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Abstract

One way to maintain cooperation between unrelated individuals and decrease the chance of providing costly aid to those who will not reciprocate is by selectively helping on the basis of the content of previous interactions. In the present study, we sought to determine whether the earliest instances of human helping behavior show specificity. In three experiments, we found that infants preferred to help an individual who, in a previous interaction, intended to provide a toy over one who did not (Experiment 1) and that infants consider this positive intention even without a positive outcome (Experiment 2). Experiment 3 provided a more detailed examination of the basis of selection, suggesting that infants are not solely avoiding unwilling individuals, but also selectively helping those who have shown a willingness to provide. Taken together, these experiments indicate that early helping behaviors show characteristics of the rich reciprocal relationships observed in adult prosocial behavior.

Keywords

altruism, reciprocity, cooperation, infant, intentionality

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Humans live within a societal structure in which individuals regularly act on behalf of one another. However, providing help appropriately to others poses at least three major challenges, including (a) identifying the intended goals of others, (b) recognizing the current obstacles to goals, and (c) possessing the motivation to exert effort to remove or minimize the obstacles with no immediate benefit to oneself (Eisenberg, Fabes, & Spinrad, 2006; Warneken & Tomasello, 2006; Zahn-Waxler & Radke-Yarrow, 1982). Because the provision of aid can be costly and because there is always a risk that the recipient will not reciprocate, this third challenge makes the existence of helping—especially toward unrelated individuals—rather surprising and thus the focus of much theoretical interest.

It is now widely accepted that one way to maintain helping between unrelated individuals is by monitoring and remembering past interactions and selectively providing aid accordingly (e.g., Trivers, 1971). By providing aid specifically to those who have helped you, the costliness of providing help to an individual who may not help back can be avoided. Research has demonstrated that reciprocating aid on the basis of the outcome of a previous interaction can provide a mechanism for the evolution of cooperation (e.g., Axelrod & Hamilton, 1981; Fehr & Fischbacher, 2004). However, reciprocating aid on the basis of the outcome of an interaction is not the only way to maintain cooperation. Although traditional models of reciprocity emphasize the role of outcome monitoring (e.g., the

obtainment of goods) in the identification of good social partners (e.g., Hamilton, 1964a, 1964b), others have suggested that the intentions behind an individual's previous actions may also influence reciprocity (e.g., Boesch & Boesch, 1989; Brosnan & de Waal, 2002; Dugatkin, 1997; Falk & Fischbacher, 2006; McCabe, Rigdon, & Smith, 2003).

This study examined whether the earliest instances of infant helping show selective reciprocity. The ability to provide instrumental aid emerges early in the second year of development (e.g., Warneken & Tomasello, 2006), but the nature of this aid is unclear. It has been suggested that infants begin life as indiscriminate helpers and then over time learn to appropriately direct aid (e.g., Hay, 2009; Hay, Caplan, Castle, & Stimson, 1991; Hay, Castle, Davies, Demetriou, & Stimson, 1990; Warneken & Tomasello, 2009). However, empirical results in related domains of social-cognitive development call for a reconsideration of this hypothesis (e.g., Wynn, 2009). For example, we know that infants show preferences for individuals on the basis of attractiveness (Langlois et al., 1987), common language (Kinzler, Dupoux, & Spelke, 2007), and past helpful behavior (Hamlin, Wynn, & Bloom, 2007). Additionally,

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infants recognize the individual specificity of intentions (Buresh & Woodward, 2006), distinguish intentional from accidental action (Carpenter, Akhtar, & Tomasello, 1998), and differentiate inability versus unwillingness as the cause of failed behavior (Behne, Carpenter, Call, & Tomasello, 2005). Infants' faculty with these early social-cognitive skills suggests that they may be equipped to make the appropriate assessments of others to allow for the selective provision of help earlier than previously believed.

In three experiments, we examined specificity in infants' helping behavior. Particular attention was paid to whether intentions or outcomes of previous interactions with two unfamiliar adults might mediate the subsequent choice of one as the recipient of aid. The experiments examined whether, in the absence of a positive outcome of the interaction (i.e., providing a toy), infants would use individuals' intentions to determine whom to help (Experiment 1) and whether infants use intentions to select whom to help even when the outcomes of actions differ (Experiment 2). Experiment 3 then provided a more detailed examination of the basis of choice in the first two experiments.

Experiment 1

Method

Participants. Twenty-four 21-month-old infants (mean age: 21.13 months; 10 girls, 14 boys) recruited from Kingston, Ontario, Canada, participated. Three additional infants were excluded from analysis as a result of experimenter error.

Materials and procedure. The infants stood across a table from two seated adult actresses. The top of the table came to shoulder height on the infants (63 cm) and sloped down toward the actresses. Parents were seated behind the infant.

