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Contingent Reciprocity

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Synonyms

Contingent cooperation; Reciprocal altruism

Definition

The contingent relationship between acts of giving and receiving among social partners.

Introduction

In evolutionary sciences, interest in contingent reciprocity mainly lies in its potential role in the evolution of cooperation and prosociality between genetically unrelated partners (Axelrod and Hamilton 1981; Trivers 1971). Specifically, selection should favor individuals who conditionally cooperate with others as long as future benefits scaled by the likelihood of future interactions outweigh the costs of cooperation (Nowak 2006). Evolutionary models have shown that strategies based on contingent reciprocity, such as tit-for-tat, can be evolutionarily stable (i.e., resistant to invasions of alternative, noncooperative strategies once constituting a significant proportion of a population) in the condition of repeated interactions with same individuals (Axelrod and Hamilton 1981).

These conditions for the evolution of contingent reciprocity can be extended to interactions in a sizable group resembling an n-person prisoner's dilemma (Boyd and Richerson 1988). More recent research also showed that when the degree of contingent reciprocity varies continuously, it is more sustainable than discrete, all-or-none reciprocity in sizable groups, and this sustainability increase with the efficiency of cooperation (marginal per capita return; Takezawa and Price 2010). Trivers (2010) further identified the following broad conditions affecting the evolution of reciprocal altruism: (1) longevity (affecting the chance of repeated encounters), (2) dispersal rate (affecting the chance of interacting with same organisms), (3) degree of mutual dependence (affecting the benefit of cooperation and the cost of defection), (4) parental care, (5) dominance hierarchy, and (6) agonistic support.

Related Concepts

Contingent reciprocity is sometimes regarded as a synonym of *reciprocal altruism* or *contingent cooperation* (Gurven 2006; Trivers 1971). However, altruism is defined as actions that are beneficial to another organism but "apparently detrimental to the organism performing the action" (Trivers 2010, p. 124). This is not

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necessarily the case for contingent cooperation or contingent reciprocity in general. For example, humans not only exchange favorable treatment reciprocally, but they also exchange unfavorable treatment reciprocally. This *negative reciprocity* also constitutes contingent reciprocity (Narotzky and Moreno 2002). Nevertheless, most of the research on contingent reciprocity is focused on contingent cooperation and reciprocal altruism.

Reciprocal actions can occur when favors are exchanged over repeated encounters between the same two individuals. Alternatively, reciprocal actions of cooperation can also be contingent upon the reputation of third parties, which is derived from their prosocial actions, even if such actions do not benefit oneself directly. Such models of *indirect reciprocity* (Nowak and Sigmund 2005; See chapters in this book: Indirect Reciprocity; Indirect Reciprocity Theory) and, additionally, models of *generalized reciprocity* show that cooperation can be stable if cooperative individuals tend to associate with each other and if individuals respond cooperatively after they have been assisted by another group member (Barta et al. 2011; Rankin and Taborsky 2009).

Contingent Reciprocity in Other Species

Contingent reciprocity has been invoked to explain cooperation among non-kins in a few nonhuman species. Reciprocated actions in nonhuman animals include joint assaults on predators to save conspecifics by pied flycatcher (Krams et al. 2008), grooming among impala (Hart and Hart 1992), food sharing via blood regurgitation among vampire bats (DeNault and McFarlane 1995; Wilkinson 1988), and grooming, food sharing, and agonistic support in several primate species (De Waal 1997; Brosnan and De Waal 2002). Some of these instances might be explained by alternative mechanisms, including kin selection and mutualism (Clutton-Brock 2009). Nevertheless, contingent reciprocity is not necessarily mutually exclusive with other mechanisms in promoting altruism. Computer simulation based on the case of blood regurgitation among vampire bats, for instance, shows that even after accounting for genetic relatedness, reciprocal altruism might make major contributions to inclusive fitness beyond kin selection in a relatively large social group (Wilkinson 1988).

Experimental evidence for contingent reciprocity is limited even among our closest primate relatives. de Waal (1997) found some evidence that captive chimpanzees trade food for grooming or vice versa in a fashion of direct reciprocity. In an experimental task, Melis et al. (2008) found chimpanzees showed weak reciprocity in helping a familiar group member getting food by unlocking a door. However, chimpanzees failed to show reciprocity in tasks where other-benefiting actions appear effortless or costless (Brosnan et al. 2009; Yamamoto and Tanaka 2009).

