

## Targeted helping by a wild adolescent male chimpanzee (*Pan troglodytes verus*): evidence for empathy?

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**Abstract** In a unique case where a chimpanzee infant captured by human poachers was returned by researchers to her natal group, an adolescent male helped the injured mother carry her infant on each of 2 days following the return. I explore various hypotheses to explain this behavior and suggest that the apparent recognition of both the infant's and mother's needs by the male supports the consideration of empathy in this case. As data accumulate, questions regarding empathy in non-humans should focus on more intricate levels as suggested by DeWaal (Annu Rev Psych 59: 279–300, 2008), rather than adhering to the assertion that empathy is uniquely human.

**Keywords** Empathy · Ape · Targeted helping · Senegal · *Pan troglodytes verus*

### Introduction

Altruism in various forms has been observed in a number of animal species, with various explanations offered, ranging from kin selection to reciprocity. I present an example of altruism in wild chimpanzees (*Pan troglodytes*), our closest living relative, in the form of targeted helping. A number of cases of altruism and apparent empathy have been reported for both wild and captive great apes (Sandin 2007), but disagreement remains as to the exact nature of such behavior in apes and the degree to which it is similar to human empathy (Premack 2007; Hirata 2009). Here, I present an example of altruism in

wild chimpanzees (*P. t. verus*) from the Fongoli community in Senegal and hypothesize that this is a putative example of empathy. I place this account into the context of hierarchical evolutionary stages proposed by DeWaal (2008), which include (1) emotional contagion, where one individual is affected by another's state of arousal or emotions, (2) sympathetic concern, where an individual is further able to assess another's situation and attempts to understand its cause, and (3) empathic perspective-taking, where an individual can adopt another's point of view, which further builds on emotional contagion and sympathetic concern. Targeted helping, where one individual specifically responds to another's situation and goals, is an example of the empathic perspective-taking stage of empathy (DeWaal 2008). While some evidence supports the hypothesis that chimpanzees lack altruistic behaviors that are related to the type of empathy thought to characterize humans (Silk et al. 2005; Jensen et al. 2006; Vonk et al. 2008), others argue that certain species, specifically apes, also exhibit characteristics consistent with empathy (Warneken and Tomasello 2006; Warneken et al. 2006, 2007; DeWaal 2008; Hirata 2009).

### Study site and subjects

The Fongoli chimpanzee community ranges within the Kedougou region in southeastern Senegal (12°40N, 12°13W). The savanna environment here is a mosaic of habitats, including woodland, grassland, bamboo and small patches of gallery forest (Pruetz 2006; Pruetz et al. 2008). Study began at Fongoli in 2001 and, after 4 years of habituation effort, systematic behavioral data collection was initiated in the spring of 2005, continuing until the present. The chimpanzee community consists of 33

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individuals: 9 adult females, 10 adult males, and 14 immature chimpanzees (estimated to be less than 13 years of age and/or nulliparous in the case of females, and, in the case of males, estimated to be less than 15 years and/or not yet integrated into the adult male dominance hierarchy as ascertained by the direction of pant-grunt vocalizations). Based on preliminary analyses of mitochondrial DNA, the adult female, Tia (TI), and the adolescent male, Mike (MI), described in this account of targeted helping are not maternally related (Stewart et al., unpublished data). Neither TI nor MI shared the same haplotype with other Fongoli chimpanzees in the community at the time this incident occurred (Stewart et al., unpublished data).

### Observations

Following a poaching incident at Fongoli in January 2009 that entailed the capture of a 9-month-old female, infant chimpanzee, researchers were able to confiscate the infant, Aimee (AM). They ultimately returned her to her mother, a primiparous young female, Tia (TI) (Pruetz and Kante 2010). Researchers kept AM in relative isolation from humans, save from feeding her with a bottle through wire mesh. After assessing her health and noting the lack of apparent illness, they attempted to return AM 5 days after she had been taken by poachers (Pruetz and Kante 2010). They located TI, carried AM to within 15 m of the party with which TI was feeding, and placed AM on the ground, where she sat until she was retrieved (Pruetz and Kante 2010). An adolescent male estimated to be approximately 10 years of age, Mike (MI), retrieved AM and carried her ventrally to the feeding tree that TI had just descended, there transferring the infant to her mother. MI was in the same feeding tree previous to his descent to retrieve AM, along with the rest of the eight other individuals, and he was seen to observe researchers place AM on the ground. As the observers were concerned with moving away from the infant once she was placed on the ground, they were unable to see whether other individuals noticed AM at this time. Following MI's transfer of AM to TI, most of the party members clustered around TI and AM, and AM could be heard pant-grunting in greeting. TI and AM rested for several hours with the rest of the party until they began late afternoon travel. TI was still limping slightly, and her wound bled after she began travelling. The poachers' dogs had attacked TI during the capture of her infant, which resulted in wounds concentrated on her genital swelling.

