Review

Varieties of altruism in children and chimpanzees

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Recent empirical research has shed new light on the perennial question of human altruism. A number of recent studies suggest that from very early in ontogeny young children have a biological predisposition to help others achieve their goals, to share resources with others and to inform others of things helpfully. Humans' nearest primate relatives, such as chimpanzees, engage in some but not all of these behaviors: they help others instrumentally, but they are not so inclined to share resources altruistically and they do not inform others of things helpfully. The evolutionary roots of human altruism thus appear to be much more complex than previously supposed.

The debate is as old as the Western intellectual tradition: are people naturally helpful toward others and society corrupts them, or are they naturally selfish toward others and society teaches them better? Despite a deep interest in the question, there was, until recently, very little empirical research into the origins of human altruism in terms of its underlying psychological mechanisms.

In the past few decades, a fair amount of research has focused on the ontogenetic origins of empathy, that is, young children's tendency to comfort others who are expressing emotional distress [1–3]. In addition, there has been a long tradition of investigating older children's moral judgments [4–6]. However, in the past few years, a number of new topics and phenomena have emerged, and some cross-species comparisons have been made, for example, between children and their nearest primate relatives such as chimpanzees. These new phenomena and approaches enable a more comprehensive understanding of both the phylogenetic and the ontogenetic roots of human altruism.

A key fact supported by this new research is that altruism is not a single homogeneous trait, but rather organisms may have greater or lesser altruistic tendencies in different domains of activity; it all depends on the costs, benefits and contexts involved. The three new domains most investigated are:

- *helping* others achieve their goals (by acting for them)
- *sharing* valuable goods such as food with others
- *informing* others of things they need or want to know

In an economic analogy, the individual may altruistically provide others with goods, services or information [7].

Helping

The behavior is as simple as it is surprising – and it is highly robust. Drop an object accidentally on the floor and try to reach for it, for example, from a desk, and infants as young as 14–18 months of age will toddle over, pick it up and return it to you [8–10]. They do this in the total absence of encouragement or praise, and they do it in some more complex situations as well, for example, when someone cannot open a cabinet because his hands are full, or is having trouble stacking books. They will even go to some trouble to do these things as they, for example, must pull themselves away from a fun activity or surmount an array of obstacles in order to help [11,12]. To provide the needed help in such situations, infants must both understand the goal of the other and be motivated to help them achieve it (Box 1 & Figure 1).

Interestingly and importantly, chimpanzees help others in some of the same situations. Human-raised chimpanzees retrieve out-of-reach objects for humans quite readily, also in the absence of encouragement or praise [8]. Mother-raised chimpanzees will even release a chain that opens a door for an unrelated chimpanzee groupmate, again in the total absence of reward [11,13]. The early ontogenetic emergence of spontaneous helping in young children and its presence in our nearest primate relatives, suggest that helping others with their instrumental goals somehow comes naturally to humans, not exclusively through cultural transmission or explicit teaching. Indeed, even before they are physically capable of helping, 6-month-old infants discriminate geometrical shapes that are 'helping' others from those who are 'hindering' them [14].

Glossary

Ultimate causation: Why a behavior evolved in terms of fitness costs and benefits. Concerning altruism, evolutionary models seek to explain how a behavior that appears fitness-reducing can evolve by, for example, resulting in long-term fitness-benefits through reciprocation between individuals or the promotion of one's own genes in genetically related individuals (kin-selection).
Proximate causation: How a certain behavior operates in the organism in terms of, for example, the cognitive and motivational processes producing it. One can thus reject the possibility of altruism in terms of ultimate causation, but still accept the idea that humans have altruistic motivations to help others in need. The current paper is concerned with the latter, i.e. the behaviors that are prompted by another person's needs, which are expressed in a negative emotional state, an unachieved goal, or a lack of resources or information.

