



# Infants distinguish between leaders and bullies

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We examined whether 21-month-old infants could distinguish between two broad types of social power: respect-based power exerted by a leader (who might be an authority figure with legitimate power, a prestigious individual with merited power, or some combination thereof) and fear-based power exerted by a bully. Infants first saw three protagonists interact with a character who was either a leader (leader condition) or a bully (bully condition). Next, the character gave an order to the protagonists, who initially obeyed; the character then left the scene, and the protagonists either continued to obey (obey event) or no longer did so (disobey event). Infants in the leader condition looked significantly longer at the disobey than at the obey event, suggesting that they expected the protagonists to continue to obey the leader in her absence. In contrast, infants in the bully condition looked equally at the two events, suggesting that they viewed both outcomes as plausible: The protagonists might continue to obey the absent bully to prevent further harm, or they might disobey her because her power over them weakened in her absence. Additional results supported these interpretations: Infants expected obedience when the bully remained in the scene and could harm the protagonists if defied, but they expected disobedience when the order was given by a character with little or no power over the protagonists. Together, these results indicate that by 21 months of age, infants already hold different expectations for subordinates' responses to individuals with respect-based as opposed to fear-based power.

infancy | social power | authority | prestige | bullying

How do infants represent and make sense of the social world (1–8)? When peering beyond the havens of their families, do they perceive a uniform social landscape in which all individuals are more or less equivalent? Or do they perceive a varied landscape structured by several types of social distinctions, each laden with rich implications for how interactions might unfold? According to recent research, one type of social distinction infants represent has to do with group memberships: Even when watching unfamiliar individuals in novel or minimal groups, infants attend to group boundaries and hold different expectations for interactions within as opposed to between groups (9–12). The present research focused on another type of distinction in infants' social landscape having to do with hierarchical and, more specifically, power differences among individuals. Following French and Raven (13) and other researchers from across the social sciences (14–18), we define power in terms of control—for example, control over resources and rights-of-way, and control or, at least, influence over individuals.

Prior research on infants' sensitivity to power asymmetries has revealed three main findings. First, infants in the first year of life already understand power differences and can use size cues to determine who is more likely to prevail when two individuals have conflicting goals. In seminal experiments (19), 10- to 16-month-olds saw a zero-sum conflict scenario involving a large and a small character. On alternate familiarization trials, one character crossed a platform in one direction, and the other character did the same in the opposite direction. In the next trial, both characters were present, moved as before, and bumped against each other three times at the center of the platform. In the test trials, each character again blocked the other's path, but then either the small (expected event) or the large (unexpected event) character

bowed and yielded the way, leaving the other character free to cross the platform and reach its goal. Infants looked significantly longer at the unexpected than at the expected event, suggesting that they could use relative size as a cue to predict which character was more likely to have the right-of-way. Subsequent experiments (20) using numerical set size as a cue to power produced similar results: 6- to 12-month-olds detected a violation when a character from a set of three bowed and gave way to a character from a set of two. Infants thus expected an individual from a numerically larger set to prevail over an opponent from a numerically smaller set.

Second, by about their first birthday, infants appreciate that power differences may be stable over time. In one experiment involving similar-sized characters (21), 12-month-olds first saw A prevail over B in a zero-sum conflict scenario involving the collection of identical objects: As each object appeared, A and B both approached it, faced off briefly, and then A took it. In the test trials, the two characters competed over a new object, and either A (expected event) or B (unexpected event) collected it. Infants looked significantly longer at the unexpected event, suggesting that they expected A to again prevail over B. This effect was eliminated when B was replaced by new character C in the test trials, indicating that infants were willing to generalize A's power over B to another, very similar conflict scenario, but not to another character C. Additional results indicated that infants did generalize A's power to extend over C, however, if they were first shown both that B prevailed over C and that A prevailed over B; infants then expected A to also prevail over C, via transitive inference (22).

Third, by about 15 mo of age, infants realize that a power relation between two individuals may extend across a range of situations.

## Significance

Prior research indicates that infants can represent power asymmetries and expect them to both endure over time and extend across situations. Building on these efforts, we examined whether 21-month-old infants could distinguish between two different bases of social power. Infants first saw three protagonists interact with a powerful character who was either a leader (with respect-based power) or a bully (with fear-based power). Next, the character gave an order to the protagonists. Infants expected the protagonists to continue to obey the leader's order after she left the scene, but they expected the protagonists to obey the bully's order only when she remained present. Thus, by 21 months of age, infants can already distinguish between respect-based and fear-based power relations.

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In one experiment (21), infants first saw A prevail over B in a zero-sum conflict scenario involving a small enclosure; B initially occupied it, but then A arrived and pushed B out of it. In the test trials, infants saw A and B compete in a different conflict scenario involving the collection of an object. Infants expected A to also prevail in collecting the object, suggesting that they viewed A as having a range of power over B that included at least the two situations tested. Similarly, in another experiment (23), 17-month-olds who first saw A prevail over B in occupying an attractive chair then expected A to also gain a larger share of a resource.

Together, the preceding results indicate that beginning in the first year of life, infants' representation of the social landscape includes power differences among individuals; by the second year, if not before, infants also hold expectations about the stability and range of power relations. Our research built on these results in a new direction by examining whether infants might also possess intuitions about the bases of power relations.

### The Present Research

Within the social sciences, it has long been acknowledged that there are many different bases or types of social power (13). To date, however, little is known about infants' ability to distinguish between different bases of power. Do infants possess only an undifferentiated concept of power that can be evoked by a variety of cues? Do they begin by representing power relations based on coercion or intimidation and gradually come to represent other types of power relations with development? Or are they able from an early age to represent at least a few distinct types of power relations? To begin to address this issue, we asked whether infants could distinguish between two broad types of power relations, fear-based and respect-based power relations.

By fear-based power, we mean control or influence over others that is achieved via coercion, intimidation, aggression, or rejection (24–27). A pronounced form of fear-based power is bullying (28), which is generally defined as repeated aggression toward victims who have difficulty defending themselves or retaliating, resulting in a power imbalance (29–32): For example, victims may choose to comply with a bully's demands to prevent further harm. [Fear-based or coercive power is often referred to as dominance (24–28); however, because the term “dominance” is sometimes used more broadly to refer to social power regardless of how it is achieved (33, 34), here we adopt the term “fear-based power” to make our meaning clear.]