On the day that AM was returned to her, TI was still unable to keep up with the rest of the group and brought up the end of the party during travel, stopping frequently to examine her wound and to wave the flies from it. She set AM on the ground at her side each time. Following about

5 min of travel (approximately 200 m) on the day AM was returned, MI picked up the infant from the ground less than 1 m from TI and carried her for approximately 15 min (approximately 500 m), until the group stopped travel. MI initially paused and waited for TI while carrying AM. At times, MI was not visible to the observer. TI occasionally stopped, at one point grooming with an adult male who was nearby when MI retrieved AM. Finally, TI caught up with the rest of the group, which stopped and fed for some time, and she took AM back. The total distance traveled between the ultimate nesting site and the point at which the chimpanzee party began travel was approximately 900 m. As the party was not located until mid-morning on this day, their daily path length is unknown. However, based on the distance they were recorded to travel after the party was located (1.4 km), MI's carrying accounted for approximately one-third of the distance they moved.

The adolescent male MI also carried AM for TI on the second day after the mother and infant had been reunited. During the period of late afternoon travel, MI again carried AM, this time for approximately 10 min (estimated to be at least 300 m). MI was not observed to carry the infant on the third day following the reunion of TI and AM, although the chimpanzee group on this day traveled only 500 m from one nest site to another, less than half the distance the group traveled on the first 2 days following the infant's return. TI and AM were followed again on 14 days during the initial 4 weeks and on 11 days during the subsequent 4 weeks following the return of AM. MI was not observed to carry AM again during this 8-week period. MI had never been observed to carry AM or any other infant previous to this incident, and he did not exhibit such behavior again until TI allowed MI and several immature females to hold and carry AM for brief periods and short distances (<5 m) approximately 6 months later (Pruetz, unpublished data; E. Wessling, personal communication). Other immature as well as adult males in the Fongoli community have been observed to carry infants older than 1 year of age short distances (less than 20 m) but never to the length that MI carried AM (Pruetz, unpublished data).

### Discussion

Various hypotheses may be put forth to explain the ultimate causes of altruism such as the targeted helping on the part of the adolescent male chimpanzee described here. Kin selection (Hamilton 1963) is an unlikely explanation given that the adolescent male, MI, and young mother, TI, are not matrilineally related. MI is unlikely to have fathered AM, given that he was estimated to be less than 9 years of age when she was conceived, and males of this age are rarely provided the opportunity to mate with females at peak

estrus (Goodall 1986). Given the average relatedness of chimpanzee males to the degree of half-brothers within certain communities (Inoue et al. 2008), MI could share some degree of her genetic material, however, if he were paternally related to AM's father, for example.

An additional explanation for the targeted helping reported here involves the cohesive nature of the Fongoli community (Pruetz and Bertolani 2009). While chimpanzees typically exhibit a fission–fusion social system, in which sub-group membership is fluid and temporary (Goodall 1986), the Fongoli community is significantly more cohesive than those studied elsewhere. On average, almost one-half of the Fongoli community is together at any given time, which is approximately three times greater than the level of cohesion reported for chimpanzees at other study sites (Pruetz and Bertolani 2009). This may contribute to a tendency for MI and others, such as the adult male that traveled with TI after MI began carrying the infant, to assist and/or wait for TI during group progression.

