

Altruism or Cooperation in Captive Chimpanzees, *Pan troglodytes*?

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Key Words

Chimpanzee · Altruism · Cooperation · Inclusive fitness

Introduction

The full extent to which non-human primates, including chimpanzees, cooperate with one another is widely debated [see Silk, 2005]. Accounts typically focus on cooperative hunting and intraspecific aggression [Boesch, 2003] or food sharing [Bethell et al., 2000], and the levels at which cooperative behaviours can be explained are numerous [e.g. Connor, 1995]. It is, therefore, important to document possible occurrences of such behaviours when they are observed, especially when these behaviours are displayed under more unusual circumstances. Here we report an event that occurred predominantly between an infant and adult chimpanzee and discuss this in terms of the competing theories underlying the evolution of cooperative behaviour (defined as an interaction that results in a net benefit to both parties [Trivers, 1985]) among social primates.

Methods

The reported observation was made during a study of a captive group of chimpanzees, *Pan troglodytes*, at Chester Zoo, UK, in October 2003. The group consisted of 5 adult males, 12 adult females, 6 subadult females, 1 juvenile female and 3 infants (2 male and 1 female). The indoor enclosure, where the following events were observed, is circular and 12.8 m in diameter. All events were observed from the indoor public viewing area, which is separated from the main enclosure by a two-way sound-proof glass wall that spans approximately two fifths of the enclosure's circumference. The glass wall is separated from the main enclosure area by a shallow moat that runs the length of the glass and is approximately 0.6 m wide and 0.3 m deep along its entire length. During the following events most, if not all, of the study group were present and resting in the indoor area.

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Results

The female infant, Kirsty, was seen crouching and leaning forward to drink from the moat, facing towards the glass wall and public viewing area. Pattie, a juvenile female, was then observed to walk quadrupedally across the enclosure towards Kirsty. When Pattie reached Kirsty, she used both arms to push her into the moat then ran away. The rest of the group began to vocalise (mainly hoot and scream vocalisations) and move around the enclosure. No animals approached Kirsty at this point.

Kirsty remained stationary in the water (we observed no vocalisations, obvious facial expressions or attempts to climb out of the moat). Chimpanzees have been known to drown [Anon., 2003] or nearly drown (saved only by human intervention) [Goodall, 1998] under similar circumstances in captivity. After a few seconds, Kirsty stood bipedally and reached towards the glass partition (where the large number of visitors may have drawn her attention), making no visible attempt to climb out of the moat on the enclosure side. Up until this point, her mother (Alice) sat on the floor, within 3 m of Kirsty, and made no obvious vocalisations, facial expressions or movements towards Kirsty.

Boris, previously the alpha male of the group, but now beta male, then approached the area of the moat where Kirsty was standing (still at the far edge against the glass wall). At this point, Alice started screaming and looking around the enclosure, but still did not approach Kirsty. Boris leant across the moat where Kirsty was and placed his right hand against the glass. As in bridging behaviour, Kirsty clung to the hair on the underside of Boris's arm and torso in a suspensory gait to reach the far side of the moat. Boris appeared to watch her as she did this. Once Kirsty was out of the moat, she made no approaches to her mother and her mother did not approach her. The group remained agitated for some time after the incident.

Discussion

We propose a series of alternative explanations for the events described above. Boris often interacts visually with visitors through the glass [pers. obs.]. Boris may have been drawn towards the glass wall by the reactions of the visitors, not by Kirsty per se. Kirsty then took advantage of Boris's proximity to climb out of the moat. The appearance of cooperation in this instance would arise as a by-product of Boris's interest in the visitors. While this is a parsimonious explanation of events, some might argue it is too reductionist in its explanation of more complex behaviours [see de Waal, 1996].

The second explanation, biological altruism, involves cooperation through kin selection [Hamilton, 1964; Axelrod & Hamilton, 1981]. Genetic tests show that Boris is likely to have been Kirsty's maternal grandfather [C. Caws, pers. commun.]. It may, therefore, be the case that Boris was acting to increase his inclusive fitness. However, the extent to which such individual acts translate into lifetime fitness remains a moot point [Silk, 2005].

The third explanation is also a form of biological altruism: reciprocal altruism. Reciprocal altruism requires a costly act by one individual that benefits another,

and is reciprocated at some point in the future [Trivers, 1971]. While the cost to Boris in this case is debatable, there is a clear benefit to his actions. In species with relatively stable social groups the likelihood (and benefit) of reciprocation is potentially high [Axelrod & Hamilton, 1981]. Boris may have acted in a deliberate manner to assist Kirsty out of the moat, and there may have been future benefits to be gained, although it is highly unlikely that Kirsty could ever truly reciprocate in this situation.

A fourth explanation is one of true altruism, which may be defined in terms of motives rather than the fitness consequences that characterise biological altruism [see de Waal, 1996]. This explanation would require a level of empathy by Boris towards Kirsty's predicament and an intention to remove her from danger. The empirical evidence to support the existence of such cognitive capacities in chimpanzees remains elusive.

In addition, there are alternative explanations that negate any discussion in terms of cooperation, for example infant handling [Silk, 2005]. In summary the events reported here highlight both the existence of apparently cooperative behaviours among chimpanzees, and the difficulty in explaining such behaviours within biological and psychological frameworks.

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