Altruistic Helping in Human Infants and Young Chimpanzees

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Human beings routinely help others to achieve their goals, even when the helper receives no immediate benefit and the person helped is a stranger. Such altruistic behaviors (toward non-kin) are extremely rare evolutionarily, with some theorists even proposing that they are uniquely human. Here we show that human children as young as 18 months of age (prelinguistic or just-linguistic) quite readily help others to achieve their goals in a variety of different situations. This requires both an understanding of others' goals and an altruistic motivation to help. In addition, we demonstrate similar though less robust skills and motivations in three young chimpanzees.

Helping is an extremely interesting phenomenon both cognitively and motivationally. Cognitively, to help someone solve a problem, one must know something about the goal the other is attempting to achieve as well as the current obstacles to that goal. Motivationally, exerting effort to help another person—with no immediate benefit to oneself—is costly, and such altruism (toward non-kin) is extremely rare evolutionarily. Indeed, some researchers have claimed that humans are altruistic in ways that even our closest primate relatives are not. A powerful method to test this idea is to directly compare human infants and our closest primate relatives (chimpanzees) on their propensity to help. Such a comparison may enable us to distinguish aspects of altruism that were already present in the common ancestor of chimpanzees and humans from aspects of altruism that have evolved only in the human lineage. To date, no experimental studies have systematically tested human infants and chimpanzees in a similar set of helping situations.

A number of studies have demonstrated that young children show concern (empathy) for others in distress. Preschool-age children and even infants (1 to 2 years of age) occasionally attempt to respond to the emotional needs of others, for example, by comforting someone who is crying (*1*–*10*). In contrast, there are no experimental studies with infants that have systematically investigated instrumental helping—providing help to people who are faced with an instrumental problem and are unable to reach their goal (*11*–*13*).

In the current study we presented 24 18-month-old infants with 10 different situations in which an adult (a male experimenter) was having trouble achieving a goal. This variety of tasks presented the children with a variety of difficulties in discerning the adult's goal and his problems in reaching the goal. These situations fell into four categories: out-of-reach objects, access thwarted by a physical obstacle, achieving a wrong (correctable) result, and using a wrong (correctable) means (Table 1) (movies S1 to S4). For each task, there was a corresponding control task in which the same basic situation was present but with no indication that this was a problem for the adult (*14*). This ensured that the infant's motivation was not just to reinstate the original situation or to have the adult repeat the action, but rather to actually help the adult with his problem. After the occurrence of the problem in each task (e.g., marker drops on floor), there were three phases: The experimenter focused on the object only (1 to 10 s), then alternated gaze between object and child (11 to 20 s), and in addition verbalized his problem while continuing to alternate gaze (e.g., "My marker!"; 21 to 30 s). In control trials, he looked at the object with a neutral facial expression for 20 s. In no case did the infant receive any benefit (reward or praise) for helping. Each individual was tested in all 10 tasks, a subsample of 5 tasks administered as experimental and 5 as control conditions (in systematically varied order). Thus, in each task 12 children were tested in the experimental condition and 12 others in the control condition for a between-subjects comparison.

Results showed that infants helped the adult (the infant performed the target behavior significantly more in experimental than in control conditions) in 6 of the 10 tasks—at least one for each category (Fig. 1). They handed him several out-of-reach objects (but not if he had discarded them deliberately); they completed his stacking of books after his failed attempt (but not if his placement of the books appeared to meet his goal); they opened the door of a cabinet for him when his hands were full (but not if he struggled toward the top of the cabinet); and they retrieved an inaccessible object for him by opening a box using a means he was unaware of (but not if he had thrown the object inside the box on purpose). Analyzed by individual, 22 of the 24 infants helped in at least one of the tasks. It is noteworthy that they did so in almost all cases immediately (average latency = 5.2 s), before the adult either looked to them or verbalized his problem (84% of helping acts within the initial 10-s phase). Thus, the experimenter never verbally asked for help, and for the vast majority of helping acts, eye contact (as a subtle means of soliciting help) was also unnecessary.