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Box 1. Studies of instrumental helping

Classic studies of young children's helping behavior documented their tendency to participate in activities such as cleaning up or fixing a broken toy [52–53], but with no control conditions to make sure that they were not just performing the activity for fun independently of the other's needs. In more recent studies, children are given a wide range of different helping tasks (Figure 1), each with its own closely matched control condition [8,9]. For example, an adult might either drop his pen accidentally or throw it down on purpose, controlling for children's general tendency to fetch objects just after they hit the floor. The basic finding is that, from at least 14 months of age, infants begin to help others in such situations, and this increases in frequency and sophistication (i.e. helping in more different kinds of situations) in the ensuing months. (To see videos of this helping behavior, please go to: http://email.eva.mpg.de/~warneken/video).

Warneken and Tomasello [8] also tested three human-raised chimpanzees in these same situations. The chimpanzees helped reliably in various problems involving out-of-reach objects, but not in the other, more complex situations (perhaps reflecting differences in the social-cognitive capacity to infer others' goals). Following on from this finding, Warneken *et al.* [11] directly compared the tendencies of 18-month-old children and mother-raised chimpanzees to fetch out-of-reach objects for others. Both species helped in this situation quite reliably, and neither species declined significantly in helping when they had to exert more effort in order to help. Nor did either species help more frequently when the potential recipient was holding a reward in his hand and delivered it after every trial in which there was helping. Of special importance in assessing chimpanzees' proclivities for helpfulness, Warneken *et al.* [11] presented subjects with a novel situation: a chimpanzee groupmate trying to get through a locked door, which only they could open by releasing a latch from their adjoining cage (Figure 2). The chimpanzees opened the door for their groupmate often, and more than in two control conditions in which the groupmate was either absent or trying to get through a different door. In one final study, chimpanzees tended to open the door more readily for a groupmate if the groupmate had previously opened the door for them (reciprocal altruism [13]).

But it is possible that parents and other adults reward young children for being helpful, and so rewards might be responsible for the origins of the behavior. However, in a study involving both young children and chimpanzees, it was found that the promise of a material reward (the person needing help held a reward in her hand and delivered it as soon as the help was forthcoming) did not increase the amount of helping of either species [11]. And in a study with 20-month-old children, it was found that providing material rewards even *decreases* the amount of helping after it is terminated; that is, rather than being the cause, external rewards can actually undermine young children's intrinsic motivation to help others [12]. The naturalness of instrumental helping for young children is thus also suggested by this so-called 'overjustification effect' of external rewards [15].

Sharing

Helping others by expending a few ergs of energy fetching a dropped pen is one thing, but sharing valuable resources with them is another. In this case, children turn out to be more generous with resources than are chimpanzees, but the comparison is complex, spanning four different ways of sharing.

First, although chimpanzees in their natural habitats mostly compete over food, they do transfer food to others in some circumstances. The most common circumstance is when individuals share food selectively with their desired coalitionary and sexual partners [16]. However, when trading food in situations that are more similar to human barter, chimpanzees are often reluctant to risk giving up a lower-value item for a potential higher-value item, indicating a distinct lack of trust that the return benefit will be forthcoming [17].

Second, although chimpanzee mothers (and sometimes others) will tolerate other individuals taking food from their possession when nothing is expected in return (what is often called 'passive sharing'), this is typically restricted to situations in which the food is of low quality and/or difficult to monopolize [18–20]. Mother chimpanzees on occasion share food with their infants more actively, but in these rare circumstances they almost always give them the leftovers in the form of shells, husks or peelings [21]. Human food sharing is of an entirely different nature [22], and even young children share food and other resources from a relatively early age [23–27].

Third, in mutualistic cooperation, chimpanzees have great difficulties sharing the spoils at the end. For example, if two chimpanzees pull in together a board with food on it, all goes well if each chimpanzee's portion of the food is on its own end of the board. However, if the food is clumped in the middle of the board, making it easy for the more dominant individual to monopolize, cooperation tends to break down [28–30]. In ongoing research, we have found that young children tend to share food rewards equally regardless of whether they are pre-divided on the board or not (Warneken, F. *et al.,* Unpublished data).