By respect-based power, we have in mind two distinct subtypes of power, legitimate and merited power. Legitimate power refers to the power of an authority figure over a group: If a group accepts as right the authority of one or more members of the group, then these members have a legitimate range of power in which they can issue directives and make decisions for the group (13, 35). Legitimate power has been described from several different perspectives in the social sciences. For example, Fiske and Rai (36, 37) have proposed that authority ranking is one of the basic relational models underlying human social interactions and that it carries moral obligations for both authority figures and subordinates: Authority figures are morally obligated “to lead, guide, direct, and protect” their subordinates, while subordinates are morally obligated “to respect, obey, and pay deference” to their authority figures (37). In a similar vein, Graham, Haidt, and their coworkers (38, 39) have argued that one of the foundations of human moral cognition is authority, which again carries moral obligations for both authority figures (e.g., maintaining order, providing protection, impartiality) and subordinates (e.g., obedience, respect, deference).

Finally, merited power refers to the influence that prestigious figures (e.g., individuals who are highly skilled, knowledgeable, or successful in valued domains) may exert, consciously or not, over those who identify with them, wish to be closely associated with them, or hope to learn from them. According to Cheng, Henrich, and their coworkers (24–26), prestigious individuals

“have earned the right, if not to be obeyed, at least to have their opinions and desires considered more closely than those of ordinary people” (26). Thus, merited power is distinct from legitimate power in that prestigious individuals are not authority figures and, as such, cannot order subordinates to do anything they do not want to do. Nevertheless, in practice, prestigious individuals' wishes are often heeded out of respect or deference, thereby granting them a great deal of social influence. Relatedly, in the developmental literature, Hawley (33, 34) and others (28, 40) have argued that while children are initially limited to employing coercive, aggressive strategies to gain control over resources, with age they gradually acquire more socially acceptable, prestige-based strategies; for example, highly socially skilled, cooperative, and charismatic children tend to prevail in disputes over resources and to receive respect from their peers. A common feature of individuals with legitimate or merited power is thus the respect or deference that is freely conferred upon them.

Although we have described fear-based and respect-based power as two distinct types of power, we acknowledge that in practice a given individual's actions could reflect both types (13, 26). For example, bullies who are socially well-integrated in their schools often possess prestige-related “strengths that are easy to recognize, like social skills, athleticism, and attractiveness” and “thrive on being perceived as dominant, popular, and cool” (32). Similarly, authority figures may at times use aggression to punish wayward group members or enforce group norms (37, 41, 42). Nevertheless, because the psychological mechanisms underlying fear-based and respect-based power are generally perceived to be fundamentally distinct (13, 24–28, 35, 41, 42), this is where we began our exploration of infants' ability to reason about the bases of power.

### Experiment 1

Could infants distinguish between a power asymmetry based on respect and a power asymmetry based on fear? To get at this question, we took advantage of a common observation about these two types of power (13, 26, 35): When obedience to an order flows from respect for the individual who issued the order, it is likely to continue even in the individual's absence. In contrast, when obedience flows from fear, it may continue only as long as the individual who issued the order remains present. As Tyler and Lind (35) put it, fear-based power “ultimately fails to control behavior because it can neither eliminate private disobedience nor assure continued obedience when the mechanism of coercion is removed.” Building on this observation, we examined whether infants would hold differential expectations for subordinates' continued obedience to an order given by either a leader with respect-based power (leader condition) or a bully with fear-based power (bully condition).

In experiment 1, 21-month-olds watched a scenario in which a character who was portrayed as a leader or a bully gave an order to three protagonists, who initially obeyed. The character then left the scene, and the protagonists either continued to obey (obey event) or disobeyed (disobey event). We reasoned that if infants in the leader condition attributed to the character respect-based power, then they might expect the protagonists to continue to obey her order after she left. For example, they might perceive the character as an authority figure with legitimate power and view the protagonists as obligated to obey her. Alternatively, they might perceive her as a prestigious figure with merited influence and expect the protagonists to respectfully defer to her wishes. In either case, infants would detect a violation in the disobey event and hence would look significantly longer at that event than at the obey event.

In contrast, if infants in the bully condition attributed to the character fear-based power, then they might expect the protagonists to continue to obey her as long as she remained present in the scene and could hurt them if they disobeyed. However, after the bully left

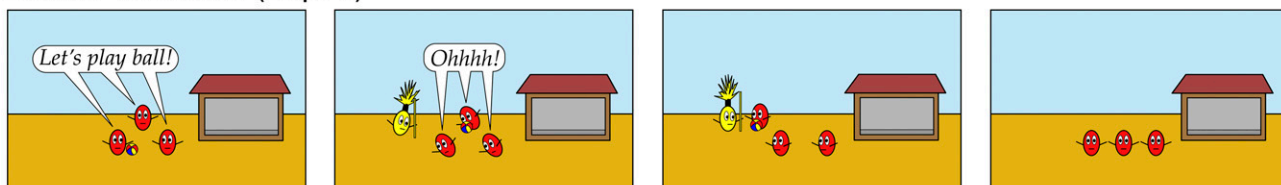
the scene, infants might view either obedience or disobedience as a plausible course of action. On the one hand, the protagonists might continue to comply with the bully's order out of fear, because she might harm them if she returned and saw their insubordinate actions. On the other hand, the protagonists might disobey her and pursue their own wishes because they had no reason—other than the fear of being harmed by her, which might weaken in her absence—to let her wishes prevail over theirs.

Infants were randomly assigned to the leader or bully condition ( $n = 16$  in all conditions). In each condition, infants received two character-familiarization trials, two order-familiarization trials, and four test trials. In the leader condition (Fig. 1A), each

character-familiarization trial presented infants with a 25-s computer-animated event that introduced the three protagonists and the leader, who were all oval shapes with faces, stick arms, and female voices. The protagonists were red; the leader was yellow, had a large yellow headdress, and carried a yellow stick. To start, the three protagonists stood in an open field to the left of a house; they said, "Let's play ball!" (in Italian, "Giochiamo con la palla!"), and passed a ball to each other until the leader entered the scene from the left. The protagonists then bowed to her in unison while saying "Ohhhh!" reverently; in reply, the leader hit the ground twice with her stick and bowed slightly. This bowing sequence was repeated three times, and then the protagonist who had the ball

