Infants Expect Others to Help One Another Achieve a Goal

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Abstract

What makes people help each other? To explore the origin of human altruism, we tested whether 16-month-old infants have an expectation of helping behavior when they observe an interaction between others. Infants watched videos in which one (capable) agent had achieved a goal while the other (incapable) one could not. In a subsequent situation, the capable agent either helped the incapable agent achieve the goal (helping event), or ignored the incapable agent and achieved the goal alone (ignoring event). Infants looked longer at the ignoring event, suggesting that they expected helping behavior rather than ignoring behavior. The results are discussed in terms of infants' understanding of the connection between goals and altruistic behaviors.

Keywords: altruism, helping behavior, violation of expectation paradigm, goal understanding, infants

Introduction

In everyday life, we often help others not necessarily expecting rewards in return. We willingly donate money to charities when we hear news about people on the other side of the earth suffering from hunger and distress due to a tragic natural disaster. We hear about doctors and rescue teams rushing into places of catastrophe to save others' lives. These behaviors cannot be explained from an economic perspective because expending resources without profits could be viewed as irrational. What makes people benevolent toward others? The origin of human altruism has been a major interest of philosophers for a long time. Recently, developmental psychologists have begun to examine infants in order to discover the development of human altruism.

Recent research with toddlers and infants demonstrates that they take some actions to help others under certain circumstances. In Warneken and Tomasello (2006), for example, when 18-month-old children observed that an adult accidentally dropped a marker pen, they picked up the pen and brought it to the adult. Infants do such behaviors spontaneously without external rewards. Another study showed that children's motivation to help others was in fact *decreased* by material rewards (Warneken & Tomasello, 2008). Meanwhile, it is difficult for younger children to give instrumental aid to others through actions because they have yet to master control of their bodies. Nevertheless, there is some evidence that even 12-month-old infants give relevant information to others by using pointing actions (Liskowski, Carpenter, Striano, & Tomasello, 2006; Liskowski, Carpenter, & Tomasello, 2008).

Infants also discriminate helping behaviors from hindering behaviors (Hamlin, Wynn, & Bloom, 2007; Kuhlmeier, Wynn, & Bloom, 2003). In studies by Kuhlmeier and her colleagues, 12-month-old infants watched a series of computer-animated videos including a social interaction between geometric shapes. In the videos, an agent (e.g., a triangle) helped a circle climb up a hill, whereas another agent (e.g., a square) hindered the circle from climbing the hill. In the following test trials, infants observed scenes in which the circle approached one of the two agents. The looking time of the infants was longer when the circle approached the helper than hinderer. This result indicates that infants are able to make a distinction between a helper and a hinderer. In addition, infants themselves show preference for agents who have helped others over agents who have not (Hamlin et al., 2007).

In summary, infants often show and prefer helping behaviors and distinguish helpers from hinderers. The present study further investigated infants' expectation of others' helping behaviors. More specifically, it asked: Do infants anticipate someone would help another when that other is in trouble or need? For instance, consider the following situation. A person sees another person repeatedly fall down while hiking. We may expect the first person to offer some help to the second person. If the first person simply passes by the second, we may be surprised.

The current research examined what 16-month-old infants expect of an agent when they watch a similar

situation. We employed the violation of expectation paradigm using computer-animated videos as stimuli (see Figure 1). The violation of expectation paradigm measures infants' looking time patterns to evaluate their reasoning about an event, where infants show longer looking times for surprising or unexpected scenes (e.g., Gergely, Nadasdy, Csibra, & Biro, 1995; Onishi & Baillargeon, 2005; Song, Baillargeon, & Fisher, 2005; Woodward, 1998). The infants were randomly assigned to either the experimental or control condition.

In the experimental condition, infants first received familiarization trials in which they watched videos about two agents, a square and a circle. The videos showed that the square was able to achieve the goal of climbing a tall hill whereas the circle was not. During test trials, the infants watched two events. In the helping event, the square helped the circle achieve the goal of climbing the hill by pushing the circle to the top of the hill. In the ignoring event, the square did not help the circle; it simply passed by the circle as if completely ignoring the circle striving to climb the hill. If infants expect the square to help the circle, they should look longer at the ignoring event than at the helping event because their expectation would be violated in the ignoring event.