Finally, in two recent experiments, chimpanzees showed a surprising lack of concern for the resources a partner would get – even when it cost them nothing. Thus, when pulling in food on a tray for themselves, chimpanzees did not behave differently whether that act of pulling did or did not deliver food, at zero cost to the actor, to a chimpanzee bystander [31–32]. In contrast, in similar experiments, young children pulled more often if the other got something too [25] (Box 2 & Figure 3).

Thus, when it comes to sharing valuable resources, crucial differences between children and chimpanzees emerge. It is not entirely clear what exactly accounts for these species differences, including the experimental findings that chimpanzees help instrumentally but do not seem to share resources with others actively (see outstanding questions). One possibility is that it is mainly due to social-cognitive differences because the need for altruistic intervention is usually more salient in instrumental helping situations (in which an individual is actively struggling with a problem). Alternatively, the sharing of resources might be especially constrained in chimpanzees due to different forms of foraging in the two species. In fact, many evolutionary theorists believe that a key event in human evolution was the transition from more individual to more cooperative hunting and gathering (e.g. [33]). But such cooperation cannot readily occur when there is difficulty sharing the spoils after they are obtained. Therefore, it is possible that food represents a special domain in which humans have become more tolerant, and ultimately more altruistic, toward others, as part of their more cooperative way of making a living [33].

Figure 1. Examples of instrumental helping tasks for young children developed by Warneken and Tomasello 2006 [8].

Informing

It comes so naturally to humans that we do not think of it as prosocial behavior at all, but the free exchange of information in communication, in which humans engage constantly, can be a kind of altruism too. Human communication is premised on the assumption that a communicative act provides useful or relevant information not for the speaker but for the listener, and it is thus a cooperative act [34]. Moreover, humans often inform others of things that they believe will help those others even when the speaker is just a bystander and they gain no benefit from it, such as giving directions or pointing to something that the other person is searching for. True, the energy or cost associated with an informative utterance is low. However, that makes it all the more mysterious why, apparently, even our closest primate relatives do not seem to offer up information to others helpfully as a matter of course.

Virtually all animal communication, including that of chimpanzees, involves one individual getting the other to do what he wants him to do. The apparent exceptions are food calls and alarm calls. However, in recent interpretations, even these vocalizations are considered mainly self-serving. Thus, when chimpanzees find food they call so that they can have company while eating, as protection against predators [35], and when they spy a predator they vocalize as a way of recruiting allies for defense, or as a way of signaling to the predator that it has been spotted [36]. Importantly, these vocalizations are also given when the entire group is already there and so not in need of any information about the situation – so their function is not to inform. Even when chimpanzees communicate with a human (e.g. by pointing [37]), they are nearly always attempting to get the human to do something for them, as do language-trained great apes (over 95% imperatives in the studies of [38,39]).

By contrast, even from their earliest, prelinguistic attempts at intentional communication, human infants inform others of things helpfully. Thus, when 12-month-old infants see an adult searching for an object, if they know where it is they will direct the adult to it with a

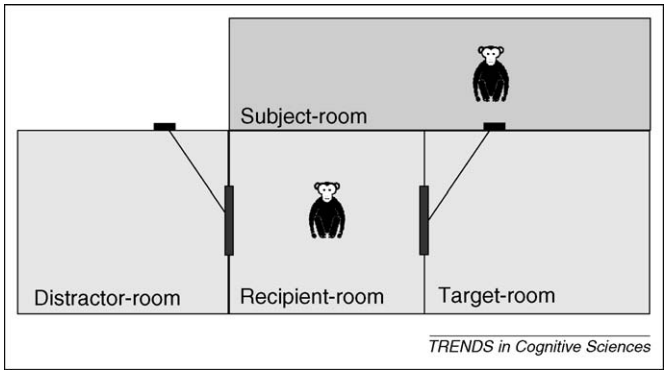

Figure 2. Schematic drawing of testing setup from Warneken *et al.*, 2007 [11]. Both sliding doors to the target and the distractor room are held shut by chains. The recipient cannot release either chain, whereas the subject can release the target chain. In the experimental condition, food is placed in the target room and the subject can release the chain for the recipient to enter. In the control conditions, food is placed in the distractor room or no recipient is present.

