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Do Infants Have a Sense of Fairness?

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Abstract

Two experiments examined infants' expectations about how an experimenter should distribute resources and rewards to other individuals. In Experiment 1, 19-month-olds expected an experimenter to divide two items equally, as opposed to unequally, between two individuals. The infants held no particular expectation when the individuals were replaced with inanimate objects, or when the experimenter simply removed covers in front of the individuals to reveal the items (instead of distributing them). In Experiment 2, 21-month-olds expected an experimenter to give a reward to each of two individuals when both had worked to complete an assigned chore, but not when one of the individuals had done all the work while the other played. The infants held this expectation only when the experimenter could determine through visual inspection who had worked and who had not. Together, these results provide converging evidence that infants in the 2nd year of life already possess context-sensitive expectations relevant to fairness.

Keywords

social cognition, morality, infant development

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Research on the development of morality has a long history within the field of psychology that weaves together two major approaches: One focuses on how parental practices and other socialization processes help children internalize and conform to societal norms, whereas the other adopts a more cognitive stance and focuses on how children gradually construct moral concepts and norms through their interactions with other individuals (for reviews, see Eisenberg, Fabes, & Spinrad, 2006; Turiel, 2006). Despite their marked differences, both approaches generally assume that sensitivity to moral norms does not emerge until the preschool years. Recently, this assumption has been called into question by widespread speculations, from various disciplines within cognitive science, that moral development builds on early-emerging sociomoral intuitions about how individuals should act toward each other (e.g., Dupoux & Jacob, 2007; Dwyer, 2006; Greene, 2005; Haidt, 2008; Jackendoff, 2007; Mikhail, 2007; Premack, 2007; Sigmund, Fehr, & Novak, 2002). These speculations naturally give rise to the empirical question of whether sociomoral expectations are already present in infancy. In the experiments reported here, we focused on the norm of fairness and examined 19- to 21-month-old infants' expectations about individuals' actions in two contexts commonly used in research on fairness with children and adults: the allocation of resources and the dispensation of rewards for effort.

Developmental investigations of fairness in resource-allocation and reward-dispensation contexts typically use either first-party tasks, in which the children tested are potential recipients, or third-party tasks, in which they are not. Both types of tasks have yielded evidence that children age 5 years and older can demonstrate sensitivity to fairness in these contexts (e.g., Damon, 1975; Enright, Franklin, & Manheim, 1980; Fehr, Bernhard, & Rockenbach, 2008; Gummerum, Hanoch, Keller, Parsons, & Hummel, 2010; Moore, 2009; Rochat et al., 2009; Thompson, Barresi, & Moore, 1997; Tsutsu, 2010; Ugurel-Semin, 1952).

In contrast, the evidence with children ages 3 to 4 years has been more mixed. On the one hand, results from first-party tasks have been generally negative: When dividing resources or rewards between themselves and others, preschoolers tend to act selfishly and to show signs of inequity aversion only when they are the disadvantaged party (e.g., Damon, 1975; Fehr et al., 2008; Gummerum et al., 2010; Hook & Cook, 1979; LoBue, Nishida, Chiong, DeLoache, & Haidt, 2011; McCrink, Bloom, & Santos, 2010; Rochat et al., 2009). For example, in one experiment, 3- to 4-year-olds chose how sweets should be shared between themselves and an anonymous child (Fehr et al., 2008). They chose between an allocation of one sweet for themselves and one sweet for their partner (1,1) and an

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allocation of (1,0), (1,2), or (2,0), depending on condition. The children chose randomly in the first two conditions (they received one sweet either way and did not much consider what their partner would get), and they chose the (2,0) allocation in the last condition, to maximize their own gain.

On the other hand, results from third-party tasks with 3- to 4-year-olds have tended to be more positive and suggest that, at least under some conditions, preschoolers expect resources and rewards to be divided fairly among recipients (e.g., Olson & Spelke, 2008; Peterson, Peterson, & McDonald, 1975; Thomson & Jones, 2005). In one experiment, for example, 3.5-year-olds were shown five dolls; one was identified as the protagonist, and the other four were identified as the protagonist's siblings and friends or as strangers (Olson & Spelke, 2008). When asked to help the protagonist allocate four items, the children divided the items equally among the other dolls, regardless of how they were identified.

