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When Are Similar Individuals a Group? Early Reasoning About Similarity and In-Group Support

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Abstract

Beginning in infancy, children expect individuals in a group to care for and be loyal to in-group members. One prominent cue that children use to infer that individuals belong to the same group is similarity. Does any salient similarity among individuals elicit an expectation of in-group preference, or does contextual information modulate these expectations? In Experiments 1 and 2, 12-month-old infants expected in-group preference between two individuals who wore the same novel outfit, but they dismissed this similarity if one of the outfits was used to fulfill an instrumental purpose. In Experiment 3, 26-month-old toddlers expected in-group preference between two individuals who uttered the same novel labels, but they dismissed this similarity if the labels were used to convey incidental as opposed to categorical information about the individuals. Together, the results of these experiments ($N = 96$) provide converging evidence that from early in life, children possess a context-sensitive mechanism for determining whether similarities mark groups.

Keywords

infancy, social cognition, similarity, in-group support, open data

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When adults watch individuals in a scene, they typically represent who belongs to what group and use that information to predict how interactions will unfold within and between groups (Balliet et al., 2014; Roberts et al., 2017). One long-standing claim in the social sciences has been that these predictions are driven in part by a principle of *in-group support*: Individuals in a group are expected to care for in-group members and to show them loyalty (Brewer, 1999; Graham et al., 2013; Rai & Fiske, 2011; Shweder et al., 1997; Tajfel et al., 1971; Tooby et al., 2006). Recent findings indicate that this principle emerges early in life (Ting et al., 2020): Infants expect individuals to help in-group members in need (Jin & Baillargeon, 2017), to refrain from helping wrongdoers who have harmed in-group members (Ting et al., 2019), to comply with in-group norms (Powell & Spelke, 2013), to prefer in-group members over out-group members (Spokes & Spelke, 2017), to reserve limited resources for in-group members (Bian et al., 2018), and to side with in-group members in conflicts with out-group members (Pun et al., 2021). These results suggest that when infants represent individuals as members of the same group, the principle of in-group support is then triggered, bringing forth rich expectations of in-group care and loyalty.

What cues might suggest to infants that individuals belong to the same group? Much research has focused on infants' ability to use similarity to infer group membership. In first-party tasks, infants are more likely to support (e.g., prefer, endorse, help, and affiliate with) an individual who speaks their language (Begus et al., 2016; Buttelmann et al., 2013; Kinzler et al., 2007; Shutts et al., 2009), shares their food or toy preferences (Gerson et al., 2017; Mahajan & Wynn, 2012), or bounces to music in synchrony with them (Cirelli et al., 2014, 2016). Likewise, in third-party tasks, infants expect individuals to

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support others who are comforted by the same caretaker (Spokes & Spelke, 2017), have the same appearance (Bian et al., 2018; Rhodes et al., 2015), speak the same language (Liberman et al., 2017), or share the same food preferences (Liberman et al., 2021). Additional findings indicate that infants can interpret as group markers not only similarities that provide meaningful information about the groups involved (e.g., about their language or preferences) but also shallow, minimal similarities (Dunham et al., 2011). Thus, infants expect individuals to support others who wear a similar novel outfit (Rhodes et al., 2015; Ting et al., 2019) or use a similar novel label to describe themselves (Jin & Baillargeon, 2017; Ting et al., 2019; for related findings with older children, see Jordan & Dunham, 2021; Sparks et al., 2017).

What mechanism might underlie infants' ability to interpret all of these different types of similarities as group markers? One possibility is that infants are equipped with a somewhat primitive and indiscriminate mechanism that responds to any salient similarity and simply views more similar individuals as more likely to belong to the same group. Another possibility is that sensitivity to similarity, even in infancy, depends on a sophisticated mechanism that takes into account contextual factors: Similarities are used to infer group membership when the context in which they are observed allows this inference; they are dismissed, however, when contextual information undermines this inference by suggesting that they carry little or no social significance.

One way to marshal evidence for the latter possibility is to demonstrate that infants refrain from interpreting a salient similarity as a group marker when contextual factors render this interpretation less likely. To date, only one manipulation has produced such a demonstration (Jin & Baillargeon, 2017). Seventeen-month-olds first heard two experimenters utter similar novel labels to convey information about themselves that was either categorical ("I'm a bem!" "I'm a bem, too!") or incidental ("I saw a bem!" "I saw a bem, too!"). With the categorical information, infants inferred that the experimenters belonged to the same group, and they later expected them to help each other, in accordance with the principle of in-group support. With the incidental information, however, infants drew no inference of group membership and held no expectation of in-group support. Similar results were obtained with 29-month-old toddlers (Ting et al., 2019). In the present research, we sought a stronger test of infants' ability to dismiss salient similarities as group markers: Experiments 1 and 2 presented 12-month-olds with a visual similarity that remained in view throughout the test events. Of interest was whether infants would refrain from interpreting this similarity as a group marker when contextual information undermined its social significance but would interpret it as a group marker otherwise, as in prior research.