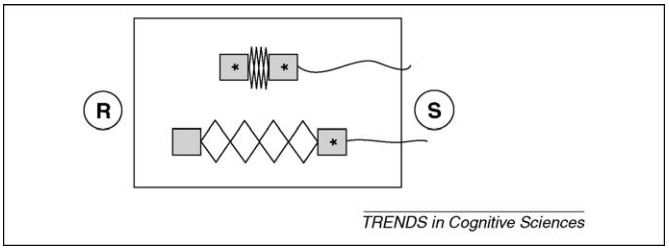

Figure 3. Pulling mechanism from Silk *et al.* [31]. The subject can pull one of two ropes, causing one tray to move toward the subject and the opposite one to the recipient. This apparatus has been adapted for a study with young children by Brownell *et al.* [25].

pointing gesture [40]. Variations on this basic situation establish that the infants do not want the object for themselves (e.g. they quit pointing as soon as the adult has fetched it), and they are not just eager for the adult to perform an activity with the object (e.g. they point preferentially to objects whose location the adult is ignorant of [41]). And so again in this domain, altruistic informing seems to come naturally to even very young infants.

The human–chimpanzee comparison for informing thus differs from that for instrumental helping, even though they both are low-cost. Humans seem to have evolved a system of communication premised on cooperation, whereas chimpanzees have not. One possible explanation is that humans evolved this informative communicative function in the context of collaborative activities such as collaborative foraging – where helping the other typically helps both toward a common goal – whereas chimpanzees do not engage in the appropriate kind of collaborative activities [42].

Social selectivity and norms

And so young children are naturally helpful, generous, and informative and from very early in ontogeny. Given various lines of evidence, it would not seem that this behavior is inculcated in them originally by culture. However, it is obvious that social experience and cultural transmission become increasingly more influential over ontogeny.

First, in terms of direct social experience with others, a year or two after they have started behaving altruistically, young children begin to become more discriminating in the targets of their altruistic acts, for example, by focusing on those who are likely to reciprocate. Thus, in a recent study, 3-year-old children directed a puppet to share things with others more often if those others had themselves shared previously [43]. This concern for reciprocity and the preference for specific social partners appears to have deep evolutionary roots, as there is some evidence that chimpanzees in the wild are also sensitive to reciprocity, for example, in such things as grooming and support in fights [16,44–46], and in a recent experimental study chimpanzees had a greater tendency to help others who had previously helped them [13].

Second, preschool children also begin to modulate their altruistic behavior in line with social norms and rules, which are acquired through cultural transmission from other group-members. Some norms are simply conventional ways of doing things (e.g. we hang our coats in our cubbyholes), and children quickly learn many of these – perhaps as ways of demonstrating group membership. Surprisingly, preschool children also enforce conventional norms on others, informing them that they are doing it 'wrong', that this is not the way 'we' do it [47]. Moral norms, such as not hitting others or sharing 'fairly' with others, are even more directly related to altruism, and children clearly distinguish these from conventional norms from early in preschool [48]. In one recent analysis, moral norms differ

Box 2. Studies of resource sharing

Giving up valuable resources to others without compensation is not something to be expected from any species at any age. But a recent set of experimental studies has used tasks in which the subject pulls in food for herself, and in some cases this action also, as a cost-free side benefit, delivers food to a bystander. One way this works can be seen in Figure 3. In this apparatus, when the subject pulls one of the ropes in front of her it brings, for example, one piece of food to herself and one to the bystander (1/1). Pulling the other rope brings one piece of food to herself but none to the bystander (1/0). So the bystander may be provided with food at zero cost in terms of either resources or effort.