The preceding results suggest that when tested in third-party tasks in which self-interest cannot intrude, even 3.5-year-old children show some sensitivity to fairness. Does this sensitivity gradually emerge during the first 3 years of life, or is it already present in infancy, as the speculations mentioned in our opening paragraph would suggest (e.g., Dupoux & Jacob, 2007; Dwyer, 2006; Haidt, 2008; Premack, 2007)? To address this question, we tested infants in two third-party tasks. In Experiment 1, 19-month-olds saw an experimenter divide two desirable items either equally or unequally between two individuals. In Experiment 2, 21-month-olds saw an experimenter give a reward to each of two individuals either after both had worked to complete an assigned chore or after one (the worker) had done all the work while the other (the slacker) played. We tested whether infants would detect a violation (as indexed by longer looking times) when the experimenter allocated the resources unequally (Experiment 1) or rewarded the worker and the slacker equally (Experiment 2). The apposition of these two contexts allowed us to examine whether infants would view the same behavior on the part of the experimenter—giving one item to each individual—as expected in the first context but as unexpected in the second. Positive results with both tasks would thus indicate that infants in the 2nd year of life already possess context-sensitive expectations relevant to fairness.

Experiment 1

In the *experimental* condition of Experiment 1, 19-month-olds watched live events in which a female experimenter divided resources between two identical animated puppet giraffes (Fig. 1). In each of three pairs of trials, the infants saw an unequal distribution (unequal event) in one trial and an equal distribution (equal event) in the other trial (the order of the events was counterbalanced across infants). Each trial had an initial and a final phase. During the initial (24-s) phase, two giraffes (placed on the hands of a hidden assistant) protruded from openings in the back wall of the apparatus; in front of each giraffe was a small place mat. The giraffes "danced" in unison until the experimenter opened a curtained window in the right wall of the apparatus; the giraffes then turned toward the experimenter, as though to observe her actions. The experimenter brought in a tray with two identical objects (toy ducks, edible cookies, or toy cars) and announced, "I have toys/cookies/cars!"; the giraffes responded excitedly, "Yay, yay!" (in two distinct voices). Next, the experimenter placed one object on the place mat in front of one giraffe; she then placed the other object in front of either the same giraffe (unequal event; which giraffe received the two objects was counterbalanced) or the other giraffe (equal event). Finally, the experimenter left, and the two giraffes looked down at their place mats and paused. During the final phase of the trial, infants watched this paused scene until the trial ended.