Statement of Relevance

Beginning in infancy, children expect individuals in a social group to prefer in-group over out-group members. One prominent cue that children use to infer group membership is similarity. To better understand how children use this cue, we asked whether they always interpret salient similarities as group markers (pointing to a rather primitive and indiscriminate mechanism) or whether they do so only when the context supports this interpretation (pointing to a more nuanced and context-sensitive mechanism). In line with the latter possibility, our results showed that when experimenters used parts of their novel outfits to store or clean objects, 12-month-old infants refrained from viewing the outfits as group markers. Similarly, when experimenters used novel labels to convey merely incidental information about themselves (e.g., "I saw a lutak!" "I saw a lutak, too!"), 26-month-old toddlers dismissed the labels as group markers. Thus, from infancy, similarities elicit an expectation of preference only if the context in which they occur supports their interpretation as group markers.

In Experiment 1, a target experimenter wearing a novel outfit faced two experimenters, one with a similar outfit (the similar experimenter) and one with a different outfit (the different experimenter). To manipulate whether infants construed the outfits as group markers, we built on findings that (a) children can be led by contextual information to adopt either a *ritual* or an *instrumental* stance when interpreting other characters' actions, and (b) they are more likely to imbue ritualistic actions with social significance, such as signaling group membership (Legare et al., 2015; Watson-Jones & Legare, 2016). For example, when an experimenter activated a light box with her head, infants construed this action as a ritualistic, conventional action if her hands were free, but as an instrumental action if they were occupied (Gergely et al., 2002). Moreover, infants found it unexpected if two experimenters who used different conventional actions to activate the light box later associated, but not if two experimenters who used different instrumental actions later associated (Liberman et al., 2018). Given these findings, we attempted to induce infants to adopt either a ritual or an instrumental stance toward the experimenters' outfits (for evidence that adults distinguish between ritualistic and instrumental outfits, see the Supplemental Material available online).

Infants first saw the target experimenter put toys away either in a box (*two-group* condition) or in a large pocket on her shirt front, as though it were intended for that instrumental purpose (*no-group* condition). Infants later saw the target experimenter prefer either the similar experimenter or the different experimenter. If our manipulation was successful, we expected responses to differ between conditions. In the two-group condition, we predicted that infants would adopt a ritual stance toward the experimenters' outfits, view the target experimenter and the similar experimenter as in-group members, and expect the target experimenter to prefer the similar experimenter over the different experimenter, in accordance with the principle of in-group support. In the no-group condition, in contrast, we expected that infants would adopt an instrumental stance toward the experimenters' outfits, dismiss them as group markers, and hold no expectation about whom the target experimenter would prefer.

Experiment 2 was identical to Experiment 1 except that a different manipulation was used to sway infants' interpretation of the experimenters' outfits: The similar experimenter either drank from a cup (two-group condition) or used a sponge attached to her outfit to clean messy lines on the cup (no-group condition). Finally, to provide further converging evidence for our conclusions, Experiment 3 examined whether 26-month-old toddlers would expect the target experimenter to prefer the similar experimenter when the two used similar novel labels to convey categorical (two-group condition) but not incidental (no-group condition) information about themselves.

Each of our three experiments thus tested whether children would expect the target experimenter to prefer the similar experimenter in the two-group but not the no-group condition. Finding this pattern across ages and manipulations would provide strong evidence that beginning early in life, the process of interpreting similarities among individuals is neither indiscriminate nor shallow: Even salient similarities may be dismissed if the context in which they are observed suggests that they carry little social significance.

The data from Experiments 1 through 3 are publicly available via OSF at https://osf.io/k5fb2/. Participants' names were obtained from a university-maintained database of parents interested in child-development research. Each participant's parent gave written informed consent, and the protocol was approved by the institutional review board at the University of Illinois at Urbana-Champaign.