The fact that natural instances of reciprocal altruism among genetically unrelated individuals is rare in nonhuman species might be explained by two major constraints. One is the cognitive demands to maintain reciprocity in a large group of individuals (Schino and Aureli 2010). Another constraint is that asymmetries in terms of dominance, resource-gathering abilities, or mate values are so common that the standard prisoner's dilemma underlying many models of reciprocity is problematic (Dawkins 2010). Within a dominance hierarchy, the capacity of the dominant individuals to coerce less dominant individuals into cooperation might remove the potential benefits of reciprocity, thus leading to nonreciprocal equilibriums (Dawkins 2010; Trivers 2010). Alternatively, dominance hierarchies might constitute reciprocal relationships if less-dominant individuals exchange their services for dominant individuals' nonaggression or protection. These constraints lead Brosnan and de Waal (2002) to distinguish three different types of reciprocity: (1) *symmetry-based reciprocity*, which is based on symmetrical dyadic relationships (e.g., mutual association, kinship), is the least cognitively complex and present in many nonprimate species, (2) *attitudinal reciprocity*, which relies on mirroring social attitudes of partners, is more cognitively complex and is exhibited by both capuchin monkeys and chimpanzees, and (3) *calculated reciprocity*, which requires mental

scorekeeping, is the most cognitively demanding one and found only in humans and some chimpanzees.

The Ontogeny of Contingent Reciprocity in Humans

Compared with nonhuman animals, humans exhibit far more instances of contingent reciprocity. Anthropological studies showed in many small-scale societies, individuals and family units share greater quantities of goods with those that previously shared with them (Gurven 2006). Empirical evidence has also been accumulating regarding the development of the capacity of contingent reciprocity in children.

Early studies provided observational and correlational evidence of children reciprocating help and sharing with those who shared with them earlier. Fujisawa et al. (2008), for example, studied naturally occurring interactions among Japanese children of 3–4 years old and found that children's provision of help and toys to peers correlated with the peers' previous prosocial actions toward them, without explicit instructions. House et al. (2013) paired children aged 3–7.5 years in repeated face-to-face interactions of a Prosocial Game, in which they chose between (1) delivering resources to both oneself and the partner, and (2) delivering resources only to oneself. Results showed that the propensity of contingent reciprocity (in terms of prosocial resource sharing) consistently appear around 5.5 years of age. Finally, the age at which contingent reciprocity emerges seems to also depend on the tasks. Warneke and Tomasello (2013) experimentally manipulated helping and sharing behaviors of social partners before giving 2.5- and 3.5-year-old children the opportunity to help or share with the partner. Whereas previous helping did not influence helping among either group of children, 3.5-year-olds, but not 2.5-year-olds, are more likely to reciprocate previous sharing.

Reasons for the Variability in Contingent Reciprocity in Humans

Different societies differ in the degree or form of contingent reciprocity (Gurven 2006), due to factors such as resource abundance, type of subsistence, and population density. Situational factors that influence the ease of cheat detection, cost/benefit ratio of altruistic actions, and stability of social grouping are likely to differ through time in the same human population. This should cause natural selection to favor developmental plasticity in contingent reciprocity (Trivers 2010).

In some cases, reciprocity can be contingent on the exchange of equivalent services or goods of roughly the same value, whereas in other cases, reciprocal actions are only contingent on efforts (Trivers 2010). Indeed, anthropological evidence supported the claim that exchange imbalances in forager-agriculturalist groups tend to favor lower-producing families. Unequal reciprocity may also be accepted as long as the unequal exchange is better than no exchange (Gurven 2006).

Conclusion

Contingent reciprocity is crucial to understanding the evolution of prosociality among unrelated organisms. In nonhuman primates and other species, evidence for contingent reciprocity is limited, likely due to the constraints of cognitive demands and/or asymmetrical relationships in dominance hierarchies. In humans, contingent reciprocity appears to emerge around 3–6 years of age, depending on the task involved. Contingent reciprocity might also differ in the form and fullness of the repayment of favors and is likely to show developmental plasticity in humans.

Cross-References

- ▶ Adaptations For Reciprocal Altruism
- ▶ Evolution of Cooperation
- ▶ Evolution of Reciprocal Altruism

- ▶ Prisoner's Dilemma and Cooperation
- ▶ Reciprocal Altruism
- ▶ Selection for Cooperative Relationships
- ▶ Strategies for Successful Cooperation

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