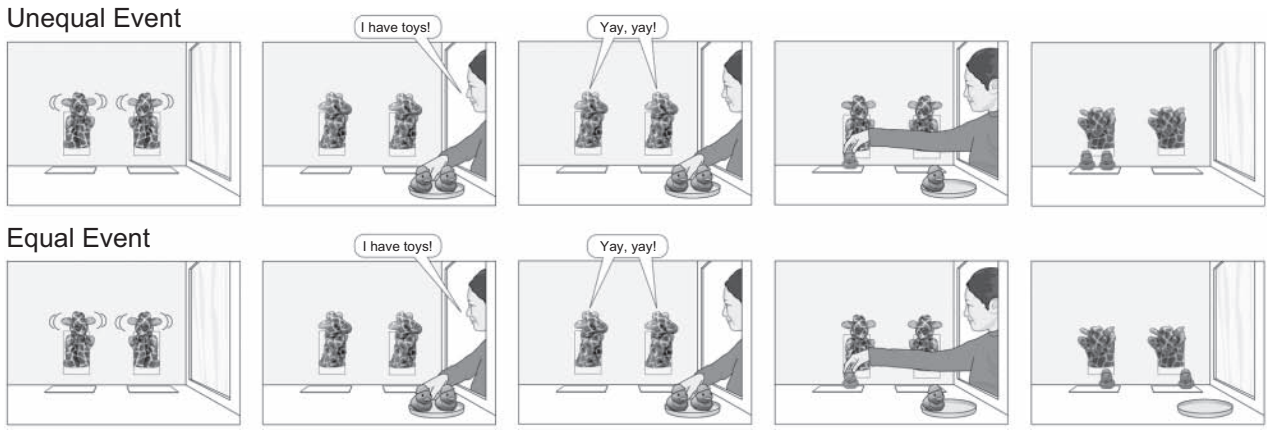

Fig. 1. Events shown in the experimental condition of Experiment 1. In each of three pairs of trials, two toy ducks (shown here), two edible cookies, or two toy cars were distributed equally to the two giraffe puppets on one trial and unequally on the other trial. The events shown in the inanimate-control condition were identical except that the giraffes were inanimate: They did not move or talk and simply faced forward.

Additional infants were tested in two control conditions. The *inanimate-control* condition served to rule out the possibility that infants simply preferred seeing the experimenter create an asymmetrical over a symmetrical display. The events were identical to those in the experimental condition except that the giraffes were inanimate (they rested on hidden posts). The *cover-control* condition involved animated giraffes and was included to rule out the possibility that infants merely expected similar individuals to have similar numbers of objects (Fig. 2). In the initial (24-s) phase of each trial, instead of bringing in and distributing the two objects, the experimenter removed covers resting over the giraffes' place mats to reveal the objects; the covers were removed one at a time, with order counterbalanced. The experimenter did not speak in this condition, but the giraffes greeted her ("Yay, yay!") as she arrived. In the unequal event, the covers were removed to reveal two objects on one place mat and none on the other; in the equal event, the covers were removed to reveal one object on each place mat. After the experimenter removed the last cover and left, the giraffes looked down at their place mats and paused, as in the experimental condition.

We reasoned that if infants in the experimental condition looked reliably longer at the unequal than at the equal event, but infants in the inanimate- and cover-control conditions looked about equally at the two events, this would indicate that 19-month-olds expect a distributor to divide resources equally between two similar individuals.

Method

Participants. Participants were 48 healthy full-term infants (24 male, 24 female) from English-speaking families (age range: 18 months 8 days to 19 months 27 days, $M = 18$ months 25 days); 16 infants (8 male, 8 female) were randomly assigned to each condition. Another 10 infants were excluded because they were overly active ($n = 4$), fussy ($n = 3$), distracted ($n = 2$), or inattentive ($n = 1$).

Apparatus and stimuli. The apparatus consisted of a brightly lit display booth (201.5 cm high × 102 cm wide × 58 cm deep) with a large opening (56 cm × 95 cm) in its front wall; between trials, a supervisor lowered a curtain in front of this opening. Inside the apparatus, the side walls were painted white, and the back wall and floor were covered with pastel adhesive paper.

The experimenter was a female native English speaker. She wore a green shirt, knelt at a window (51 cm × 38 cm) in the right wall of the apparatus, and slid a white curtain to open or close the window. A large screen behind the experimenter hid the testing room.

The giraffes were identical puppets (about 26 cm × 15 cm × 11 cm at their largest points) made of beige and brown fabric. The giraffes protruded from openings (each 20 cm × 12.5 cm and filled with beige felt) located 20 cm apart in the back wall of the apparatus. Centered beneath each giraffe was a white place mat (1 cm × 20 cm × 13 cm). In the cover-control condition, identical tan covers (each 10 cm × 22.5 cm × 15.5 cm, with a wooden knob at the top) stood over the place mats at the start of each trial.

The three pairs of identical items used in the trials were purple toy ducks, edible brown cookies, and red toy cars. In the experimental and inanimate-control conditions, the experimenter introduced the items on a round blue tray (1.5 cm high, 17 cm in diameter).

During each test session, one camera captured an image of the events, and another camera captured an image of the infant. The two images were combined, projected onto a television set located behind the apparatus, and monitored by the supervisor to confirm that the events followed the prescribed scripts. Recorded sessions were also checked off-line for accuracy.