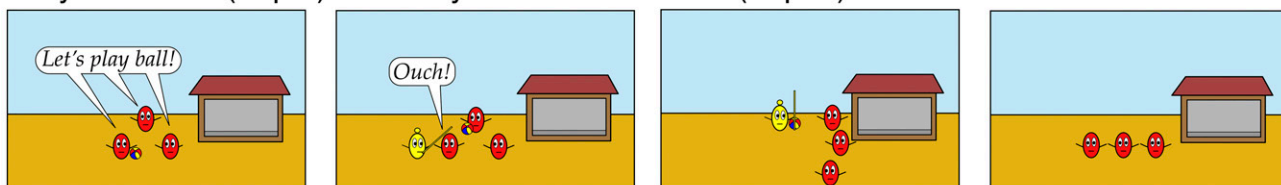
## Character-Familiarization Trials

### A Leader Condition (Exp. 1)



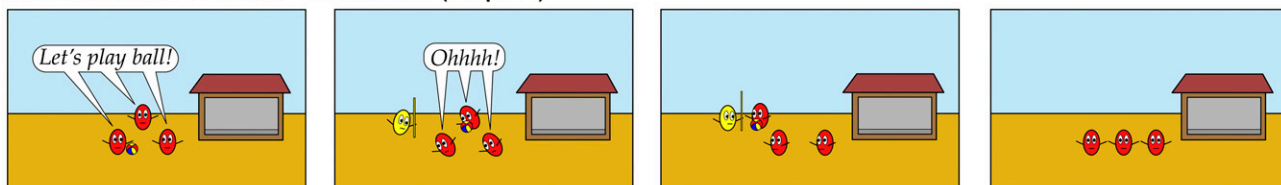
*the protagonists bowed 3 times then gave the character their ball*

### B Bully Condition (Exp. 1) and Bully-Present Condition (Exp. 3)



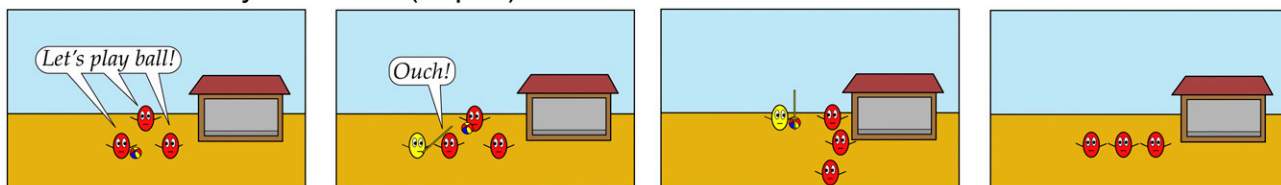
*the character hit each protagonist in turn then stole their ball*

### C Bareheaded-Leader Condition (Exp. 2)



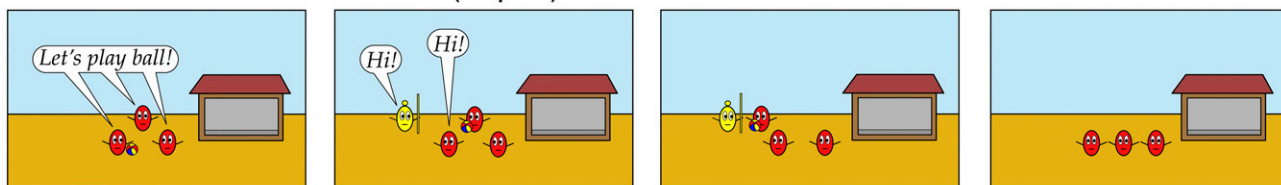
*the protagonists bowed 3 times then gave the character their ball*

### D Bareheaded-Bully Condition (Exp. 2)



*the character hit each protagonist in turn then stole their ball*

### E Powerless-Character Condition (Exp. 3)



*the protagonists each greeted the character in turn then gave her their ball*

**Fig. 1.** Schematic depiction of the character-familiarization trials in the different conditions (A–E) of experiments 1 to 3.



gave it to the leader, who left with it. Finally, the protagonists formed a line, and the event ended (Movie S1). The animation repeated, after a blank screen, until the trial ended (see *Methods* for criteria).

In each order-familiarization trial (Fig. 2), infants saw a 7-s event designed to familiarize them with the leader's order. To start, the protagonists stood in a line in the field and jumped together three times until the leader arrived. They then watched while she pointed her stick at the house and said, "Time for bed!" ("Ora della nanna!"). The animation repeated until the trial ended. Finally, in each test trial, infants saw a 15-s event that began like the order-familiarization event but then continued. After receiving the leader's order, the protagonists filed into the house (through its left side) and could be seen through its front window. Next, while the protagonists watched, the leader left the scene. At that point, either the protagonists remained in the house and closed their eyes, as though going to sleep (obey event; Movie S2), or they filed back out of the house into the field (disobey event; Movie S3). Each animation repeated until the trial ended. Infants saw the obey and disobey events on alternate trials for two pairs of trials, with order counterbalanced across infants.

The bully condition (Fig. 1B) was identical to the leader condition with two exceptions. First, the leader was replaced by the bully, who also was yellow and carried a yellow stick, but had only a small headdress. Second, the 25-s event shown in the character-familiarization trials was modified: When the bully arrived, she hit the protagonist who stood front left on top of the head twice with her stick; the protagonist winced at each blow and said "Ouch!" ("Ai!"), and then she moved away from the bully, toward the house. This sequence was repeated with the protagonist who stood front right and then with the protagonist who stood at the back

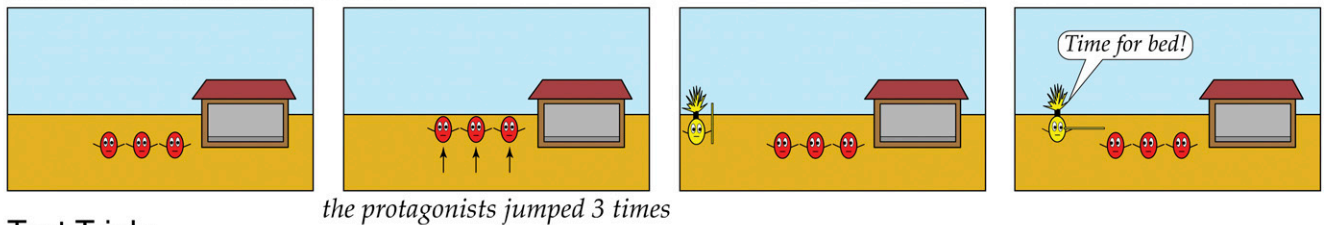
and had the ball. When this last protagonist moved away, the bully took the ball and left with it. The protagonists then formed a line, and the event ended (Movie S4).

For infants in experiment 1 to show the predicted test pattern—longer looking at the disobey than at the obey event in the leader condition, but equal looking at the two events in the bully condition—four preconditions had to be met. First, when watching the character-familiarization trials, infants in each condition had to perceive that the character exerted some type of power over the protagonists; without such an asymmetry, infants would expect disobedience (as confirmed in experiment 3), because the three protagonists would prevail over the lone character via simple numerical superiority (20).

