General Certificate of Education
Advanced Level Examination
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Critical Thinking CRIT3

Unit 3 Beliefs, Claims and Arguments

Source Material

This source material is to be read in conjunction with questions in Unit CRIT3

Document A

altruism ***noun***

1 unselfish regard for the welfare of others

2 behaviour by an animal that is not beneficial to, or may be harmful to, itself but that benefits others of its species

altruistic *adjective* **altruistically** *adverb*

altruist *noun* a person or animal who behaves altruistically

Vervet monkeys and ground squirrels are two species that give alarm calls to warn others of the presence of predators, even though in doing so they attract attention to themselves, increasing their personal chance of being attacked.

Sterile worker bees devote their lives to the service of the colony, with no possibility of reproducing themselves.

Natural Selection

According to the Darwinian theory of Evolution by Natural Selection survival depends on 'fitness'. Only those organisms that compete successfully survive and reproduce, and pass on their genes to their offspring. Those that are not well-fitted die out, become extinct.

So how can altruism be explained by Natural Selection? Some would simply say it can't: that Natural Selection is wrong and that existence of altruism proves it. But, if Natural Selection is correct – and most scientists today think that it is – then there must be some survival advantage in being altruistic.

Document B

Biological Altruism

In evolutionary biology, an organism is said to behave altruistically when its behaviour benefits other organisms, at a cost to itself. The costs and benefits are measured in terms of *reproductive fitness*, or expected number of offspring. So by behaving altruistically, an organism reduces the number of offspring it is likely to produce itself, but boosts the number that other organisms are likely to produce. This biological notion of altruism is different from the everyday concept. In everyday terms, an action would be called 'altruistic' only if it was done with the conscious intention of helping another. But in the biological sense there is no such requirement. Indeed, some of the most interesting examples of biological altruism are found among creatures that are (presumably) not capable of conscious thought at all, such as insects.

Altruistic behaviour is common throughout the animal kingdom, particularly in species with complex social structures. For example, vampire bats regularly regurgitate blood and donate it to other members of their group who have failed to feed that night, ensuring they do not starve. In numerous bird species, a breeding pair receives help in raising its young from other 'helper' birds, who protect the nest from predators and help to feed the fledglings. Vervet monkeys give alarm calls to warn fellow monkeys of the presence of predators. And in social insect colonies (ants, wasps, bees and termites), sterile workers devote their whole lives to caring for the queen, constructing and protecting the nest, foraging for food, and tending the larvae. Such behaviour is maximally altruistic: sterile workers obviously do not leave any offspring of their own – so have personal fitness of zero – but their actions greatly assist the reproductive efforts of the queen.

The existence of altruism in nature is at first sight puzzling, as Darwin himself realized. Natural selection leads us to expect animals to behave in ways that increase their *own* chances of survival and reproduction, not those of others. But by behaving altruistically an animal reduces its own fitness, so should be at a selective disadvantage compared with one which behaves selfishly.

Kin Selection

Some organisms tend to exhibit strategies that favor the reproductive success of their relatives, even at a cost to their own survival and/or reproduction. The classic example is a social insect colony. Many evolutionary biologists explain this by the theory of **kin selection**: all the members of the colony are close relatives, so their genes are practically the same. Natural selection should eliminate such behaviors; however, there are many cases, in which animals cooperate despite an obvious disadvantage to the individual donor.

Alarm calls in ground squirrels are another example. Paul Sherman, of Cornell University, studied the alarm calls of ground squirrels. He observed that they occurred most frequently when the caller had relatives nearby.

Recent studies provide evidence that even certain plants can recognize and respond to kinship ties. Using *Sea Rocket* (left) for her experiments, Susan Dudley at McMaster University in Canada compared the growth patterns of unrelated plants sharing a pot to plants from the same clone. She found that unrelated plants competed for soil nutrients by aggressive root growth. This did not occur with sibling plants.

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Document C

Reciprocal Altruism: '*You scratch my back, I'll scratch yours.'*

Theories of *Reciprocal Altruism* attempt to explain cases of (apparent) altruism among organisms. It is basically the idea that it may pay an organism to help another, if there is an expectation of the favour being returned – *reciprocated* – in the future. ('If you scratch my back, I'll scratch yours.') The cost of helping is offset by the likelihood of the return benefit, permitting the behaviour to evolve by natural selection.

For reciprocal altruism to work, there is no need for the two individuals to be relatives, nor even to be members of the same species. However, it is necessary that individuals should interact with each other more than once, and have the ability to recognize other individuals with whom they have interacted in the past. If individuals interact only once in their lifetimes and never meet again, there is obviously no possibility of return benefit, so there is nothing to be gained by helping another. However, if individuals encounter each other frequently, and are capable of identifying and punishing 'cheaters' who have refused to help in the past, then the helping behaviour can evolve. A 'cheat' who refuses to help will ultimately sabotage his own interests, for although he does not incur the cost of helping others, he forfeits the return benefits too – others will not help him in the future.

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Document D

Games and Dilemmas

One model that has been used to assess the gains and losses of altruism and cooperation is Game Theory. This is not so surprising since games, like real life, have winners and losers.

Take for example the famous 'Prisoner's Dilemma'. Two prisoners are being interrogated in separate cells on a serious charge. Before being separated they have agreed to remain silent. The interrogator has insufficient evidence to get a conviction unless one of the prisoners informs on the other.

The interrogator visits the cells in turn and offers each prisoner the same two choices: continue to remain silent, or testify against your partner. The deal is that if they *both* stay silent they will both be charged with a minor offence and serve a sentence of three years in jail. If they both inform on each other, they will serve seven years each. But if one turns informer, and the other keeps his word and stays silent, the informer goes free at once and the one who keeps his promise gets 20 years. Neither prisoner knows what the other will do.

The following table summarises the choices and outcomes for each prisoner.

Choices			Outcomes	
By A	**By B**		**For A**	**For B**
Stay silent	Inform	→	20 year sentence	Goes free
Inform	Stay silent	→	Goes free	20 year sentence
Inform	Inform	→	7 year sentence	7 year sentence
Stay silent	Stay silent	→	3 year sentence	3 year sentence

What should **A** do? (The same question applies to **B**.)

In a single one-off situation like this it is arguably a better strategy to act selfishly and inform. However, when such choices occur many times as they do in real life, persistent selfish behaviour soon ceases to pay off, because the other player or players will retaliate by doing the same. In the long run there is more to gain for everyone – or less to lose – in cooperating than in cheating, or betraying, or breaking promises.

This has led many theorists to argue that, after all, altruism can evolve by natural selection.

END OF SOURCE MATERIAL