Procedure. Infants sat on a parent's lap centered in front of the apparatus; parents were instructed to remain silent and close their eyes. Each infant's looking behavior was monitored by two hidden naive observers; looking times during the initial and final phases of each trial were computed separately, using

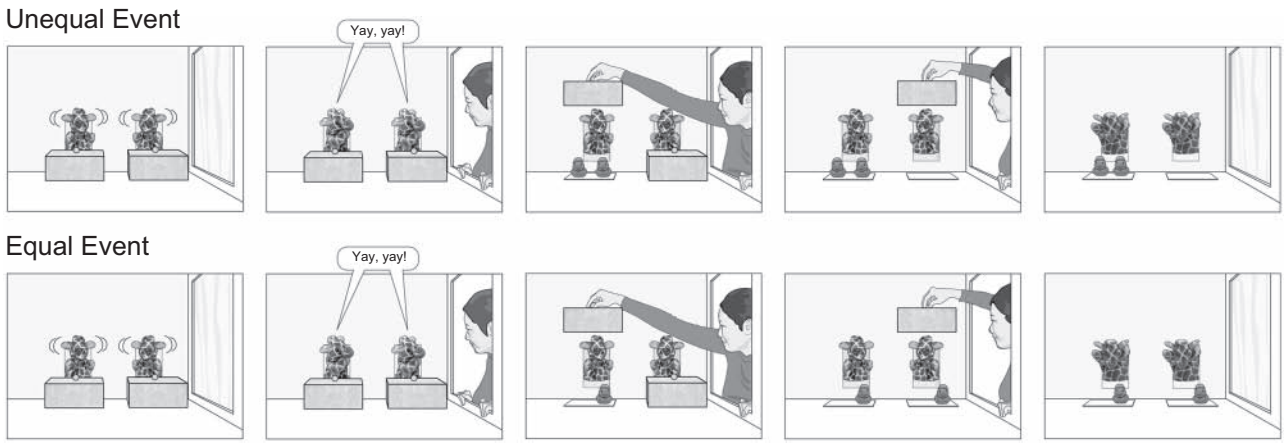

Fig. 2. Events shown in the cover-control condition of Experiment 1. In each of three pairs of trials, the experimenter removed covers in front of the two giraffe puppets to reveal two toy ducks (shown here), two edible cookies, or two toy cars. In one trial, both objects were in front of the same giraffe; in the other trial, one object was in front of each giraffe.

the primary observer's responses. The infants were highly attentive during the initial phases of the trials; across conditions, they looked, on average, for 23.5 of the 24 s. The final phase of each trial ended when the infant (a) looked away for 1.5 consecutive seconds after having looked for at least 4 cumulative seconds or (b) looked for a maximum of 60 cumulative seconds (the criteria were established through pilot work and used for all conditions). Interobserver agreement in looking time during the final phase averaged 93% per trial per infant. Preliminary analyses revealed no significant interaction of condition and event with infant's sex, order of the events, or the giraffe (right or left side) that had the two objects; the data were therefore collapsed across these latter three factors.

Results and discussion

Infants' looking times during the final phases of the test trials were averaged across pairs (Fig. 3) and subjected to an analysis of variance (ANOVA) with condition (experimental, inanimate-control, or cover-control) as a between-subjects factor and event (unequal or equal) as a within-subjects factor. The analysis yielded only a significant Condition × Event interaction, $F(1, 45) = 3.71$, $p = .032$. Planned comparisons revealed that infants in the experimental condition looked reliably longer at the unequal ($M = 19.5$ s, $SD = 11.1$) than at the equal ($M = 13.4$ s, $SD = 6.7$) event, $F(1, 45) = 6.31$, $p = .016$, Cohen's $d = 0.665$; infants in the inanimate-control condition looked about equally at the unequal ($M = 14.5$ s, $SD = 6.8$) and equal ($M = 16.9$ s, $SD = 10.6$) events, $F(1, 45) = 1.04$, $p = .313$, $d = –0.270$; and infants in the cover-control condition also looked about equally at the unequal ($M = 15.2$ s, $SD = 6.5$) and equal ($M = 16.6$ s, $SD = 6.8$) events, $F(1, 45) = 0.34$, $p = .563$, $d = –0.210$. Examination of individual responses indicated that 12 of the 16 infants in the experimental condition looked longer at the unequal event (cumulative binomial probability, $p = .038$), but only 7 of the 16 infants in the inanimate-control condition ($p = .773$) and 8 of the 16 infants in the cover-control condition ($p = .598$) did so.