Second, when watching the character-familiarization trials, infants in the leader condition had to attribute to the character a particular type of power, respect-based power. For example, they might view her as an authority figure with legitimate power (e.g., a parent or daycare teacher), as a prestigious individual with merited power (e.g., a supercool older peer or cousin), or as some combination of the two. The character-familiarization trials included several cues that might help signal the leader's type of power (26, 37): The protagonists all faced her and bowed to her in unison while saying "Ohhhh!" reverently (i.e., they displayed respect and awe); she bowed back slightly to them, thereby engaging in a self-deprecating display of subordinate behavior, as prestigious individuals sometimes do (26); she wore a large and eye-catching headdress, which increased her height and gave her an imposing appearance (37); and one of the protagonists approached the leader and offered her their ball. Of course, infants might not be sensitive to all of these cues, but

## Leader Condition (Exp. 1)

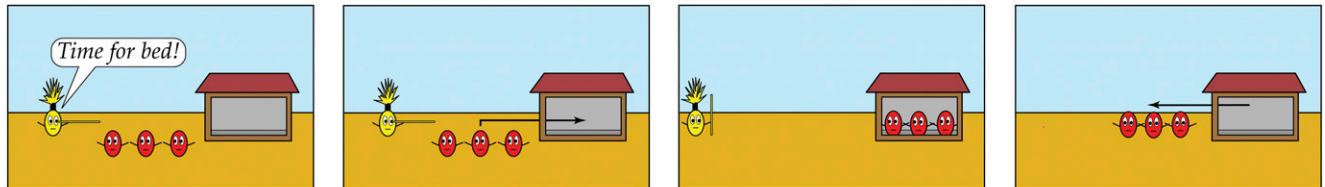
### Order-Familiarization Trials



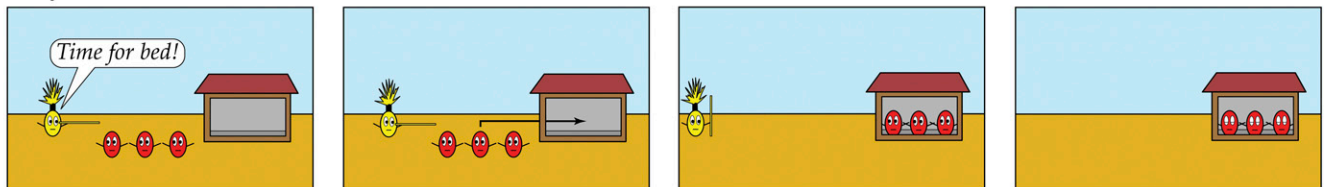
### Test Trials

Each event began as in the order-familiarization trials then continued as shown below

#### Disobey Event



#### Obey Event



**Fig. 2.** Schematic depiction of the order-familiarization and test trials in the leader condition of experiment 1. Trials in other conditions were identical, with two exceptions. First, in each condition, the character was that shown in the character-familiarization trials for that condition (Fig. 1). Second, in the bully-present condition, the character remained in the scene after giving her order.

even a few might be sufficient for infants to infer that the leader held respect-based power over the protagonists.

Third, when watching the character-familiarization trials, infants in the bully condition had to attribute to the character a different type of power, fear-based or coercive power. This seemed very likely, as there is now considerable evidence that even young infants correctly perceive hitting, stealing, and hindering as negative, antisocial actions (43–46). Apart from the bully's negative acts, the protagonists' fearful reactions (i.e., wincing and saying "Ouch!," moving away defensively without attempting to resist or retaliate, and keeping their bodies turned away from the bully) might also signal to infants that the bully exerted fear-based power over the protagonists.

Finally, for experiment 1 to yield the predicted pattern of results, infants had to recognize not only that the leader and the bully had different types of power but also that these differences had implications for the protagonists' behavior in the new context of the test trials. Specifically, the protagonists might continue to obey the leader in her absence out of an obligation or inclination to abide by her wishes, but they were less likely to continue to obey the bully, whose power to coerce them might weaken in her absence.

To verify our interpretations of the leader and bully character-familiarization videos, we showed these videos to 20 naïve adults (15 female, mean age 20.95 y), along with the character-familiarization videos from experiments 2 and 3, using a Latin square design (Dataset S1). After each video (which showed the event three times), participants (*i*) selected which of nine labels described the character (leader, bully, authority figure, elder, mean guy, prestigious individual, friend, aggressor, and nice guy) and (*ii*) rated on a scale ranging from 1 (not at all) to 7 (very much) how well 10 adjectives described the protagonists' feelings toward the character (respectful, afraid, friendly, bullied, admiring, sociable, neutral, in awe, threatened, and generous). For the leader condition of experiment 1, participants circled, on average, 3.65 labels ( $SD = 0.67$ ); the labels that were selected by at least 16/20 (80%) adults (henceforth preferred labels) were leader, authority figure, and prestigious individual ( $M = 18.33$ ,  $SD = 1.15$ ; nonpreferred labels,  $M = 3.00$ ,  $SD = 4.47$ ). The adjectives that were given at least 5.6/7 (80%) ratings (henceforth preferred adjectives) were respectful, admiring, and in awe ( $M = 6.52$ ,  $SD = 0.03$ ; nonpreferred adjectives,  $M = 3.32$ ,  $SD = 1.25$ ). For the bully condition, participants selected an average of 3.70 labels ( $SD = 1.17$ ) for the character, and preferred labels were bully, mean guy, and aggressor ( $M = 19.67$ ,  $SD = 0.58$ ; nonpreferred labels,  $M =$

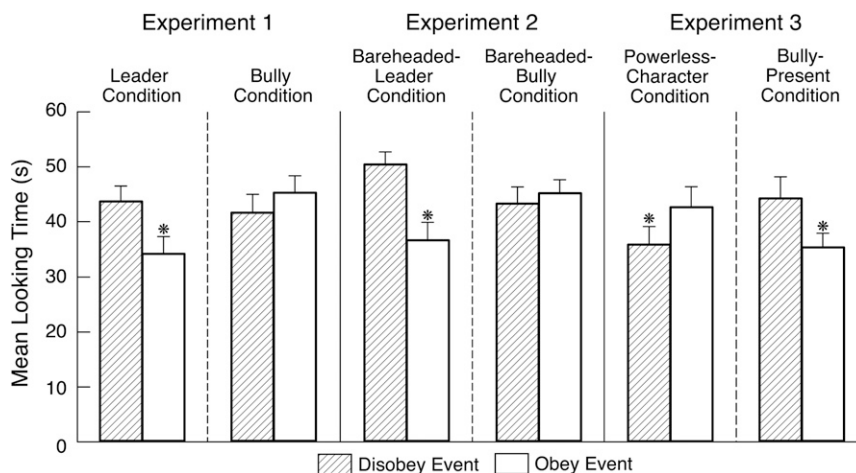
2.50,  $SD = 2.59$ ). Finally, preferred adjectives for the protagonists' feelings were afraid, bullied, and threatened ( $M = 6.42$ ,  $SD = 0.40$ ; nonpreferred labels,  $M = 1.41$ ,  $SD = 0.19$ ). Adults' preferred descriptors thus closely matched our interpretations of the leader and bully character-familiarization videos.

