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## Puzzle of Altruism, The



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### Synonyms

[Mechanisms of altruism](#)

### Definition

There are different evolutionary mechanisms such as kin selection, reciprocal altruism, and cultural group selection that explain the mechanisms of altruism commonly seen in human societies.

From an evolutionary perspective, a behavior is called social if it influences the fitness of both the actor and the recipient (West et al. 2007). William Hamilton (1964) classified social behaviors into four types: those that increase the fitness of both the actor and the recipient (mutual benefit), those that increase the fitness of the actor but decrease that of the recipient (selfishness), those that decrease the fitness of the actor but increase that of the recipient (altruism), and those that decrease the fitness of both the actor and the recipient (spite). The most puzzling seems to be

altruism because even spite might have a relatively straightforward explanation: An actor might gain a foothold by a fitness decreasing behavior if it decreases the fitness of a rival even more. Therefore, most effort in social evolution theory in the last half-century went into developing evolutionary explanations of altruistic behavior.

Hamilton proposed kin selection as one mechanism through which natural selection can favor altruism over selfishness: If the actor and the recipient of the altruistic behavior are genetic relatives, the altruistic behavior is actually helping the survival of the altruist's genes. More precisely, altruistic behavior will evolve if the coefficient of genetic relatedness,  $r$ , exceeds the cost-benefit ratio of the altruistic behavior,  $c/b$  (see also Nowak 2006).

The first solution to altruism among nonrelatives was proposed by Trivers (1971) in his theory of reciprocal altruism: If the actor behaves altruistically toward the recipient in need at time  $t_1$ , and the recipient returns the favor when the actor is in need at time  $t_2$ , then both of them will be better off compared to the situation where neither behaved altruistically. The obvious threat to the evolution of altruism through reciprocal altruism is the possibility of cheating: taking the benefit at  $t_1$  but never returning it. Since this is evolutionarily the most beneficial strategy, altruism cannot evolve unless cheating is prevented. For this reason, relatively complex cognitive skills, such as memory for past exchanges and mind reading skills for recognizing potential cheaters, must be

in place before reciprocal altruism can lead to the evolution of altruistic behavior (see Stevens and Hauser 2004).

In reciprocal altruism, reciprocity is direct: The same actor and recipient are involved in both interactions. Indirect reciprocity, on the other hand, involves the introduction of third parties at time  $t_2$  and is based on the principle of reputation. By behaving altruistically at time  $t_1$ , the actor gains a reputation in the population of being an altruist. This will increase his chances of receiving altruistic benefits from other members of the population at a later time because of his reputation of being a suitable cooperation partner (Nowak and Sigmund 1998).

One final mechanism proposed to solve the puzzle of the evolution of altruism is cultural group selection (Fehr and Fischbacher 2003). Economic exchange games played in the laboratory demonstrate that humans cooperate altruistically even when their game partners are nonrelatives (excluding kin selection as a mechanism), when the game is one shot with no future interactions (excluding reciprocal altruism), and when the game is played anonymously with no possibility of reputation building (excluding indirect reciprocity). Even under such conditions, at least some individuals display altruistic rewarding (rewarding fair and norm-compliant behavior even when the rewarding is costly to the actor) and altruistic punishment (punishing unfair behavior even when the punishment is costly to the actor). It has been claimed that stronger reciprocators, those who use altruistic rewarding and punishment, are at a disadvantage as individuals compared to selfish individuals; however, a group composed of strong reciprocators will be more likely to survive than a group composed of selfish individuals. Thus, altruism in the form of strong

reciprocity has most likely evolved through the mechanism of cultural group selection. This proposal is controversial (see West et al. 2011), and it remains to be seen whether individual selection mechanisms will suffice to explain strong reciprocity.

## Cross-References

- ▶ [Evolution of Human Sociality](#)
- ▶ [Evolution of Reciprocal Altruism](#)
- ▶ [Indirect Benefits of Altruism](#)
- ▶ [Reciprocal Altruism](#)
- ▶ [Reciprocal Altruism and Group Living](#)

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