The results of Experiment 1 support three conclusions. First, 19-month-olds expect a distributor to divide resources equally between two similar individuals. Second, this expectation is unlikely to reflect low-level factors, because it is absent when the individuals are replaced with inanimate objects. Third, infants do not merely expect similar individuals to have similar numbers of items: when covers are removed to reveal that similar individuals have unequal numbers of items, and it is unclear how this outcome came about, infants do not view it as unexpected.

Experiment 2

In Experiment 2, 21-month-olds watched live events in which a female experimenter asked two female individuals to put away toys (slightly older infants were used in Experiment 2

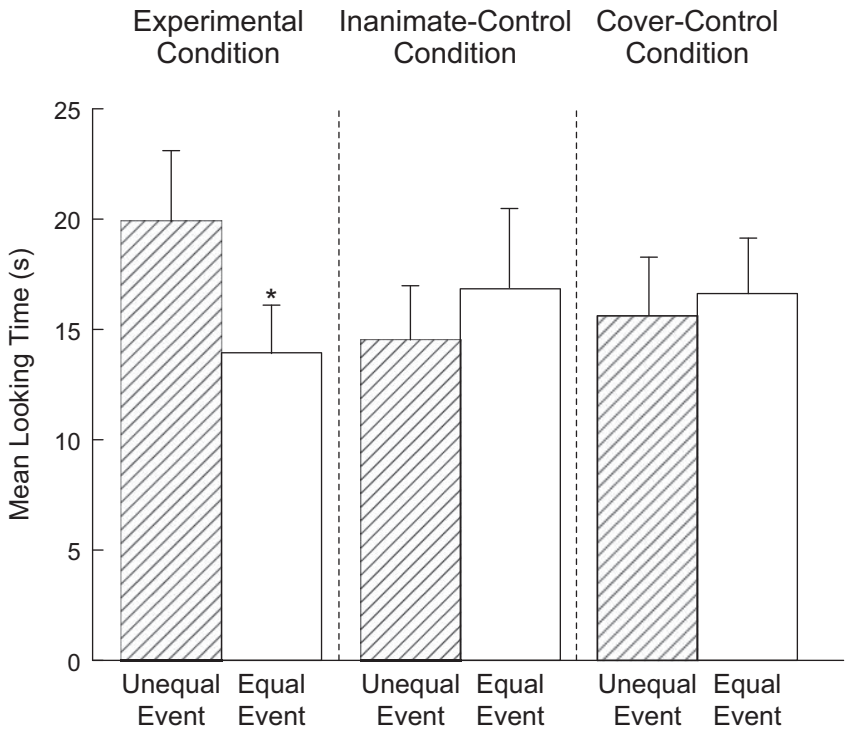

Fig. 3. Mean looking times at the unequal and equal events in the experimental, inanimate-control, and cover-control conditions of Experiment 1. Error bars represent standard errors, and an asterisk denotes a significant difference between events ($p < .05$ or better).

than in Experiment 1 for pragmatic reasons and because the language used was more complex than in Experiment 1). In the *explicit* condition, the experimenter told the individuals they would receive a reward if they complied. In the *implicit* condition, the experimenter did not mention rewards beforehand; we wanted to ascertain whether infants would hold expectations about the dispensation of rewards even in the absence of an explicit contract. In each condition, infants received a single trial in which they saw either one individual working while the other played (one-works event) or both individuals working (both-work event). (In pilot work, infants showed clear expectations only in the first trial, most likely because the events were long and linguistically demanding and thus tended to tax infants' information-processing resources.)