Experimental studies on altruistic behaviors in nonhuman primates are scarce. There are anecdotal reports of possible instances of helping (*15*–*17*) and some experiments demonstrating empathic intervention by various monkey species when another individual is displaying emotional distress (but no experiments with apes) (*18*). However, there are no studies, to our knowledge, of nonhuman primates helping others who are struggling to achieve their goals (instrumental helping) (*19*, *20*). In two recent experiments, chimpanzees were given the opportunity to deliver food to a conspecific (*21*, *22*), but again that conspecific was not trying to solve a problem in which the subject could help instrumentally [see also (*23*)]. Results were negative. But it is possible that altruism would be more likely when it involves objects other than food, because chimpanzees often compete over food and the drive to acquire food for themselves might preclude their capacity to act on behalf of others. In the current study, therefore, we gave the same basic tasks of instrumental helping given to the infants, with some minor modifications, to three young chimpanzees (*Pan troglodytes*, one of humans' two closest living relatives). These individuals were 36, 54, and

Table 1. Examples of problems used in child study.

Category	Task	Problem
Out-of-reach	Marker	The adult accidentally drops a marker on the floor and unsuccessfully reaches for it (experimental) or intentionally throws a marker on the floor (control).
Physical obstacle	Cabinet	The adult wants to put magazines into a cabinet, but the doors are closed so that he bumps into it (experimental) versus bumping into the doors as he tries to lift the magazines onto the cabinet (control).
Wrong result	Book	A book slips from a stack as the adult attempts to place it on top of the stack (experimental) or he places it next to the stack (control).
Wrong means	Flap	A spoon drops through a hole and the adult unsuccessfully tries to grasp it through the small hole, ignorant of a flap on the side of the box (experimental). Alternatively, he throws the spoon in the box on purpose (control).

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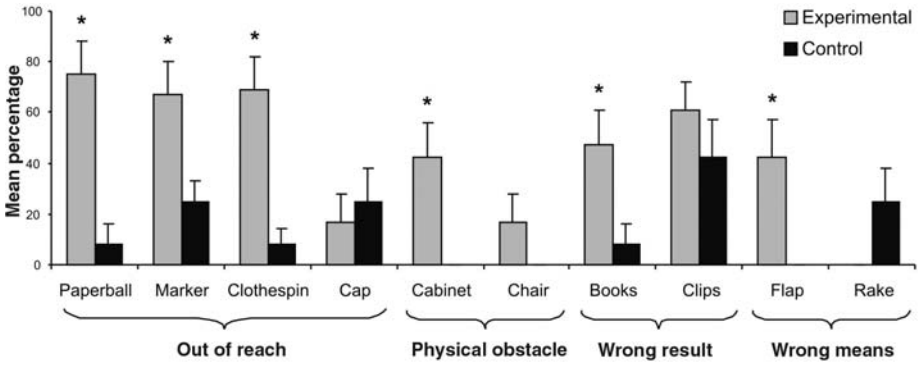

Fig. 1. Mean percentage of target behaviors as a function of task and condition. In tasks with multiple trials, the mean percentage of trials with target behavior per total number of trials was computed for each individual. Independent-sample *t* tests (df = 22) revealed significant differences between conditions for the tasks Paperball ($t = 4.30$, $P < 0.001$), Marker ($t = 2.70$, $P < 0.05$), Clothespin ($t = 4.38$, $P < 0.001$), Books ($t = 2.33$, $P < 0.05$), and Cabinet ($t = 3.08$, $P < 0.01$). For the Flap task with only one trial per individual, we computed Fisher's exact test ($N = 24$, $P < 0.05$). In these six tasks, children performed the target behavior significantly more often in the experimental than in the control condition. No difference between conditions was found for the tasks Clips ($t = 1.04$, $P = 0.31$), Cap, Chair, and Tool, Fisher's exact tests ($N = 24$), $P = 1.0$, 0.48, and 0.22, respectively. Error bars represent SE; $^*P < 0.05$.