Infants' looking times in the two test pairs (Fig. 3) were averaged and compared using an ANOVA with condition (leader, bully) as a between-subject factor and event (obey, disobey) as a within-subject factor. The only significant effect was the condition  $\times$  event interaction,  $F(1, 30) = 8.52$ ,  $P = 0.007$ ,  $\eta_p^2 = 0.22$ . Planned comparisons revealed that, as predicted, infants in the leader condition looked significantly longer at the disobey ( $M = 43.49$ ,  $SD = 11.45$ ) than at the obey ( $M = 34.05$ ,  $SD = 11.79$ ) event,  $F(1, 30) = 8.88$ ,  $P = 0.006$ , Cohen's  $d = 0.81$ , whereas infants in the bully condition looked about equally at the disobey ( $M = 41.44$ ,  $SD = 13.02$ ) and obey ( $M = 45.08$ ,  $SD = 12.12$ ) events,  $F(1, 30) = 1.32$ ,  $P > 0.250$ ,  $d = -0.29$ . Nonparametric Wilcoxon signed-rank tests confirmed the results of the leader ( $Z = 2.74$ ,  $P = 0.006$ ) and bully ( $Z = 0.98$ ,  $P > 0.250$ ) conditions.

Infants in the leader condition expected the protagonists to continue to obey the leader after she left, and they detected a violation when the protagonists disobeyed her and returned to the field instead. In contrast, infants in the bully condition tended to look equally at the two test events, most likely because they viewed both outcomes as plausible: The protagonists might continue to obey the absent bully to avert harm, as she might hurt them if she came back and found them in the field, or they might disobey her and return to the field, because her power to coerce them became weaker in her absence, allowing their own wishes to prevail.

## Experiment 2

Experiment 2 had two goals: One was to confirm the results of experiment 1, and the other was to address an alternative interpretation of these results. It might be suggested that infants in experiment 1 did not, in fact, distinguish between respect-based and fear-based power; rather, they held an undifferentiated concept of power that took into account mainly the relative physical sizes of the character and protagonists. Recall that in the task of Thomsen et al. (19), infants expected the larger of the two characters to have the right-of-way. In a similar way, perhaps infants in experiment 1 expected the character with the large headdress to control the protagonists in the test trials, but were uncertain whether the character with the small headdress could do so. To rule out this alternative interpretation, infants were tested using the same procedure as in experiment 1 except that



**Fig. 3.** Mean looking times at the test events in experiments 1 to 3. Error bars represent SEs, and an asterisk denotes a significant difference between the two events within a condition ( $P < 0.05$  or better).

the characters no longer had a large (leader) or a small (bully) head and were thus bareheaded, like the protagonists. The characters in the bareheaded-leader (Fig. 1C and Movie S5) and bareheaded-bully (Fig. 1D) conditions were thus identical in appearance and differed only in how they interacted with the protagonists in the character-familiarization trials; the order-familiarization and test trials were now identical. Evidence that infants in the bareheaded-leader condition looked significantly longer at the disobey than at the obey event, and that infants in the bareheaded-bully condition looked equally at the two events, would thus rule out the notion that infants considered only the relative sizes of the character and protagonists when forming expectations in the test trials.

Adults' responses to the character-familiarization videos from experiment 2 were similar to those from experiment 1. In the bareheaded-leader condition, participants circled an average of 3.45 labels ( $SD = 1.15$ ) for the character, and preferred labels were leader, authority figure, and prestigious individual ( $M = 17.33$ ,  $SD = 1.53$ ; nonpreferred labels,  $M = 2.83$ ,  $SD = 4.02$ ). Preferred adjectives for the protagonists' feelings toward the character were respectful, admiring, and in awe ( $M = 6.27$ ,  $SD = 0.18$ ; nonpreferred adjectives,  $M = 3.49$ ,  $SD = 1.06$ ). In the bareheaded-bully condition, participants circled 3.35 labels ( $SD = 0.59$ ) on average, and preferred labels were bully, mean guy, and aggressor ( $M = 20.00$ ,  $SD = 0.00$ ; nonpreferred labels,  $M = 1.17$ ,  $SD = 1.47$ ). Preferred adjectives were afraid, bullied, and threatened ( $M = 6.63$ ,  $SD = 0.13$ ; nonpreferred labels,  $M = 1.44$ ,  $SD = 0.15$ ). Adults' responses thus appeared to be guided mainly by the behavioral cues available.

Looking times in the two test pairs (Fig. 3) were averaged and compared using an ANOVA with condition (bareheaded-leader, bareheaded-bully) as a between-subject factor and event (obey, disobey) as a within-subject factor. The analysis yielded a significant main effect of event,  $F(1, 30) = 6.92$ ,  $P = 0.013$ , and, crucially, a significant condition  $\times$  event interaction,  $F(1, 30) = 12.03$ ,  $P = 0.002$ ,  $\eta_p^2 = 0.29$ . Planned comparisons revealed that infants in the bareheaded-leader condition looked significantly longer at the disobey ( $M = 50.28$ ,  $SD = 8.77$ ) than at the obey ( $M = 36.44$ ,  $SD = 13.04$ ) event,  $F(1, 30) = 18.60$ ,  $P < 0.001$ ,  $d = 1.25$ , whereas infants in the bareheaded-bully condition looked about equally at the disobey ( $M = 43.14$ ,  $SD = 12.42$ ) and obey ( $M = 45.04$ ,  $SD = 9.83$ ) events,  $F(1, 30) = 0.35$ ,  $P > 0.250$ ,  $d = -0.17$ . Wilcoxon signed-rank tests confirmed the results of the bareheaded-leader ( $Z = 2.84$ ,  $P = 0.004$ ) and bareheaded-bully ( $Z = 0.67$ ,  $P > 0.250$ ) conditions.