During the initial (83-s) phase of the trial in the explicit condition, two individuals knelt at open windows in the right and left walls of the apparatus (Fig. 4). Next to each individual was an open transparent box, and at the center of the floor was

Fig. 4. Events shown in the explicit condition of Experiment 2. In both events, two individuals were playing with colorful foam toys; next to each individual was an open transparent box. An experimenter promised the individuals a reward if they put the toys away and then left. In the one-works event, one individual put the toys away in her box while the other continued to play; in the both-work event, each individual put half the toys away in her box. In both events, the individuals closed their boxes, and then the experimenter returned and gave each individual a reward. The events shown in the implicit condition were similar except that the experimenter did not promise a reward beforehand (see the text). The events shown in the control condition were identical to those in the explicit condition except that the boxes either were completely opaque or had a clear window at the front through which the infants (but not the experimenter) could see the boxes' contents.

a pile of 20 colorful foam toys. Each individual played with two toys until the experimenter opened doors at the back of the apparatus. The experimenter exclaimed, "Wow! Look at all these toys! It's time to clean them up. If you put the toys away, you can have a sticker." She then held up a clear bag filled with identical stickers and added, "See? I have stickers! If you put the toys away, you can have a sticker!" (as she spoke, the experimenter looked at the two individuals in turn, and order was counterbalanced). Next, a bell rang; the experimenter said, "I'll be back!" and left with her bag of stickers. In the one-works event, one individual (the slacker) continued to play, while the other individual (the worker) placed the toys, two at a time, into her box (which individual was the slacker and which was the worker was counterbalanced); after several seconds, the slacker tossed the toys she was holding onto the pile and thereafter simply watched the worker. In the both-work event, both individuals worked at putting away the toys, each placing half in her box.

In both events, after the toys were put away, the individuals closed their boxes. The experimenter then returned and said, "Wow! Good job cleaning up all the toys!" She looked carefully at each individual's box (order was counterbalanced); because the boxes were transparent, the experimenter could determine who had worked in her absence. Next, she brought in her bag of stickers, placed a sticker on each individual's box (order was counterbalanced), and exited from the apparatus. Each individual then grasped her sticker and affixed it to a mark on her box. During the final phase of the trial, each individual peeled off her sticker, placed it back on the box, and repeated these actions until the trial ended.

The implicit condition was similar, with the following exceptions. When the experimenter first arrived, she did not show her stickers but simply said, "Wow! Look at all these toys! It's time to clean them up! Yes, it's time to put the toys away! It's time to clean them up!" When she returned, the experimenter said, "Wow! Good job cleaning up all the toys!" and then, after bringing in her stickers, she added, "Now you can have a sticker!" Finally, the worker was always rewarded first in the one-works event (i.e., order was counterbalanced only in the both-work event).

Infants were also tested in a control condition identical to the explicit condition except that the individuals' boxes were not transparent. For half the infants, the boxes were completely opaque (painted beige); for the other infants, the boxes retained a clear window at the front through which the infants (but not the experimenter) could see their contents (this manipulation had no effect). The control condition served to rule out the possibility that the infants in the explicit and implicit conditions looked reliably longer at the one-works event not because they were puzzled that the experimenter rewarded the worker and slacker equally (even though she knew, from inspecting the boxes, that the slacker had done no work), but because they were responding to tangential aspects of the event (e.g., they were puzzled that the slacker did no work, or they preferred to see all the toys in one box).

We reasoned that if infants in the explicit and implicit conditions looked reliably longer when shown the one-works as opposed to the both-work event, and infants in the control condition looked about equally at the two events, this would indicate that 21-month-olds expect a distributor to reward individuals according to (her knowledge of) their efforts.

Method

Participants. Participants were 54 healthy full-term infants (27 male, 27 female) from English-speaking families (age range = 20 months 5 days to 22 months 16 days, M = 21 months 0 day); 18 infants (9 male, 9 female) were randomly assigned to each condition. Another 5 infants were excluded because they were fussy (n = 1), refused to continue (n = 2), or had test looking times that were more than 3 standard deviations from the condition mean (n = 2). Within each condition, half the infants saw the one-works event, and half saw the both-work event.