54 months of age at the time of testing and had been raised their whole life by humans. Each chimpanzee performed both conditions of each task in two different sessions on consecutive days. They were tested by a highly familiar human caretaker with whom they spent time on a daily basis.

The chimpanzees helped in some of the tasks (movies S5 to S8). All three chimpanzees helped reliably in the five tasks involving reaching: Across all such trials, the chimpanzees could retrieve objects for the human from 0 to 13 times in both the experimental and control conditions. The scores of the three individuals (experimental, control) were as follows: Alex, 5, 0; Alexandra, 10, 3; Annet, 9, 0 (each pair is significantly different from a chance distribution: Fisher's exact test, $P = 0.039$; $P = 0.017$, $P = 0.0005$, respectively). Because it was more difficult to control the behavior of the chimpanzees than that of the children, the human had to call each one by name to pay attention more often and sooner in the process. Nonetheless, when the chimpanzees helped, they did so relatively quickly (average latency = 12.9 s of reaching for the object), with each of the three individuals helping the human from 4 to 7 times across all tasks before she verbalized anything. As with the human infants, they did so without receiving any benefit (reward or praise) for helping (although they retained the object in their possession for some seconds before handing it over more often than did the children).

However, the chimpanzees did not help the human reliably in the other types of tasks—that is, in those involving physical obstacles, wrong results, or wrong means. In a follow-up study, we gave them two additional tasks of these types—designed to make the human's problem especially salient and with more time for a response—and they still did not help in these tasks (*14*). Presumably, when someone is reaching with an outstretched arm toward an object, the goal is in principle easier to understand and the kind of intervention follows straightforwardly. This could explain why out-of-reach tasks (in contrast to the other scenarios) elicited more helping by children and the only instances of helping by chimpanzees. Children and chimpanzees are both willing to help, but they appear to differ in their ability to interpret the other's need for help in different situations.

These experimental results demonstrate instrumental helping (toward goals) in a nonhuman primate. It is possible that helping behaviors are more likely when they involve objects that are not food, and that this explains why we obtained positive results when others, using different tasks involving food, have found negative results. It should also be noted that the chimpanzees of the current study, unlike those in (*21*, *22*), were helping not a conspecific but a human. This might be important because chimpanzees are extremely competitive with one another (*24*, *25*), but when they grow up interacting with humans, they seem to develop some more cooperative skills and motivations as well. Although our chimpanzees had been rewarded in the past for handing humans objects already in their possession upon request, they had not been encouraged to retrieve, nor rewarded for retrieving, out-of-reach objects for humans.

The human infants helped much more, and they did so for an adult they had just met (who was clearly not kin). Of special note, they helped in four different kinds of situations, whereas the chimpanzees helped in only one. This could be due to a greater propensity to help in children, or to children's more sophisticated cognitive skills in discerning the goal of the other in a variety of different situations. Infants 18 months of age are too young to have received much verbal encouragement for helping from parents. However, even if they had received some prior encouragement, many of the current tasks would have been unfamiliar for them, and the recipient of the help was an unfamiliar adult as well. In any case, viewed from a larger evolutionary perspective, the facts that human parents encourage their children to help others and that children comply by helping (even before they are linguistic) are noteworthy as the teaching and learning of prosocial norms.

A number of theorists have claimed that human beings cooperate with one another and help one another (especially non-kin) in ways not found in other animal species (*26*–*28*). This is almost certainly so, and the current results demonstrate that even very young children have a natural tendency to help other persons solve their problems, even when the other is a stranger and they receive no benefit at all. However, our nearest primate relatives show some skills and motivations in this direction as well, and this suggests that the common ancestor to chimpanzees and humans already possessed some tendency to help before humans began down their unique path of hypercooperativeness (*25*, *29*).

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Supporting Online Material

www.sciencemag.org/cgi/content/full/311/5765/1301/DC1
Materials and Methods
Table S1
Movies S1 to S8

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