Lastly, we compared experiments 1 and 2 ( $n = 64$ ) using an ANOVA similar to that described above but with experiment (1, 2) as an additional between-subject factor. The main effect of experiment was not significant, nor was any interaction involving this factor, all  $F_s(1, 60) \leq 1.24$ ,  $P_s > 0.250$ . As before, the analysis yielded a significant main effect of event,  $F(1, 60) = 7.74$ ,  $P = 0.007$ , and a significant condition  $\times$  event interaction,  $F(1, 60) = 20.42$ ,  $P < 0.001$ ,  $\eta_p^2 = 0.25$ . Infants in the combined leader conditions looked significantly longer at the disobey ( $M = 46.89$ ,  $SD = 10.61$ ) than at the obey ( $M = 35.25$ ,  $SD = 12.29$ ) event,  $F(1, 60) = 26.65$ ,  $P < 0.001$ ,  $d = 1.01$ , whereas infants in the combined bully conditions looked about equally at the two events (disobey:  $M = 42.29$ ,  $SD = 12.55$ ; obey:  $M = 45.06$ ,  $SD = 10.86$ ),  $F(1, 60) = 1.51$ ,  $P = 0.224$ ,  $d = -0.24$ . Wilcoxon signed-rank tests confirmed the results of the combined leader ( $Z = 3.96$ ,  $P < 0.001$ ) and bully ( $Z = 1.10$ ,  $P > 0.250$ ) conditions.

The results of experiment 2 thus confirmed and extended those of experiment 1. Infants were able to identify the character as a leader or a bully based solely on the behavioral cues provided in the character-familiarization trials; they remembered the character's type of power across trials; and they expected the protagonists to continue to obey the absent leader, but held no

expectations as to whether they would continue to obey the absent bully.

### Experiment 3

In experiment 3, we sought to address an alternative interpretation of the results of experiments 1 and 2: Perhaps infants' responses were based not on considerations of power at all but on a simple notion of positivity or likability. According to this interpretation, infants expected obedience in the test trials when the character and protagonists had interacted positively in the character-familiarization trials, but they held no particular expectation about obedience or disobedience when the character and protagonists had not interacted positively. We evaluated this positivity interpretation by testing two predictions from it.

A first prediction was that infants would expect obedience in the test trials even if the character had no power over the protagonists, as long as they interacted positively in the character-familiarization trials. To evaluate this prediction, 21-month-olds were tested in a powerless-character condition (Fig. 1E) identical to the leader condition except that the (25-s) character-familiarization event depicted a positive interaction with no cues that the character had any power over the three protagonists. As before, the protagonists played ball until the character arrived. The protagonist who stood front left then wiggled left and right twice while saying "Hi!" ("Ciao!"); in reply, the character wiggled left and right once while saying "Hi!" ("Ciao!"). This sequence was repeated with the protagonist who stood front right and then with the protagonist who stood at the back and had the ball. Next, this protagonist gave the ball to the character, who took it and left. The protagonists then formed a line, and the event ended (Movie S6). If responses in the leader and bareheaded-leader conditions were based on positivity, then infants in the powerless-character condition should again expect the protagonists to continue to obey the character after she left, because the four of them had interacted positively in the character-familiarization trials. However, if these responses were based on considerations of the character's power, as we suggested, then infants in the powerless-character condition should hold a different expectation. As we saw in the Introduction (20), when two sets of individuals have competing goals, infants expect the numerically larger set to prevail. If infants correctly attributed competing goals to the three protagonists (staying in the field) and the lone character (having the protagonists go to bed), then they should expect the protagonists to disobey the character and return to the field. Longer looking times at the disobey than at the obey event would thus support the positivity interpretation, whereas the reverse looking pattern would support our interpretation.

Adults' responses to the powerless-character character-familiarization video differed markedly from their responses to the other videos. They selected 2.25 labels ( $SD = 0.85$ ) for the character on average, and the only preferred label was friend ( $M = 17.00$ ; nonpreferred labels,  $M = 3.50$ ,  $SD = 4.07$ ). Preferred adjectives for the protagonist's feelings toward the character were friendly, sociable, and generous ( $M = 6.10$ ,  $SD = 0.20$ ; nonpreferred adjectives,  $M = 2.81$ ,  $SD = 1.61$ ). Adults' responses thus closely matched our description of the video.

The second prediction from the positivity interpretation was that it should not matter whether the bully left the scene or remained present in the test trials: As long as the character-familiarization trials depicted a negative interaction, infants should hold no particular expectation about whether the protagonists would obey or disobey the character. To evaluate this prediction, 21-month-olds were tested in a bully-present condition (Fig. 1B) identical to the bully condition except that in the (15-s) test events, the bully remained in the scene after the protagonists went into the house (Movies S7 and S8). If responses in the bully and bareheaded-bully conditions were based on an absence of positivity in the character-familiarization trials, then infants in the bully-present condition



should again look equally at the obey and disobey events because they received the same character-familiarization trials. However, if, as we suggested, these responses were based on two opposing considerations (the protagonists might continue to obey to avert harm, or they might disobey because the bully was away and they wanted to stay in the field), then a different result should be found. With the bully remaining in the scene, infants should now expect the protagonists to continue to obey her order, as she might hurt them if they disobeyed. Equal looking times at the obey and disobey events, as in the bully and bareheaded-bully conditions, would thus support the positivity interpretation, whereas longer looking times at the disobey than at the obey event would support our interpretation.

To increase the similarity of the powerless-character and bully-present conditions, the character wore a small headdress (as in the bully condition of experiment 1) in both conditions. The order-familiarization trials were thus identical in the two conditions, and the test trials differed only in that the bully remained in the scene in the bully-present condition.

Looking times in the two test pairs (Fig. 3) were averaged and compared using an ANOVA with condition (powerless-character, bully-present) as a between-subject factor and event (obey, disobey) as a within-subject factor. Only the condition  $\times$  event interaction was significant,  $F(1, 30) = 12.48$ ,  $P = 0.001$ ,  $\eta_p^2 = 0.29$ . Planned comparisons revealed that infants in the powerless-character condition looked significantly longer at the obey ( $M = 42.52$ ,  $SD = 15.06$ ) than at the disobey ( $M = 35.71$ ,  $SD = 12.64$ ) event,  $F(1, 30) = 4.69$ ,  $P = 0.038$ ,  $d = -0.49$ , whereas infants in the bully-present condition looked significantly longer at the disobey ( $M = 44.04$ ,  $SD = 15.74$ ) than at the obey ( $M = 35.13$ ,  $SD = 9.98$ ) event,  $F(1, 30) = 8.02$ ,  $P = 0.008$ ,  $d = 0.68$ . Wilcoxon signed-rank tests confirmed the results of the powerless-character ( $Z = 2.15$ ,  $P = 0.032$ ) and bully-present ( $Z = 2.17$ ,  $P = 0.030$ ) conditions.