Apparatus and stimuli. The apparatus was the same as in Experiment 1 except that there was an open window in both the right and the left walls of the display booth and the back wall had a large central window (71.5 cm × 56 cm) that could be closed with two identical doors. The experimenter was a female native English speaker; she wore a beige turtleneck and sat in a chair behind the back window. The two individuals wore black turtlenecks and knelt at the right and left windows. Stimuli included 20 two-dimensional foam shapes (7 cm × 15.5 cm) colored red, yellow, green, and blue; 10 yellow smiley-face stickers (6 cm in diameter) in a clear, quart-size ziplock bag; and two identical plastic boxes (35.5 cm × 11 cm × 19.5 cm) with hinged lids.

During each test session, one camera captured an image of the event, and another camera captured an image of the infant. The two images were combined, projected onto a television set located behind the apparatus, and monitored by the supervisor to confirm that the event followed the prescribed script. Recorded sessions were also checked off-line for accuracy.

Procedure. Infants sat on a parent's lap centered in front of the apparatus; parents were instructed to remain silent and close their eyes. Each infant's looking behavior was monitored by two hidden naive observers; looking times during the initial and final phases of the trial were computed separately, using the primary observer's responses. The infants were highly attentive during the initial phase of the trial; across conditions, they looked, on average, for 81.0 of the 83 s. The final phase of the trial ended when the infant (a) looked away for 1 consecutive second after having looked for at least 5 cumulative seconds or (b) looked for a maximum of 90 cumulative seconds (the criteria were established through pilot work and used for all conditions). Interobserver agreement during the final phase of the trial averaged 98% per infant. Preliminary analyses revealed no significant interaction of condition and event

with infant's sex, which individual was the worker, or which individual was addressed first; the data were therefore collapsed across these latter three factors.

Results and discussion

Infants' looking times during the final phase of the trial (Fig. 5) were subjected to an ANOVA with condition (explicit, implicit, or control) and event (one-works or both-work) as between-subjects factors. The analysis yielded a significant main effect of event, $F(1, 48) = 8.10$, $p = .007$, and a significant Condition × Event interaction, $F(2, 48) = 3.33$, $p = .044$. Planned comparisons revealed that infants in the explicit condition looked reliably longer if shown the one-works ($M = 58.4$ s, $SD = 25.4$) as opposed to the both-work ($M = 30.2$ s, $SD = 13.4$) event, $F(1, 48) = 7.17$, $p = .010$, $d = 1.389$; infants in the implicit condition also looked reliably longer when shown the one-works ($M = 66.9$ s, $SD = 23.6$) as opposed to the both-work ($M = 38.3$ s, $SD = 22.2$) event, $F(1, 48) = 7.38$, $p = .009$, $d = 1.248$; and infants in the control condition looked about equally at the one-works ($M = 33.9$ s, $SD = 26.9$) and both-work ($M = 38.8$ s, $SD = 19.7$) events, $F(1, 48) = 0.22$, $p = .641$, $d = –0.208$. Wilcoxon sum-rank tests confirmed these results for the explicit ($W = 59$, $p < .025$), implicit ($W = 58$, $p < .025$), and control ($W = 71$, $p > .20$) conditions.

The results of Experiment 2 support three conclusions. First, 21-month-olds expect individuals to be rewarded according to their efforts: Infants in the explicit and implicit conditions detected a violation when the worker and the slacker were rewarded equally. Second, a prior explicit contract is not necessary for infants to hold expectations about the dispensation of rewards: Responses were similar in the explicit and implicit conditions. Finally, infants showed clear expectations about the experimenter's actions only when she could determine who had worked and who had not; when the experimenter could not see the boxes' contents, infants no longer detected a violation when she rewarded the worker and the slacker equally.