Experiment 1

Infants in each condition received a familiarization trial, a pretest trial, and two test trials (Fig. 1). Only the familiarization trial differed across conditions; in this trial, we manipulated whether infants adopted a ritual or an instrumental stance toward the experimenters' outfits. The target experimenter sat alone at the back of a puppet-stage apparatus and, as explained above, stored toys either in a box (two-group condition) or in a pocket (no-group condition). In the pretest trial, the target experimenter was absent, and the similar experimenter and the different experimenter sat at side windows and read identical picture books. In the test trials, the target experimenter approached either the similar experimenter (*approach-similar-experimenter* event) or the different experimenter (*approach-different-experimenter* event) to read with her. Evidence that infants in the two-group condition looked significantly longer at the approach-different-experimenter than at the approach-similar-experimenter event, whereas infants in the no-group condition looked equally at the events, would indicate that although the target experimenter and the similar experimenter always wore the same outfits, infants refrained from interpreting this similarity as a group marker when shown that one of the outfits served an instrumental function.

Method

Design. Each trial had an initial phase and a final phase. During the initial phase, which was computer controlled, infants saw the scripted events appropriate for the trial, ending with a paused scene. During the final phase, which was infant controlled, infants watched this paused scene until the trial ended. Across trials, infants saw two outfits: a pink outfit (pink shirt, purple forehead band with a flower at the front) and a blue outfit (blue shirt, green fuzzy tiara, red scarf with multicolored dots). The target experimenter and the similar experimenter wore one outfit (whether this was the pink or the blue outfit was counterbalanced), and the different experimenter wore the other outfit. Whichever outfit the target experimenter and the similar experimenter wore also had a large black-and-white pocket on the shirt front.

In the (18-s) initial phase of the familiarization trial in the two-group condition, the target experimenter sat alone with a colorful open box on her left. Scattered on the apparatus floor were six colorful thin foam toys. The target experimenter grasped the back of the box with her left hand and then picked up each toy, one at a time, and placed it silently in the box. She then looked down at the apparatus floor and paused until the trial ended. The trial in the no-group condition was identical except that the target experimenter opened the top of her pocket with her left hand and silently placed each toy in it (because the toys were thin and the pocket extended below the apparatus floor, the target experimenter's appearance was not changed by the addition of the toys to her pocket).

