positive correlation?
- *Kin-interaction*: the relevant behavioural correlation can be due to kin interacting preferentially with close-enough kin.
- This can occur for various reasons, including simple spatial proximity of relatives over a certain period of time (e.g. bird siblings in a nest).
- This is the key idea behind so-called 'kin-selection' models of the evolution of altruism (e.g. Hamilton [1964]).

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- Sober [1992:181-182] shows that, for instance, if interactions are exclusively between full sibs then $w_A > w_S$ iff $\frac{1}{2} > c / b$.
- Sober [1992] also suggests that behavioural correlation underpins the evolution of altruistic behaviour due to 'reciprocal altruism'.
- *Reciprocation*: in cases in which pairs of organisms are initially formed at random but then interact *repeatedly* (for n rounds, with $n > 1$), the relevant behavioural correlation can be introduced by *reciprocal* behavioural strategies such as tit-for-tat.
(Definition: 'strategy' = rule governing a *sequence* of actions)

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- Example:
 - Population of individuals, with either trait *TFT* (frequency = p) or trait *AS* (frequency = $(1 - p)$).
 - At each generation, each individual pairs up at random with some other individual and interacts with it for n rounds.
 - Always selfish (*AS*): behave selfishly during every interaction.
 - Tit-for-tat (*TFT*): behave altruistically during interaction i_1 , then during all subsequent interactions i_j ($i > 1$) behave as partner did during i_{j-1} .
- The payoffs for behavioural pairings at each round are as before:

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	A	S
A	$x - c + b$	$x - c$
S	$x + b$	x

- Here are the possible pairings and the behavioural sequences that ensue:

- AS: S_1 S_2 S_3 ... S_n
- AS: S_1 S_2 S_3 ... S_n
- AS: S_1 S_2 S_3 ... S_n
- TFT: A_1 S_2 S_3 ... S_n
- TFT: A_1 A_2 A_3 ... A_n
- TFT: A_1 A_2 A_3 ... A_n

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- From this, we can see that the fitnesses are:
 - $w_{AS} = \Pr(TFT|AS)[x + b + (n - 1)x] + \Pr(AS|AS)(nx)$
 - $w_{TFT} = \Pr(TFT|TFT)n(x + b - c) + \Pr(AS|TFT)[x - c + (n - 1)x]$
- We have assumed random initial pairing:
 - $\Pr(TFT|AS) = \Pr(TFT|TFT) = p$
 - $\Pr(AS|AS) = \Pr(AS|TFT) = 1 - p$
- So the equalities reduce to:
 - $w_{AS} = p[x + b + (n - 1)x] + (1 - p)(nx)$
 - $w_{TFT} = pn(x + b - c) + (1 - p)[x - c + (n - 1)x]$
- From this, we can easily show that:

$$w_{TFT} > w_{AS} \text{ iff } p(n-1) > c / b$$

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- So: the longer the period of interaction, the higher the frequency of tit-for-tatters, the lower the cost of altruistic behaviour and the higher the benefit, the better the prospects for tit-for-tat (and hence for altruistic actions to be observed).
- And it turns out that the higher the values of p and n , the greater the required correlation (i.e. $\Pr(A/A) - \Pr(A/S)$).
- So we have seen that:
 - Evolutionary theory *does* have the resources to account for the evolution of altruistic behaviour.
 - Whether or not altruistic behaviour can evolve hinges on two matters: behavioural correlation and cost/benefit.

Reference

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Next and final lecture: Evolution & Ethics

- Reading: take a look at the Sober, Kitcher and Ruse & Wilson papers.