In two additional ANOVAs, we compared the test looking times in the powerless-character condition with those in the leader (experiment 1) and bareheaded-leader (experiment 2) conditions. The condition  $\times$  event interaction was significant in each analysis, both  $F_s(1, 30) \geq 17.58$ ,  $P < 0.001$ ,  $\eta_p^2 \geq 0.37$ , confirming that responses in the powerless-character condition differed from those in the leader and bareheaded-leader conditions. Lastly, we compared the test looking times in the bully-present condition with those in the bully (experiment 1) and bareheaded-bully (experiment 2) conditions. Once again, the condition  $\times$  event interaction was significant in each analysis, both  $F_s(1, 30) \geq 6.04$ ,  $P \leq 0.020$ ,  $\eta_p^2 \geq 0.17$ , confirming that infants held different expectations for the protagonists' behavior when the bully remained present as opposed to left the scene.

The results of experiment 3 rule out the positivity interpretation of experiments 1 and 2. In the powerless-character condition, infants expected the three protagonists to disobey the lone powerless character, even though the four of them had interacted positively in the character-familiarization trials. Conversely, in the bully-present condition, infants expected the protagonists to continue to obey the bully, even though the four of them had interacted negatively in the character-familiarization trials. Positivity thus played little role in infants' reasoning, as they expected disobedience despite a positive interaction (powerless-character condition) and obedience despite a negative interaction (bully-present condition). More generally, the results of experiment 3 support our suggestion that the negative findings of the bully and bareheaded-bully conditions represented the output of two opposing considerations: One (supported by the bully-present condition) was that the protagonists might continue to obey the absent bully out of fear of being harmed, and the other (supported by the powerless-character condition) was that the protagonists might disobey the absent bully because her power over them diminished while she was away.

## General Discussion

Our findings demonstrate that some sensitivity to the different bases of social power is already present in infancy. In the leader (experiment 1) and bareheaded-leader (experiment 2) conditions, infants first received character-familiarization trials in which three protagonists were playing a ball game in a field when a character arrived; the protagonists bowed reverently to her and gave her their ball, and then she left with it. In the test trials, the protagonists were jumping when the character returned, ordered them to go to bed, and then left. Infants expected the protagonists to remain in the house in the character's absence, and they detected a violation if they disobeyed her and returned to the field instead. Infants in the bully (experiment 1) and bareheaded-bully (experiment 2) conditions saw similar events except that in the character-familiarization trials, the character hit each protagonist in turn and then stole their ball. Infants now looked equally whether the protagonists stayed in the house or returned to the field. These negative results suggested that infants could make sense of both outcomes: The protagonists might choose to stay in the house because the character might hurt them if she came back and found them in the field, or they might choose to return to the field because the character's power over them weakened in her absence, allowing their own wishes to prevail. Support for these two opposing expectations came from experiment 3. In the bully-present condition, the bully remained in the scene after issuing her order, and infants expected the protagonists to stay in the house to avoid further harm. Finally, the character-familiarization trials in the powerless-character condition suggested that the character had little or no power over the protagonists, and infants expected them to return to the field after she left.

Together, these results support two conclusions. First, they confirm prior evidence that infants can detect power asymmetries and expect them both to endure over time and to extend across a range of situations (19–23). This is important: As French and Raven (13) noted, "power is a useful concept for describing social structure only if it has a certain stability"; it becomes useless if "the potential influence is so momentary or so changing that it cannot be predicted from the existing relationship." Second, our results provide new evidence that infants can distinguish between at least two types of power relations. In the leader conditions, infants were most likely led by the reverent bowing they observed to infer that the character held respect-based power over the three protagonists. Consequently, in the test trials, they expected the leader's wishes to prevail over those of the protagonists, despite her numerical inferiority, even after she left the scene; strikingly, her absence did not diminish the strength of her power in infants' eyes. In the bully conditions, in contrast, infants were led by the unprovoked aggressive actions of the character, coupled with the lack of retaliation or defensive counterattack by the protagonists, to infer that a fear-based power asymmetry existed between them. Accordingly, in the test trials, infants expected the protagonists to obey the bully as long as she remained present. When she left, however, infants understood that her power or control over the protagonists might diminish, and they no longer viewed it as unexpected when the protagonists chose to disobey her.

Future research can build on our findings in several directions. A first direction will be to gather converging evidence for our findings by using different cues to establish the leader's or bully's power over the protagonists. Prior research indicates that by the end of the preschool years, children can already use a whole host of cues to determine who is more powerful in a social interaction (40, 47–50). In one experiment (50), children ages 3 to 9 y listened to vignettes that used one of five different cues to signal which of two characters was more powerful; after each vignette, children were asked, "Who's in charge?" By 7 to 9 y of age, children were sensitive to all five cues: They answered correctly when the more powerful character prevailed in obtaining a resource or imposing a

goal, or when she set new clothing norms, issued orders about what to do next, or gave (or denied) permission to use a toy or enter an enclosure. In line with this research, one might investigate, for example, whether the bareheaded-leader condition would yield the same results if the protagonists no longer bowed reverently to the character and offered her their ball but instead she brought in the ball and gave them permission to use it. Finding the same test results even if the character-familiarization trials made use of alternative power cues not only would provide convergent validity for our results but would also help map out the developmental trajectory of sensitivity to power cues in early childhood.

A second direction, related to the first, will be to extend our findings by exploring what expectations infants hold when the only cue to the character's power is her larger size (e.g., her large headdress, as in experiment 1). Would infants expect the character, based on her larger size alone, to hold respect-based power over the protagonists? If yes, it will be interesting to present infants with a bully similar to that in experiments 1 and 2, who hits the protagonists and steals from them, but now also wears a large headdress. Would infants then have a conflicted view of the bully as a bad leader?

A third research direction will be to explore exactly how infants conceptualize each type of power explored here. With respect to fear-based power, future research can examine how much negativity is needed to trigger the expectations we observed in our bully conditions (i.e., you have to obey the bully when she is around, but you do not have to when she is away). These conditions depicted highly negative events: The bully hit each protagonist on top of the head with her stick and stole their ball. Would the same results be obtained if the character only stole the ball, only hit one protagonist, or only shouted at them? How many harmful actions, and what sorts of harmful actions, would be sufficient to signal a fear-based power relation? Relatedly, what if the character-familiarization trials depicted zero-sum conflicts as in prior research with infants (19–23)? After seeing the character prevail over the protagonists in occupying an enclosure, say, how would infants expect the protagonists to respond to an order issued by the character? Would mild intimidation or coercion invoke the same expectations as in our bully conditions, or would something harsher and more fear-inducing be required to do so? Answers to these questions will help determine whether infants possess an undifferentiated concept of coercive power or distinguish from a young age between milder and more pronounced forms of coercion.