To rule out the possibility that infants would look longer at the ignoring event than at the helping event simply because the agents' movements are more interesting or perceptually salient in the ignoring event, another group of infants were tested in the control condition. The control condition was identical to the experimental condition except that the circle did not show an intention to climb the tall hill during the familiarization trials. Instead, it simply moved around aimlessly. If infants reason that the circle does not have the goal of climbing the tall hill, and thus that the square does not have to help the circle achieve the goal, infants should look for equal amounts of time at the helping and ignoring events. However, if the ignoring event is simply more interesting than the helping event, infants in both the control and experimental conditions should look longer at the ignoring event than at the helping event.

Experiment

Participants

A total of 31 infants initially participated in the study. However, 7 infants were excluded from the data analyses because of parental interference (1), distraction (1), experimental error (2), and fussiness (3). So, 24 16-month-old infants (12 boys, 12 girls, M = 16;12, range 15;8 – 17;22) were kept for data analyses. They were randomly assigned to the experimental condition or the control condition.

Materials and procedure

Figure 1 shows examples of the stimulus videos. In the videos, a red circle and a yellow square-like geometric shapes climbed small and tall hills. The shapes had some personifying features, i.e., eyes and a nose.

In the experimental condition, the infants received 4 trials during the familiarization phase. In the first two trials, only the square was in the video and infants watched it climb the two hills successfully.

At the beginning of the third and fourth familiarization trials, the square was on top of the tall hill and the circle was at the bottom left corner of the scene. The circle approached the small hill and successfully climbed it. It then tried, but failed, to climb the tall one—it moved up the tall hill until it reached the middle, slid down, and ended up stuck between the two hills. It attempted to climb the tall hill twice more, but continued to fail. The square watched all of these attempts from the top of the tall hill.

In the following test phase, infants received 2 test trials comprising the helping and ignoring events. At the beginning of each trial, infants saw a static scene in which the square was now at the bottom left corner of the scene and the circle was stuck between the two hills. In the helping event, the square pushed the circle up the tall hill and they successfully reached the top together. In the ignoring event, by contrast, the square simply passed by behind the circle and climbed up the tall hill alone, as if ignoring the circle.

In the control condition, the infants watched videos that were identical to those in the experimental condition, with the exception of the movement of the circle in the third and fourth familiarization trials. At the beginning, the circle was at the bottom middle of screen, between the hills. The circle rolled only half up the tall hill, and then reverted to the valley. After that, it moved to the left corner of the scene over the small hill and returned to the original place. The circle stopped at the valley between the two hills. Thus, the circle did not show the intent to climb the tall hill.

The duration of each video was 6 seconds, and these videos were played repeatedly until the end of each trial. Each trial ended if the infants looked away from the monitor for 2 consecutive seconds after watching at least 6 cumulative seconds, or if they looked at the videos for 60 cumulative seconds.

Half of the infants in each condition saw the helping event first, and half saw the ignoring event first. Infants sat on a parent's lap, approximately 45 cm away from a 20-inch computer monitor. The parents were asked to close their eyes and remain silent during the experiment.

Two observers monitored each infant's looking behavior through peepholes in cloth-covered frames on either side of the apparatus. The primary observer's responses determined the end of each trial. Interobserver agreement averaged 93% per trial per infant.

Results

The infants' looking times during the familiarization and test trials were analyzed. Preliminary analyses did not reveal any effect of gender or order of test events