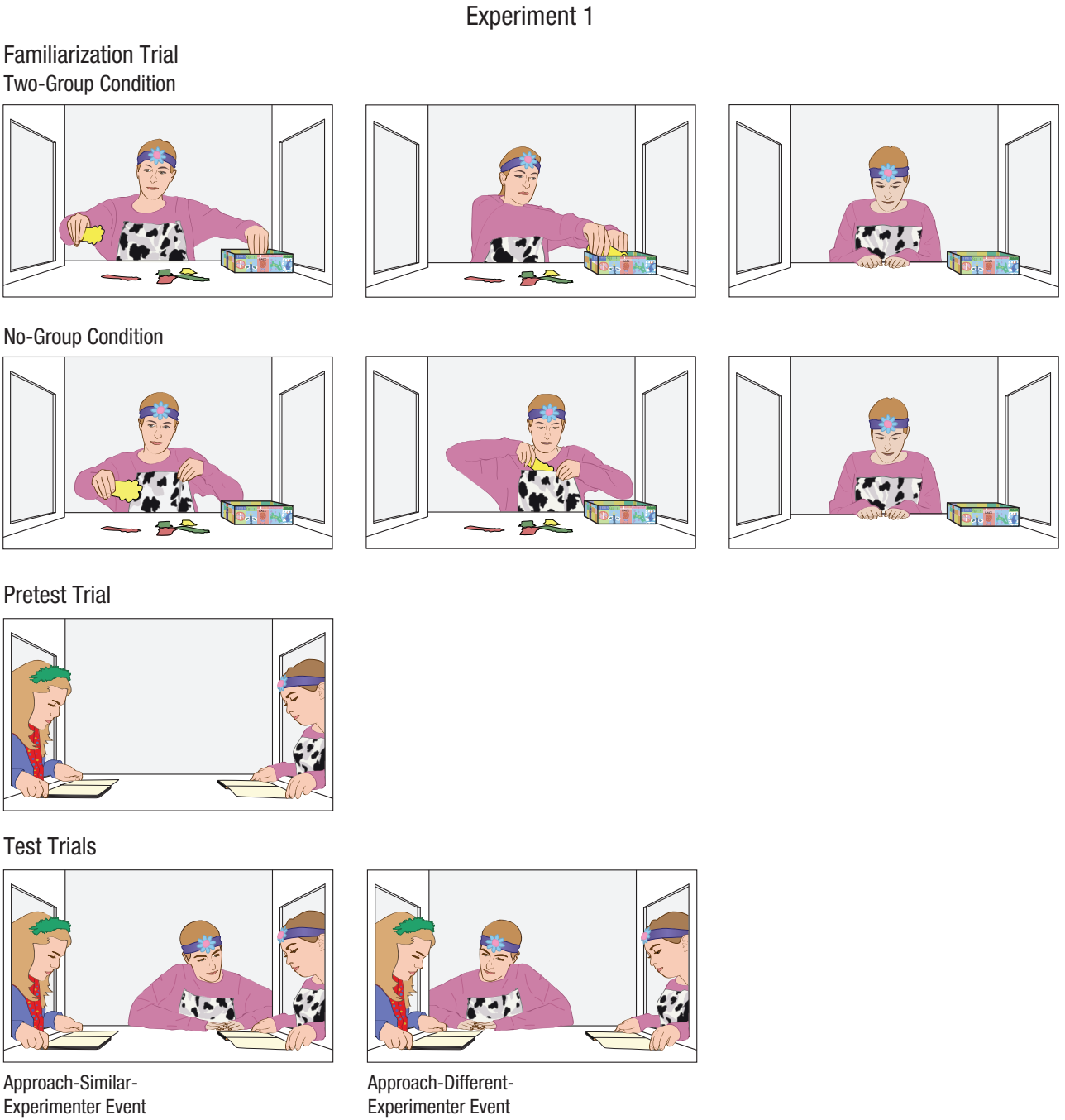

Fig. 1. Paradigm in Experiment 1. Infants first received a familiarization trial in which the target experimenter put toys away either in a box (two-group condition) or in a large pocket on her shirt front (no-group condition). All infants then received one pretest trial and two test trials, which were the same in both conditions. In the pretest trial, the similar experimenter and the different experimenter sat at side windows and read identical picture books. In the test trials, the target experimenter approached either the similar experimenter (*approach-similar-experimenter* event) or the different experimenter (*approach-different-experimenter* event) to read with her.

In the (18-s) initial phase of the pretest trial, the target experimenter was absent, and the similar experimenter and the different experimenter sat at their side windows (which window each experimenter occupied was counterbalanced) and looked at an identical picture book. They opened their books, flipped through the first three pages, each at her own rate, and then paused until the trial ended.

In the (7-s) initial phase of each test trial, all three experimenters sat at their windows; the target experimenter had no book, and the similar experimenter and the different experimenter each had their book open to

the first page. The target experimenter looked back and forth at them twice (side of first look was counterbalanced), and then she approached either the similar experimenter (approach-similar-experimenter event) or the different experimenter (approach-different-experimenter event) to read with her. The similar experimenter and the different experimenter looked at the target experimenter as she moved, and then all three experimenters paused, looking down at the books, until the trial ended. The order of the two test events was counterbalanced within each condition.

Power analysis. In a previous violation-of-expectation report on early morality (Sloane et al., 2012), infants were shown a fair and an unfair event using a within-subjects design. Infants in the experimental condition (n = 16 per condition) looked significantly longer at the unfair than at the fair event, whereas those in the inanimate-control condition looked equally at the events. The data yielded a significant Condition × Event interaction with an effect size (η_p^2) of .142. An analysis in G*Power (Version 3.1; Faul et al., 2007) based on this value, with α set at .05 and power set at .80, suggested that the minimum number of participants needed per condition in our experiments—which focused on in-group support rather than fairness but used a similar design—was 11. Nevertheless, we tested 16 participants per condition, in line with this and other previous reports on early morality (Choi & Luo, 2015; Margoni et al., 2018). We ceased data collection for a given condition when we reached our target of N = 16.

Participants. Participants were 32 full-term 12-month-olds (15 male; age: M = 12 months, 3 days; range = 11 months, 10 days to 12 months, 24 days). No additional infants were tested, and none were excluded. Sixteen infants were randomly assigned to each condition.

Apparatus. The apparatus consisted of a brightly lit white display booth (204 cm high × 100 cm wide × 74 cm deep) with a large opening (57 cm × 93 cm) in its front wall; between trials, a supervisor lowered a curtain to hide this opening. The target experimenter sat at a window (72 cm × 96 cm) in the back wall, and the similar experimenter and the different experimenter sat at windows (57 cm × 48 cm) in the side walls; each side window had a white curtain that could be drawn aside. Behind the experimenters, floor-to-ceiling white curtains hid the testing room from view. Stimuli included a colorful open box, six colorful thin foam toys, and two identical picture books.

During a testing session, the experimenters never made eye contact with the infant: As the events unfolded, they looked at each other or at the objects they acted on. Two cameras captured images of the infant and events; the two images were combined, projected onto a monitor located behind the apparatus, and checked by the supervisor to confirm that the trials followed the prescribed scripts. Recorded sessions were also checked off-line for experimenter and observer accuracy.