Conclusion

In Experiment 1, 19-month-olds expected an experimenter to distribute two items equally between two individuals; in Experiment 2, 21-month-olds expected an experimenter to distribute rewards equally between two individuals when both had worked, but not when one had worked while the other had chosen not to; the same behavior on the part of the experimenter—giving one item to each individual—was thus viewed as expected in the first context, but not in the second. Together, these results suggest that by 19 to 21 months of age, infants

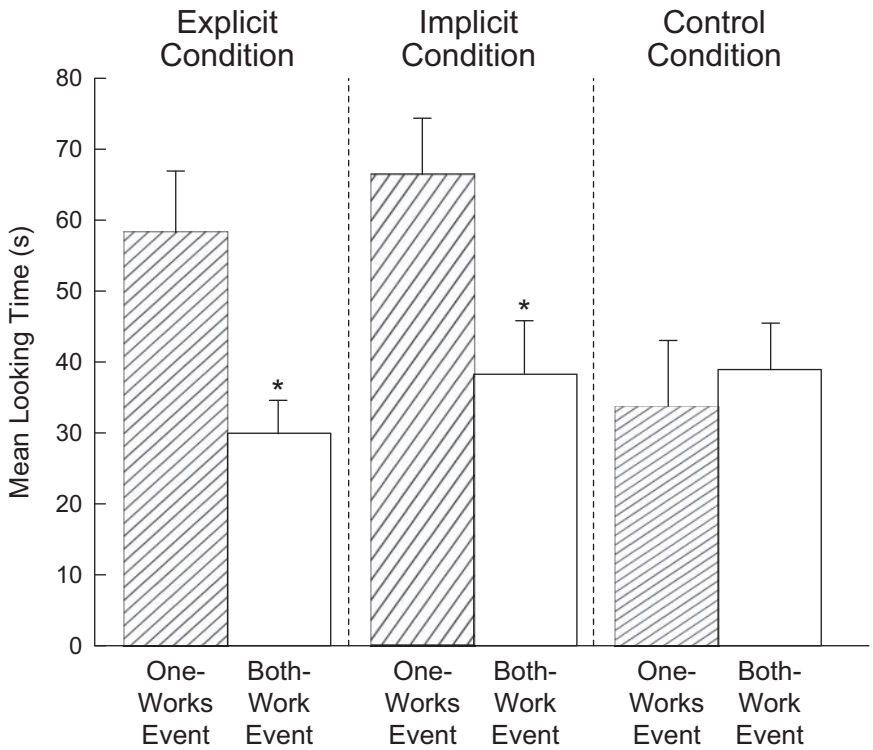

Fig. 5. Mean looking times at the one-works and both-work events in the explicit, implicit, and control conditions of Experiment 2. Error bars represent standard errors, and asterisks denote significant differences between events ($p < .05$ or better).

show context-sensitive expectations about the allocation of resources and the dispensation of rewards, at least in simple situations.

How might infants attain such expectations? There are at least two broad possibilities. One is that infants' expectations reflect an early-emerging concern for fairness. This possibility is consistent with recent speculations that a few sociomoral norms—evolved to facilitate positive interactions and cooperation within social groups—are innate and universal, though elaborated in various ways by cultures (e.g., Boyd & Richerson, 2005; Dupoux & Jacob, 2007; Dwyer, 2006; Fiske, 1991; Greene, 2005; Haidt, 2001; Mikhail, 2007; Premack & Premack, 2003). Although researchers disagree widely about what these norms may be, a sense of fairness is often listed as a possible candidate, and our findings would provide evidence for this norm. The other possibility is that from observing and participating in everyday social interactions, infants acquire a list of behavioral rules about how individuals typically distribute resources and rewards (e.g., Sripada & Stich, 2006; Turiel, 2006). From this perspective, our results would suggest that by 19 to 21 months of age, infants have already identified some of the rules that prevail in their social environment and can extend these rules to new situations.

Whichever possibility turns out to be correct, the present findings indicate that infants in the 2nd year of life already have rich and subtle expectations about how individuals should distribute resources and rewards to others. These findings raise important questions about the nature of these expectations, about the role they play in infants' own social interactions, and about the factors that affect them. For example, would infants expect distributors to act selfishly when dividing resources between themselves and others, or to show in-group favoritism when dispensing rewards to members of their own social group and members of other groups? Future research that provides answers to these questions should help to clarify the developmental origins of human sociomoral reasoning.

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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