Turning to respect-based power, it will be important to determine whether infants perceived the character in the leader conditions as an authority figure, a prestigious individual, or some undifferentiated combination of the two. As was discussed earlier, many researchers in the social sciences have argued that the power relation between authority figure and subordinates typically is accepted as legitimate by all parties involved and carries a whole host of role-specific expectations: For example, authority figures are expected to promote cooperation, maintain order, and provide protection, whereas subordinates are expected to obey, respect, and defer to authority figures (35–39, 51, 52). Such expectations may have gradually evolved in our species due to the prominent role of authority figures in activities critical to survival such as movements to new hunting grounds, food acquisition, within-group peacekeeping, and warfare (27, 41, 42, 53, 54). In contrast, prestigious individuals (e.g., individuals who are highly skilled or knowledgeable in valued domains) typically lack the authority to compel or enforce compliance—indeed, they are generally expected not to arrogate authority (24, 26). Instead, their power rests on their own merit, which evokes admiration, respect, and deference in others and, as such, grants them some degree of social influence. Given the preceding descriptions, one way to find out whether infants construed the character in the leader conditions as an authority figure would be to explore what expectations they held about the character's actions toward the protagonists

(rather than what expectations they held about the protagonists' actions toward the character, as in the present research). For example, would infants expect the character to intervene if one of the protagonists transgressed against the others, to provide protection if they were attacked by outsiders, to show impartiality in regulating access to a group resource, or to enforce cooperation toward a group goal? Positive findings would support the view that abstract expectations about the relation between authority figure and subordinates emerge early in life, perhaps as a part of the basic structure of human moral cognition (1, 36–39).

Could the expectations revealed by the present experiments be explained in simpler terms, as learned products from infants' social environments? For example, infants might learn at an early age that prescriptions by individuals such as parents and daycare teachers ("Time for bed!") must be obeyed even when they momentarily leave the room, while demands by bossy siblings or pushy peers can sometimes be ignored, especially from a safe physical distance. Such learning could occur through statistical learning mechanisms (55), mechanisms that support social heuristics that are advantageous in daily life (56), or socialization processes that help children internalize and adhere to social norms (57). Although such learning must certainly contribute to infants' skillful and culturally appropriate navigation of their social world, early-emerging skeletal expectations about the legitimate power of authority figures could still guide and shape this learning. Future research can help shed light on this question by investigating whether infants in the first year of life already hold a rich array of expectations about the rights and duties of authority figures and subordinates. The younger the age at which such expectations can be observed, and the richer and more varied these expectations, the more compelling will be the conclusion that an abstract sense of authority contributes to the hierarchical structures in infants' representation of the social landscape.

In sum, our results demonstrate that 21-month-olds expect individuals to continue to obey a leader's order even after she leaves, but to obey a bully's order only while she is present. Our results thus provide evidence that infants in the second year of life not only hold expectations about the stability and range of power relations, as shown in prior research, but also can distinguish between a few different types of power relations. As such, our results help shed light on the hierarchical structures in infants' social landscape, and pave the way for further investigations of these structures.

## Methods

**Participants.** Participants in all three experiments were 96 healthy term infants (46 male;  $M = 21$  mo, 10 d; range = 20 mo, 0 d to 23 mo, 23 d). Another 30 infants were excluded because they looked the maximum time allowed in both test pairs (16), because they failed to complete at least one usable test pair due to a technical error (1) or due to their becoming fussy (8), active (2), or drowsy (1), or because of parental interference (2). Data collection began while F.M. was visiting the University of Illinois in the United States (33/64 infants in experiments 1 and 2 were tested there) and was completed when he returned to the University of Trento in Italy. Each infant's parent provided written informed consent, and the protocol was approved by the local Institutional Review Board (University of Illinois) or Ethics Committee (University of Trento). Comparison of the test data from the two countries revealed no significant interaction of condition and event with country in experiment 1 or 2, both  $F_s(1, 28) \leq 0.22$ ,  $P > 0.250$ ; subsequent analyses therefore collapsed across country as a factor.

**Apparatus and Procedure.** The apparatus in each country consisted of a display booth with a large opening in its front wall; between trials, a supervisor lowered a curtain in front of this opening. Inside the apparatus was a television screen (46 cm high  $\times$  82 cm wide; United States) or a computer monitor (34 cm  $\times$  59 cm; Italy) on which the events were shown. Each infant sat on a parent's lap facing the apparatus; parents were instructed to remain silent and to close their eyes during the test trials. Each infant's looking behavior was monitored by two naïve observers hidden on either side of the apparatus (their guesses about test order were 47% correct overall, binomial  $P > 0.250$ ). The primary observer's responses were used in the analyses. Interobserver agreement (calculated for each trial by dividing the number of 100-ms intervals



in which the observers agreed by the total number of intervals in the trial) averaged 95% per trial per infant.

Each testing session took place in a brightly lit room, and each trial began with a bright attention getter. Infants first received the two character-familiarization trials appropriate for their condition. Each trial ended when infants (*i*) looked away for 2 consecutive seconds after having looked for at least 25 cumulative seconds (the duration of one event loop) or (*ii*) looked for a maximum of 75 cumulative seconds. As is typical, the minimum value of each trial ensured that infants had the opportunity to watch at least one event loop before the trial could end, and the maximum value allowed infants to watch a few loops per trial. In each experiment, looking times during the two character-familiarization trials were averaged and compared using an ANOVA with condition as a between-subject factor. This effect was not significant in any of the experiments, all  $P_s \geq 0.234$  (see [Dataset S1](#) for means in each condition). Next, infants received the two order-familiarization trials appropriate for their condition (two infants did not receive these trials). Each trial ended when infants (*i*) looked away for 2 consecutive seconds after having looked for at least 7 cumulative seconds (one event loop) or (*ii*) looked for a maximum of 35 cu-

mulative seconds. Looking times during the order-familiarization trials were analyzed as above, and the effect of condition was again not significant, all  $P_s > 0.250$ . Finally, infants received the two test pairs appropriate for their condition; 18/96 infants completed only one usable test pair because of technical errors (2) or because they became fussy (9) or active (7). Each test trial ended when infants (*i*) looked away for 2 consecutive seconds after having looked for at least 15 cumulative seconds (one event loop) or (*ii*) looked for a maximum of 60 cumulative seconds. Preliminary analyses of the test data in experiments 1 to 3 revealed no significant interaction of condition and event with either infants' sex or test order, both  $F_s(5, 72) \leq 1.58$ ,  $P_s \geq 0.177$ ; subsequent analyses therefore collapsed across these latter two factors.

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