This type of apparatus was first used by Silk *et al.* [31] in a study with chimpanzees. The finding was that when faced with a 1/1 versus 1/0 option, the chimpanzees chose randomly and irrespective of whether another chimpanzee was even present on the other side. Another study with chimpanzees confirmed this result and added a control condition ensuring that the chimpanzees knew for sure what was happening with the food on the bystander's side ([32]; see also [54] for further variations on this theme with the same basic finding).

Adapting this apparatus for a study with young children, Brownell *et al.* [25] found that whereas 18-month-old children chose randomly, 25-month-old children more often chose the 1/1 option benefiting both themselves and the adult bystander simultaneously. Notably, they did this only in a condition in which the bystander had verbalized her desire for the food, indicating that young children require explicit cues to note the other person's need in this context.

From around 4–5 years of age, children share even if it involves a cost to themselves. In Moore *et al.* [23], children were tested in a similar resource allocation-paradigm with the difference that the recipient was not present during the test. Children more often chose equal rewards for both themselves and another child over a selfish option with a higher immediate payoff for them only – at least when this other person was a friend rather than a non-friend or a stranger. In addition, Fehr *et al.* [24] showed that from 8 years of age, children allocate more resources to ingroup- over outgroup-members in this anonymous test-situation, thus providing evidence for parochialism in children.

from conventional norms precisely because they connect with our natural sense of empathy for harmed individuals. That is, the kind of empathy for the plight of others that underlies young children's altruistic behaviors provides an emotional base for moral norms that conventional norms simply do not have [49]. Although it is controversial, there is no good evidence that chimpanzees or any other nonhuman species operate with social norms of any kind (see [50] for a review). This is where chimpanzees and humans seem to part: both chimpanzees and humans become more selective in their altruism based upon direct social experience with others (by e.g. preferring reciprocators), but only humans appear to reshape their natural altruistic tendencies according to the norms of their social group.

And so, although culture does not create altruism in young children, later in ontogeny it comes to play a crucially important role in mediating their altruistic tendencies [7]. This developmental timeline makes sense as infants initially act mainly within the protected environment of their family and do not have to self-regulate via social norms because they are supervised by adults. However, during middle childhood, when they start to act more autonomously with a larger number of people, they need to be concerned with whether the target of their altruistic act reciprocates or judges their reputation according to internalized social norms. Thus, as children become independent agents in the culture, these things become important mediators of all of their social activities.

Conclusion

The take-home messages from this review are two. First, from an early age human infants and young children are naturally empathetic, helpful, generous, and informative. The mechanisms presumably responsible for the emergence of human altruism as an evolutionarily stable behavior – reciprocity, reputation and social norms – do not seem to kick in until after children have been practicing their natural altruism (with a good bit of selfishness in parallel, of course) for a few years. This natural altruism also helps to explain the well-known finding that inductive parenting – in which the adult points out to the child the effect of her actions on others or on the functioning of the group – is especially effective in promoting altruistic behavior [51]. Such parenting presumes, correctly, that children will be naturally cooperative, if only they can see clearly the effects of their actions on others.

Second, altruism is not a single trait or phenomenon. Both in evolution and ontogeny individuals may be more or less altruistic independently in different domains of activity. This is apparent at the species level in the different ways that young children and chimpanzees either are or are not helpful in the three different forms of altruism reviewed here. We know relatively little about the way that young children mediate their altruistic tendencies as ontogeny proceeds – through such mechanisms as reciprocity, reputation and social norms – and so this is an important topic for future research (see also Box 3).

Box 3. Outstanding questions

- What accounts for the apparent species similarities and differences in the various types of altruism? In particular, why do chimpanzees help others, but not appear to share resources or provide information as readily?
- When during human ontogeny do factors such as reciprocity, social norms and reputation formation begin to modulate altruistic behaviors?
- Are there cross-cultural differences in the emergence and the further development of altruism, especially as a function of different rearing practices and cultural norms?

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