An alternative explanation may also be that MI was given the opportunity to carry AM when he might otherwise have been prevented from doing so if TI had been healthy. Evidence in primates suggests that males will care for unrelated as well as related infants in some cases. Experiments with common marmosets (*Callithrix jacchus*) showed that males removed from the context of other adults exhibited similar interest in caring for related and unrelated infants (Zahed et al. 2008). In a 12-month study of alloparental behavior in Mahale chimpanzees, Nishida (1983) reported such behavior performed by an adolescent male that was not maternally related to the infants he carried and groomed with, similar to what is normally seen in young female chimpanzees. At Tai, Ivory Coast, Boesch et al. (2010) reported 18 cases of altruistic adoption of orphaned chimpanzees, with nine of these cases involving male adoption of orphans. In seven of these cases, kinship was known. Males were known to be unrelated to the adopted infants in three cases, three males were siblings of their adopted infants, and in only one case was the male caretaker the infant's father (Boesch et al. 2010). Regardless of the ultimate cause of MI's targeted helping behavior, the issue of concern here is his recognition of TI's state, her physical needs and those of her infant.

Although it may be argued that the adolescent male, MI, did not exhibit a true form of altruism, in that he may be distantly related to the female or infant (kin selection; Hamilton 1963) or behaved in this way as a form of future investment in a male mating strategy (Teleki 1973; Stanford 1999), this does not negate his assessment of the condition of the injured female and her needs. The best explanation is that MI's targeted helping of TI is an example of DeWaal's (2008) empathic perspective taking,

rather than sympathetic concern or emotional contagion. Neither TI nor AM emitted any emotional signals to indicate distress. MI apparently perceived the difficulty TI had in keeping up with the group, that carrying AM would assist TI in travel, and he anticipated her goal, which was to arrive with the rest of the party at a feeding site. Hirata's (2009) examples of mother–infant interactions in which mothers assisted infants where the infant did not emit an emotional signal are similarly accounts of putative empathy in chimpanzees.

Although it is not known whether MI is generally more interested in infants than are other young males, his attention to TI during the targeted helping incident related here indicates that his goals were not merely selfish in nature. In a compilation of putative examples of empathy in elephants (*Loxodonta africana*), Bates et al. (2008) categorize such 'babysitting' as cases where individuals recognize that others have emotions and that they can differ from one's own emotions. MI's carrying of AM could be interpreted as understanding another's differences regarding goal-directedness, physical competence and intention (Bates et al. 2008). These are operationally defined as behavior that can be directed at specific ends (goal directedness = carrying infant), recognition that others have abilities and vulnerabilities that differ from your own (physical competence = TI's inability to carry infant and keep up with group), and that others can have wants and needs that differ from your own (intention = carrying infant to feeding site) (Bates et al. 2008).

This case report adds to the varied literature on the nature of altruism and related behaviors, such as empathy, in non-humans. Although results of some experiments with captive chimpanzees vary as to this species' regard for others (Silk et al. 2005; Jensen et al. 2006; Vonk et al. 2008), most provide some support for the hypothesis that chimpanzees are capable of exhibiting empathy (Warneken and Tomasello 2006; Warneken et al. 2006, 2007; DeWaal 2008; Hirata 2009). Similarly, a number of studies on capuchin monkeys (*Cebus* spp.) suggest that these species are capable of exhibiting behaviors such as altruism and regard for others, which are requisites of empathy, but the intricacies of such abilities are complex (Barnes et al. 2008; Lakshminarayanan and Santos 2008; Paukner et al. 2009). It is necessary, therefore, to examine the nature of seemingly altruistic behavior and empathy on a number of levels, as proposed by DeWaal (2008), and to consider alternative hypotheses.

I suggest the behavior described here is a form of empathy on the part of the adolescent male, who recognized the difficulty experienced by the female as well as her needs. Specifically, the adolescent male's aid of an unrelated, injured female in carrying her infant during group travel exemplifies DeWaal's (2008) 'empathic

perspective taking'. This example in the context of a unique situation is significant in light of the paucity of examples of empathy in wild non-human primates. While the act of consolation is often given as an example of empathy (DeWaal 2008), where relief is provided in terms of stress experienced by the recipient, the particular case described here provides an example of a behavior (targeted helping) that was relatively more costly for the individual providing aid and was relatively more beneficial for the individual receiving aid. As anecdotal as well as experimental data accumulate, the question of interest in regards to empathy in non-humans should focus on more intricate levels of empathic behavior as suggested by DeWaal (2008), rather than adhering to the assertion that this trait is uniquely human.

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