Procedure. Each infant sat on a parent's lap, and parents were instructed to remain silent and to close their eyes during the test trials. Two observers hidden on either side of the apparatus monitored each infant's looking behavior; the observers were blind to the infant's condition and test order. Looking times during the initial and final phases of each trial were computed separately using the primary observer's responses. Infants were highly attentive during the initial phases of the trials and looked, on average, for 96% of each initial phase. The final phase of each trial ended when infants (a) looked away for 2 consecutive seconds after having looked for at least 6 cumulative seconds or (b) looked for a maximum of 60 cumulative seconds. The 6-s minimum value allowed infants to continue processing what they had seen before the trial could end.[1] Interobserver agreement in the final phase of each test trial was calculated by determining the proportion of 100-ms intervals in which the two observers agreed. Agreement was calculated for all 32 infants and averaged 95% per trial.[2]

Results

Looking times during the final phases of the test trials (Fig. 2) were analyzed using an analysis of variance (ANOVA) with condition (two-group, no-group) as a between-subjects factor and event (approach-similar-experimenter, approach-different-experimenter) as a within-subjects factor. The analysis yielded a marginally significant main effect of event, $F(1, 30) = 3.571$, $p = .068$, $\eta_p^2 = .106$, 90% confidence interval (CI) = [.000, .285], and a significant Condition × Event interaction, $F(1, 30) = 7.793$, $p = .009$, $\eta_p^2 = .206$, 90% CI = [.032, .389]. Planned pairwise comparisons revealed that infants in the two-group condition looked significantly longer at the approach-different-experimenter event (M = 29.58 s, SE = 4.20) than at the approach-similar-experimenter event (M = 19.88 s, SE = 2.98), $F(1, 30) = 10.957$, $p = .002$, $\eta_p^2 = .268$, 90% CI = [.065, .446], whereas infants in the no-group condition looked equally at the approach-different-experimenter event (M = 19.31 s, SE = 3.78) and approach-similar-experimenter event (M = 21.18 s, SE = 2.78), $F(1, 30) = 0.407$, $p = .528$, $\eta_p^2 = .013$, 90% CI = [.000, .138]. Nonparametric Wilcoxon signed-rank tests confirmed the results of the two-group ($Z = 2.637$, $p = .008$) and no-group ($Z = 0.724$, $p = .469$) conditions.

Discussion

Infants in the two-group condition adopted a ritual stance toward the experimenters' outfits, interpreted