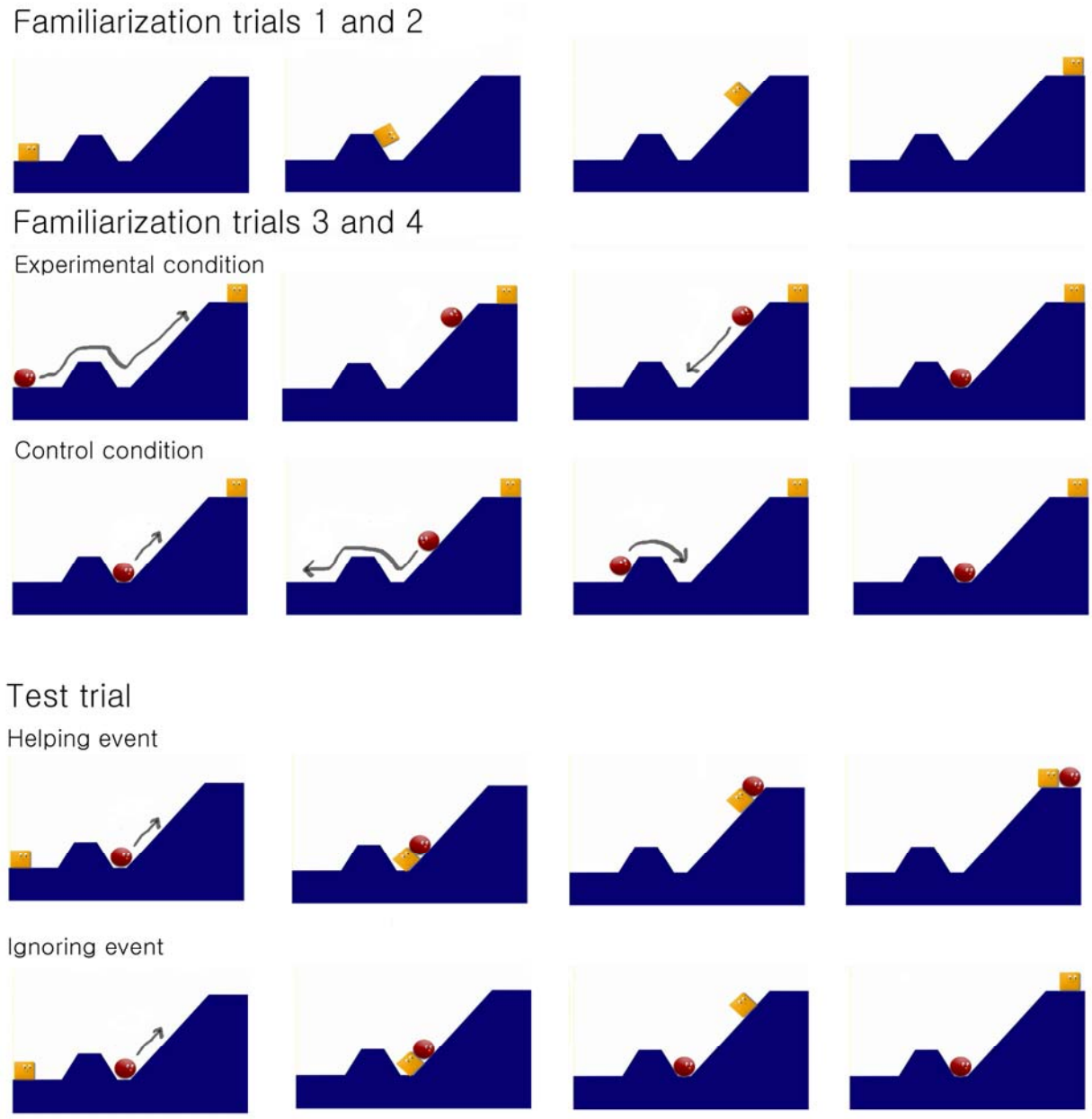

Figure 1: Video stimuli used in the experiment.

(helping event first or ignoring event first) for the looking times during these trials, *F*s(1, 16) < 3.34, *p*s > .086. Therefore, these factors were collapsed in further analyses.

During the 4 familiarization trials, the mean looking time of the infants was 23.9 seconds (*SD* = 10.4) in the experimental condition and 23.1 seconds (*SD* = 11.1) in the control condition. A single-factor analysis of variance (ANOVA) with condition (experimental or control) as a between-participants factor demonstrated no main effect of condition, $F(1, 22) < 1$, indicating that the infants in the two conditions did not significantly differ in their mean looking times during the familiarization trials.

The infants' looking times during the test trials were analyzed with a 2 X 2 ANOVA with condition (experimental or control) as a between-participants factor and event (helping or ignoring) as a within-participants factor (see Figure 2). The results revealed no significant main effect of condition or event, *F*s(1, 22) < 1. However, the interaction between condition and event was significant, $F(1, 22) = 5.26$, $p < .05$. A planned comparison indicated that the infants in the experimental condition looked reliably longer at the ignoring event (*M* = 34.0 seconds, *SD* = 19.6) than at the helping event (*M* = 23.2 seconds, *SD* = 15.7), $F(1, 22) = 4.77$, $p < .05$, whereas those in the control condition did not show a difference in looking times between the events (ignoring event, *M* = 24.3 seconds, *SD* = 18.1; helping event, *M* = 30.2 seconds, *SD* = 19.8), $F(1, 22) = 1.22$, $p > .2$.

A non-parametric Wilcoxon signed-ranks test revealed the same pattern as above. In the experimental condition, 11 of the 13 infants looked longer at the ignoring event than at the helping event ($Z = 2.13$, $p < .05$), whereas in the control condition, 4 of 11 infants looked longer at the ignoring event than at the helping event and one of them looked equally at both events, $Z = .66$, $p > .5$.