During the familiarization phase, the infants were introduced by an experimenter to the two actresses who offered—but failed to provide—the infant with a desirable toy four times each. Initially, both women picked up the toy, called the infant's attention to the toy (e.g., “[name], look”), and then offered the toy to the child by placing it at the edge of the table. At this point, both of the actresses failed to give the toy to the child, but their reasons for failure differed. One failed to give the toy to the infant because she was *unwilling*, whereas the other was *unable*.¹ The unwilling actress waited for the child to reach for the toy and then pulled it out of the infant's grasp in a teasing manner (smiling and saying, again in a teasing manner, “Hmm . . . hmm,” as she examined the toy). In contrast, the unable actress offered the child the toy and then watched in surprise as it rolled away because of the slanted tabletop. She then picked up the toy in a confused or surprised manner (examining the toy with a furrowed brow while making a confused vocalization, “Hmm . . . hmm”). The side, order, and identity of the actresses, in addition to the toys that they offered, were counterbalanced between participants.

During the test phase, which immediately followed familiarization, the experimenter centered the child in the room and called the actresses' attention to a new toy as she placed it on the edge of the table, from which it subsequently fell to the floor. Both actresses simultaneously reached for the toy with outstretched arms, maintaining neutral expressions and not making eye contact with the participant (see Fig. 1). Infants were given an opportunity to retrieve the toy and give it to one of the actresses. The test trial ended immediately after a choice was made or after 15 s elapsed without a choice. Because the outcomes of the interactions with the actresses were the same (i.e., no toy was provided), a preference to help one of the individuals would indicate that infants were basing their helping behavior on the underlying intentions of the actresses.

For all experiments reported, two coders recorded the infants' choices (one coder was unaware of the purpose of the experiment and the actresses' roles during familiarization). There was 100% agreement between coders. After this initial coding, the naive coder watched the test event for all participants again and observed no differences between the two actresses in their behavior or expressions during the test phase. Further, this coder was unable to reliably characterize the role that the actresses had played in familiarization; the coder reported that she was simply guessing which label (e.g.,



Fig. 1. The test phase of Experiment 1. One infant at a time stood across a table from two actresses. The experimenter called the actresses' attention to a new toy as she placed it on the edge of the table, from which it subsequently fell to the floor. The two actresses simultaneously reached for the toy with outstretched arms, maintaining neutral expressions and not making eye contact with the participant. Infants were given an opportunity to retrieve the toy and give it to one of the actresses.

unwilling or unable for Experiment 1) to apply, and her accuracy across the three experiments was 49%.

Results and discussion

Sixteen of the 24 infants (67%) helped one of the two actresses by picking up the toy and handing it to her.² The other 8 infants did not help either actress and instead kept the toy to themselves. The infants who engaged in helping showed a significant preference to give the toy to the previously unable actress ($n = 12$, 75%) rather than to the unwilling actress ($n = 4$, 25%; binomial test, $p = .038$), indicating that they selectively helped individuals who had earlier demonstrated positive intentions toward them.

One possible interpretation of Experiment 1 is that infants direct their helping on the basis of previous intentions only when they have no other cues to follow. In a situation in which the infants can use the outcome of a previous interaction (e.g., receiving a desired toy) to direct their subsequent helping behavior, they may be less likely to use intentions. As such, a second, stronger test is to present infants with a choice of helping one of two individuals who have both previously demonstrated positive intentions, but only one of whom has achieved a successful outcome. If early instances of selective helping are based on the outcomes of previous interactions over and above the underlying intentions, infants should prefer to help an individual who successfully provided a toy to an individual who was unable to provide a toy. In contrast, if infants base the provision of aid primarily on partners' intentions, helping should be distributed equally. Experiment 2 tested infants in this manner.

Experiment 2

Method

Participants. Twenty-one 21-month-old infants (mean age: 21.56 months; 10 girls, 11 boys) participated. Two additional infants were tested but excluded as a result of experimenter error (1) and failure to observe the manipulation (1).

Materials and procedure. Experiment 2 used the same procedure as Experiment 1, except that the unwilling actress was replaced by a *successful* actress who handed the desired toys to the infant. The successful actress picked up the small toy and drew the infant's attention to it by smiling and saying, "Hmm . . . hmm" while she examined the toy and then placed it at the edge of the table for the infant, saying, "[name], look." Once the child had an opportunity to examine the toy, the experimenter got the child to store the toy in a bucket before the successful confederate offered another toy. For the test trial, both the unable and the successful actresses maintained a neutral expression, looking only at the dropped toy.

Results and discussion

Sixteen of the infants offered the toy to an actress; this 76% rate of helping was similar to the helping rates in Experiment 1, $\chi^2(1, N = 45) = 0.49, p = .48$. However, infants distributed their helping equally to the previously successful ($n = 7$, 44%) and previously unable actresses ($n = 9$, 56%; binomial test, $p = .77$). Thus, a successful outcome alone does not appear sufficient to encourage selective helping, especially when the intentions leading to the different outcomes were similarly positive.