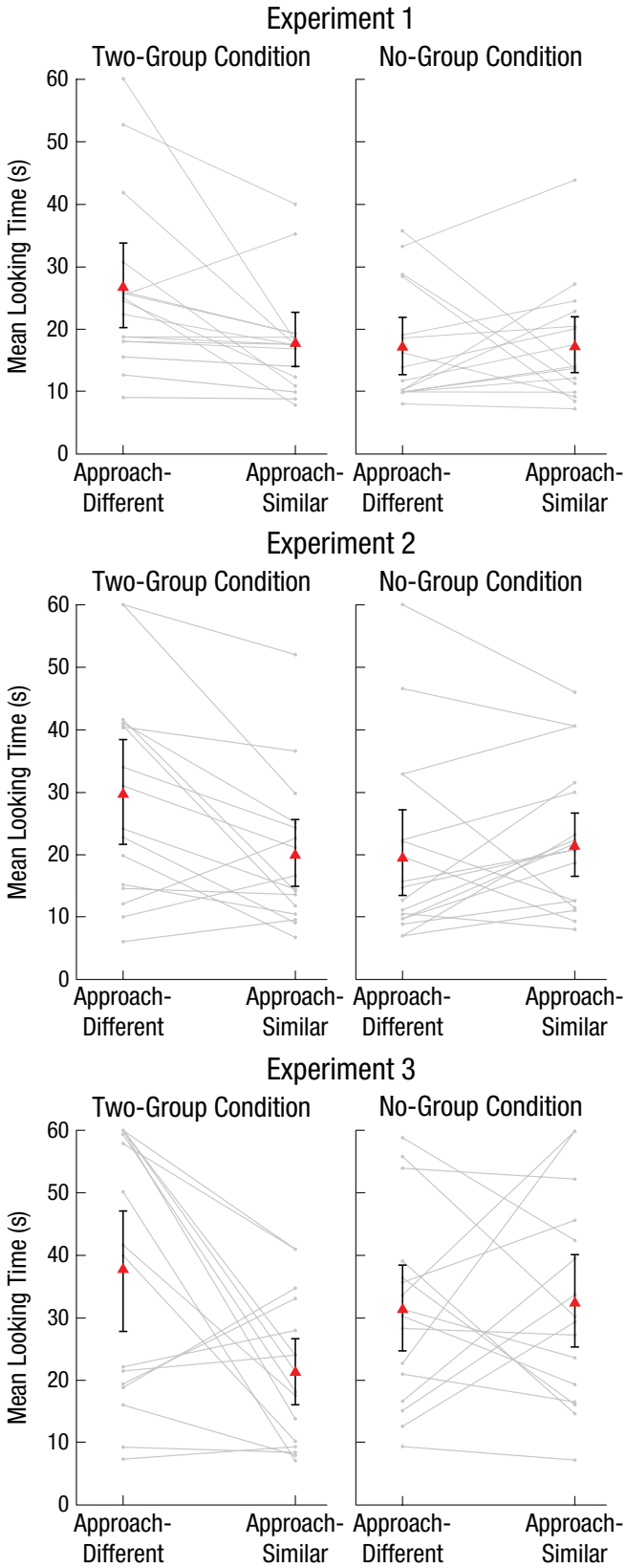

Fig. 2. Looking times at the approach-similar-experimenter and approach-different-experimenter events, separately for the two-group and no-group conditions in Experiments 1 ($N = 32$), 2 ($N = 32$), and 3 ($N = 32$). Red triangles indicate condition means. Gray dots indicate individual infants' means, and gray lines connect individual infants' means for each event. Error bars represent 95% confidence intervals.

them as group markers, and brought to bear an expectation of in-group support to predict whom the target experimenter would prefer. Conversely, infants in the no-group condition adopted an instrumental stance toward the experimenters' outfits, dismissed them as group markers, and had no alternative basis for predicting whom the target experimenter would prefer.

Experiment 2

Experiment 2 used a different instrumental-stance manipulation, in which both outfits were visible from the start. In two familiarization trials, the similar experimenter and the different experimenter had identical picture books (the target experimenter was absent), and either the similar experimenter (*similar-experimenter* event) or the different experimenter (*different-experimenter* event) also had a cup. In the two-group condition, whoever had a cup drank from it before putting it away and reading her book. In the no-group condition, the different experimenter again drank from her cup, but the similar experimenter used a sponge attached to her outfit to clean messy lines on her cup before putting it away and reading her book. If infants adopted an instrumental stance when the similar experimenter used her outfit to clean her cup, we predicted that results would replicate those of Experiment 1.

Method

Design. Infants in each condition received two familiarization and two test trials (Fig. 3). In the two-group condition, the order of the similar-experimenter and different-experimenter familiarization events was counterbalanced. At the start of the (30-s) initial phase in the similar-experimenter event, the similar experimenter and the different experimenter sat facing their closed books. While the different experimenter looked at her book, the similar experimenter picked up a red cup from the apparatus floor, silently drank from it twice, put it out of the apparatus (on a stool), and returned to her book. The trial then proceeded as in the pretest trial of Experiment 1: Each experimenter flipped through three pages and then paused until the trial ended. The different-experimenter event was identical except that the different experimenter drank from a green cup. The test trials were identical to those in Experiment 1.

The no-group condition was identical, with four exceptions. First, two small light-blue sponges were attached to the forehead band of the pink outfit (on either side of the flower), and two small orange sponges were attached to the red scarf of the blue outfit. Second, each cup had a white band covering its midsection. Third, in the similar-experimenter event, which was always shown first, messy dark lines could be seen on the band of the similar experimenter's cup; she frowned at the lines, used

one of her sponges to silently remove them, smiled at her clean cup, put it away, and readjusted her outfit (i.e., replaced her forehead band or smoothed down her scarf) as she returned to her book. Finally, the test trials were identical to those in the two-group condition except for the sponges on the experimenters' outfits.

Participants. Participants were 32 full-term 12-month-olds (15 male; age: M = 12 months, 8 days; range = 11 months, 11 days to 12 months, 23 days), none of whom had participated in Experiment 1. Sixteen infants were randomly assigned to each condition. Another five infants were excluded because they were distracted (e.g., by a pacifier; n = 3), looked the maximum allowed in both test trials (n = 1), and (in the no-group condition) had a difference between two test trials that was over 3 standard deviations from the condition mean (n = 1).

Apparatus and procedure. The apparatus and procedure were similar to those in Experiment 1 except for the changes noted above. Stimuli included the two picture books from Experiment 1 and two tall cups, one red and one green; both cups were empty, and the experimenters pretended to drink from them. Infants were highly attentive in the initial phases of the familiarization and test trials and looked, on average, for 95% of each initial phase. Interobserver agreement in the final phase of each test trial was calculated for all 32 infants and averaged 93% per trial.