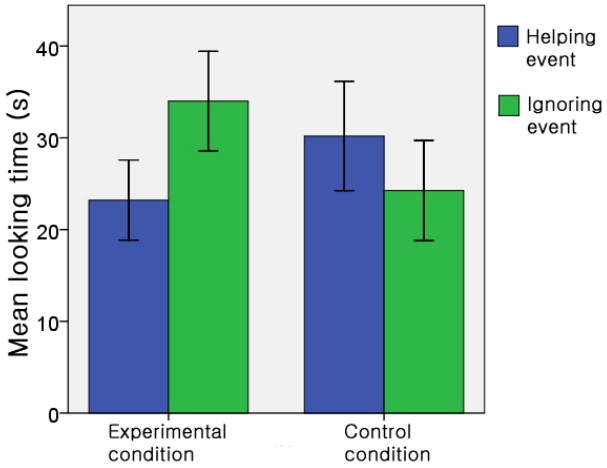

Figure 2: Mean looking times of the infants during the test trials. Error bars denote standard error.

Discussion

This study demonstrates that 16-month-old infants expect an agent to be helpful when the agent sees another in need of aid. In the experimental condition, infants looked reliably longer at the ignoring event than at the helping event. This result indicates that the infants expected the competent agent to help the less competent agent achieve the less competent agent's goal.

The infants in the control condition, by contrast, looked for comparable durations at the helping and ignoring events. The results of the control condition confirmed that the results of the experimental condition are not simply due to infants' perceptual preference for movement of the agents in the ignoring event. Note that infants' understanding of basic physics such as *solidity* and *continuity* emerges very early in life (Spelke, 1994). Therefore, the ignoring event could have been more interesting simply because it seems to defy a law of physics, i.e., that solid objects cannot "pass through" one another. However, this possibility was not the case because the infants in the control condition did not show the difference in their looking times between the events. The only difference between two conditions was the motion of the circle during the third and fourth familiarization trials. The circle showed an intention to climb the hill only in the experimental condition. Thus, the infants could have expected that the square would help the circle in the experimental condition, but not in the control condition. The square pushing the circle to the top of the tall hill hence could have been viewed as helping the circle achieve the goal in the experimental condition. In contrast, the same motion in the control condition could not have been viewed as helpful because climbing the hill was not the circle's demonstrated goal.

The present study thus supports and extends previous studies that investigated infants' understanding and showing of helping behaviors. According to previous findings, infants show spontaneous helping behavior (Warneken & Tomasello, 2006), distinguish helpers from hinderers (Kuhlmeier, Wynn, & Bloom 2003), and prefer helpers to hinderers (Hamlin, Wynn, & Bloom, 2007). In addition, our findings suggest that infants expect an agent to willingly help, rather than neglect, others. In our study, infants expected to see helping behavior even though (1) they did not observe interactions between the agents before the test trials, and (2) they were not informed about the characteristics of the agents beyond the agents' competence to achieve the goal.

Furthermore, our findings extend previous findings that infants of this age can attribute goals to nonhuman agents. Previous research has found that infants are able to notice the goal of a nonhuman agent when several cues to animacy are provided (Biro & Leslie, 2007; Luo & Baillargeon, 2005). In Biro and Leslie (2007), for instance, 9-month-old infants can reason what an object's goal is when it moves freely, as though its movements are being directed by its free will. In our experiment, agents' actions through self-propelled movements and personifying features such as eyes and a nose may have helped the infants detect goals of the agents.

Our results also suggest that infants can infer an agent's goals or intentions even when it fails to accomplish the goal. That is, infants in the experimental condition did not see the circle reach the top of the hill during the familiarization trials, but they were able to infer the goal of the circle. The findings are consistent with previous evidence that infants can infer an agent's goal when observing others' failed actions (Bradone & Wellman, 2009; Hamlin, Newman, & Wynn, 2009).

What do the current findings suggest about the developmental origin of human altruism? Where does the expectation about others' helpful actions come from? On the one hand, the propensity to expect helping behavior could be acquired from interaction with others. Attachment with parents in infancy may especially influence the development of their social models. A recent study suggests that 12- to 16-month-old infants have different expectations of others' behavior in a social context depending on the infants' experiences with their mothers (Johnson, Dweck, & Chen, 2007). On the other hand, the possibility exists that the expectation of helping behavior is an innate tendency since 16-month-old infants are not old enough to have had extensive social interactions in groups. In either case, our findings suggest that the expectation of altruistic behavior emerges in a very early period of human life. To further investigate the root of this altruistic mechanism, future studies can examine the relationship between these results and social factors such as parenting styles, daycare systems, or presence of siblings.

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