Experiment 3

The results of Experiments 1 and 2 suggest that infants do show specificity in their helping behavior and that the underlying intentions of their previous interactions influence this specificity. What remains unknown is whether they are willing to help all individuals, except for those who demonstrate negative intentions (e.g., unwillingness to provide a desired toy), or whether they will remain selective in the absence of an overtly negative individual. To examine this question, Experiment 3 tested whether infants would choose to help an individual who demonstrated a willingness to provide a desired toy more often than an individual with ambiguous intention in regard to providing the toy, even when in both instances infants received the toy.

Method

Participants. Participants included twenty 21-month-old infants (mean age: 21.41 months; 8 girls, 12 boys). Four additional infants were tested but excluded as a result of parental interference (2) and failure to observe the manipulation (2).

Materials and procedure. Procedures remained similar to Experiment 2 except that infants were presented with the successful provider and an ambiguous provider. The table was turned around such that the top slanted down toward the child, away from the actresses. The actions of the successful actress remained unchanged from Experiment 2. In contrast, the ambiguous actress said to herself in a pleasant manner, "Hey, look," and then reached behind the table to pick up the small toy. She explored it by herself without looking at the child, saying, "Hmm . . . hmm," in an inquisitive manner. The actress then placed the toy on the edge of the tabletop, never making eye contact with the participant. The toy rolled down to the infant, but the actress did not observe or comment on it as she had already begun to reach for another toy behind the table. Thus, the intention of this actress was neither to explicitly provide nor to explicitly not provide. This process continued for the remaining three familiarization events. In all four events, all 16 infants reached for and explored the toy before placing it in the bucket. The subsequent test trial was identical to the previous experiments.

Results and discussion

Sixteen of the infants offered the toy to an actress; this 80% helping rate was similar to the helping rates in Experiments 1 and 2, $\chi^2(2, N = 65) = 1.09, p = .58$. There was a significant preference to give the toy to the previously successful actress ($n = 12, 75%$) rather than to the ambiguous actress ($n = 4, 25%$; binomial test, $p = .038$), which suggests that infants remain specific in their helping behavior even when neither of their potential recipients has previously displayed unwillingness to provide a desired toy.

General Discussion

Even in the earliest instances of helping behavior, infants are not indiscriminate, but instead they direct their help on the basis of previous interactions with individuals. More specifically, the underlying intentions of their interactants appear to strongly influence their subsequent prosocial behavior, more so in some cases than the actual outcomes of the interactions. Thus, the intention reading that has of late been documented in infancy (e.g., Behne et al., 2005, Meltzoff, 1995; Woodward, 1998) appears to influence helping behavior not just by determining someone's overall goal (e.g., to obtain an out of reach object) but also by mediating decisions as to the target of helping behavior.

This study also allows us to form some initial proposals regarding more specific aspects of the mechanism. Infants do not simply help all individuals except those who have previously displayed an overt unwillingness to provide. In Experiment 3, infants preferentially helped an individual who had previously willingly provided toys over an individual who had ultimately provided the toys but not indicated any intention to do so (or not to do so). Infants, thus, do not *solely* avoid helping previously unwilling individuals but will selectively help those who have shown a willingness to provide. Indeed, the extent to which infants avoid helping previously unwilling providers remains unclear, but note that the propensity to use negative information to inform subsequent action, and perhaps even a bias to do so in contexts such as social referencing, has been documented for infants (see Vaish, Grossman, & Woodward, 2008, for an extensive review).

Further, the actresses the infants preferred to help were not simply "nice people" in relation to others, as all the actresses were friendly (e.g., all smiled and spoke in pleasant tones). Instead, it was their willingness to provide (even if unable to) that set them apart. It is possible that this served to define them as good partners, those with whom it might be beneficial to enter into a reciprocal helping relationship. Taken together, these findings suggest that specificity in the form of intention-based reciprocity can be observed in early helping behavior, in turn indicating that some of the foundations for the complex nature of adult other-oriented behaviors are in place in infancy. Future research examining the situations under which aid is

selectively provisioned on the basis of intentions versus outcomes will help to identify the unique cognitive mechanisms that allow for the ubiquitous and essential social cooperation of humans.

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Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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Notes

1. The behavior of these actresses was based on that of the actresses in Behne, Carpenter, Call, and Tomasello (2005).
2. In this and subsequent experiments, infants were tested until 16 engaged in helping behavior, allowing for comparison across experiments. Note that when we examined the samples needed to achieve 16 helpers, we found that the overall frequency of helping (regardless of who was helped) was similar to the rates of helping in Warneken and Tomasello (2006) and was not significantly different across the three experiments.

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