Results

Looking times during the final phases of the test trials (Fig. 2) were analyzed as in Experiment 1. The analysis yielded a significant main effect of event, $F(1, 30) = 4.858$, $p = .035$, $\eta_p^2 = .139$, 90% CI = [.005, .322], and a significant Condition × Event interaction, $F(1, 30) = 5.184$, $p = .030$, $\eta_p^2 = .147$, 90% CI = [.008, .330]. Infants in the two-group condition looked significantly longer at the approach-different-experimenter event (M = 25.69 s, SE = 3.62) than at the approach-similar-experimenter event (M = 16.45 s, SE = 1.83), $F(1, 30) = 10.040$, $p = .004$,

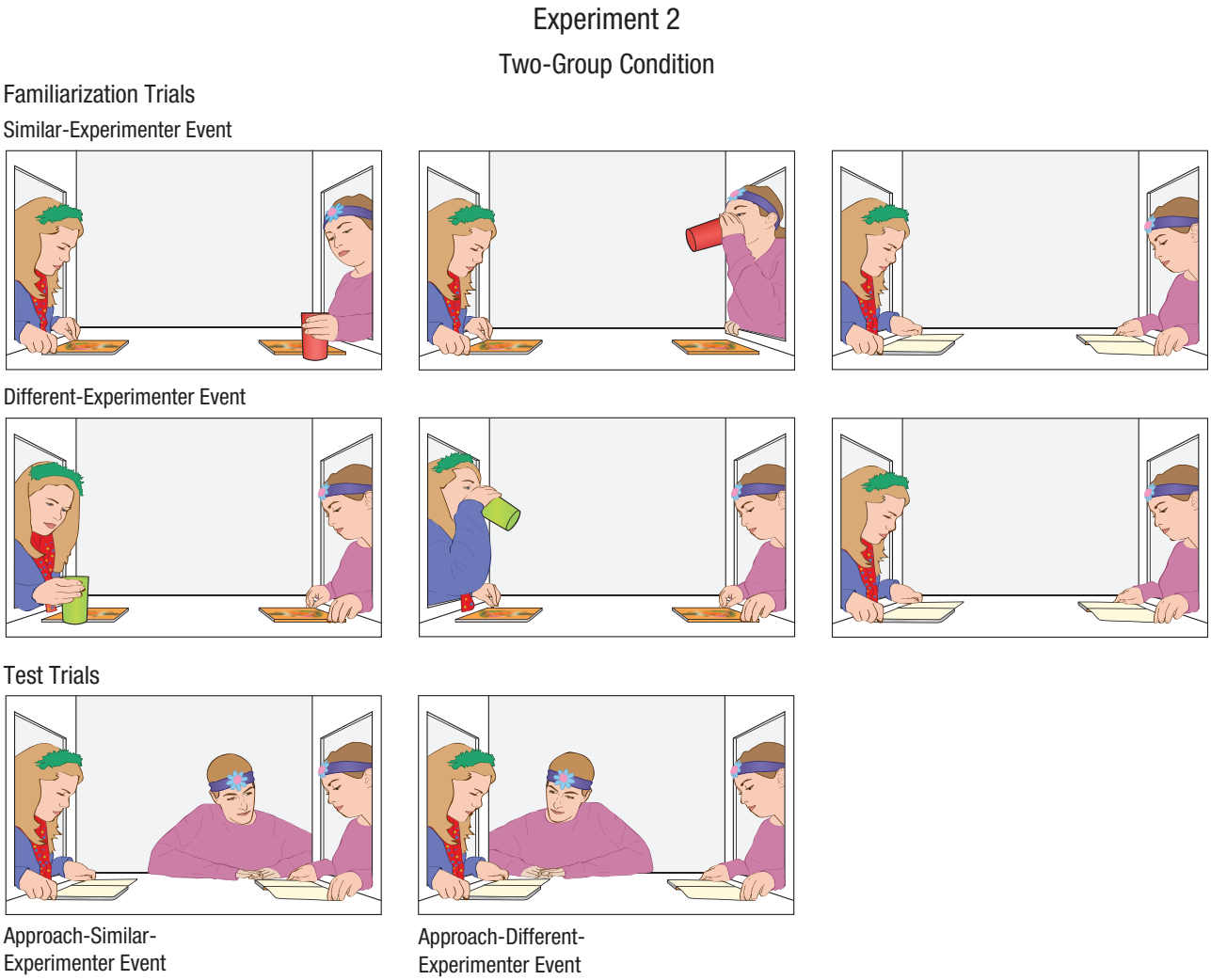

Fig. 3. *(continued on next page)*

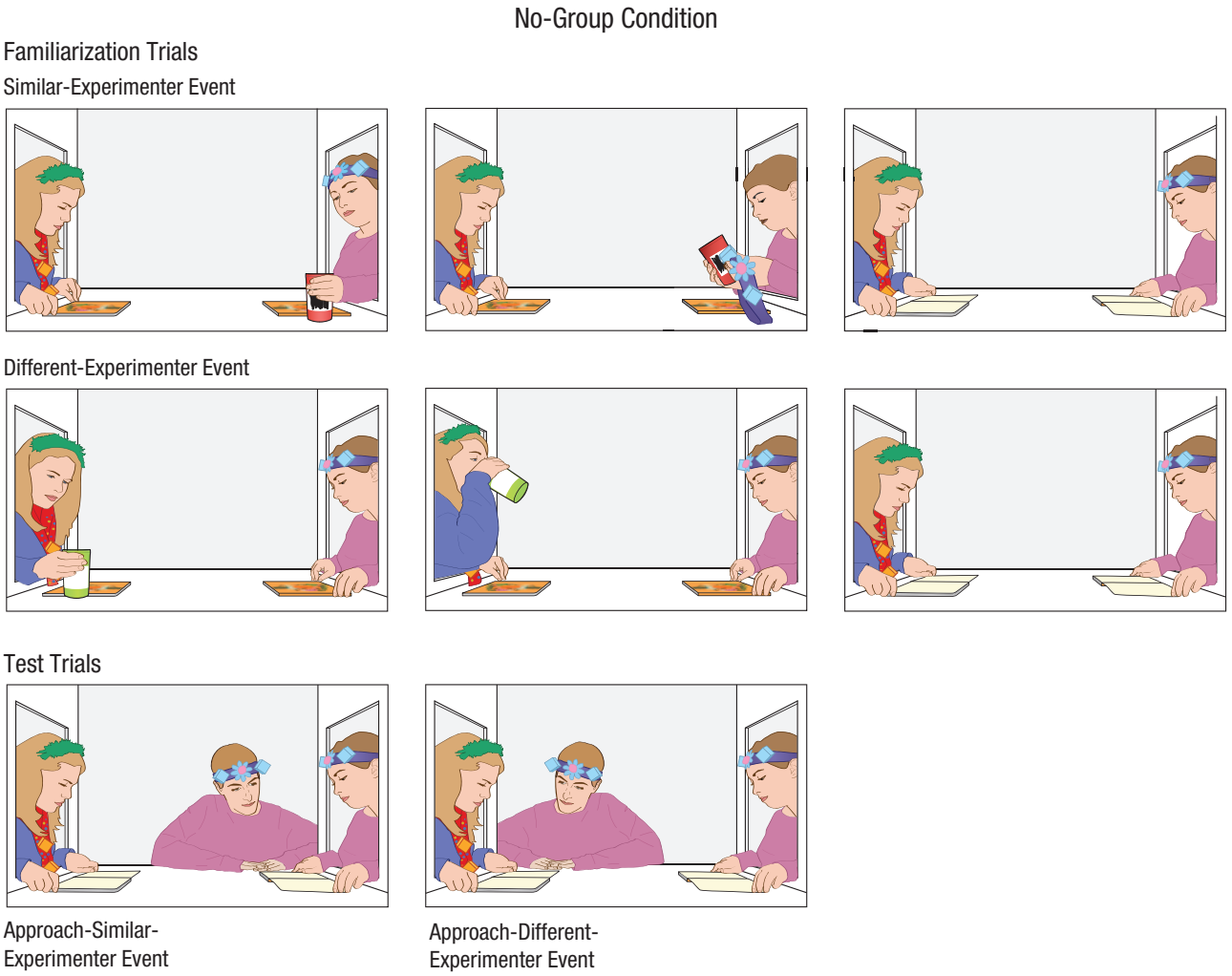

Fig. 3. Paradigm in Experiment 2. Infants received two familiarization trials in which either the similar experimenter (*similar-experimenter* event) or the different experimenter (*different-experimenter* event) had a cup (the target experimenter was absent). The similar experimenter either drank from the cup (two-group condition) or used a sponge attached to her outfit to clean messy lines on the cup (no-group condition). The test trials were identical to those in Experiment 1, except for the sponges attached to the experimenters' outfits in the no-group condition.

η_p^2 = .251, 90% CI = [.055, .431], whereas those in the no-group condition looked equally at the approach-different-experimenter event (M = 17.08 s, SE = 2.33) and the approach-similar-experimenter event (M = 17.23 s, SE = 2.33), $F(1, 30) = 0.003$, $p = .959$, $\eta_p^2 < .001$, 90% CI = [.000, .000]. Wilcoxon signed-rank tests confirmed the results of the two-group ($Z = 3.154$, $p = .002$) and no-group ($Z = 0.517$, $p = .605$) conditions.

Discussion

As in Experiment 1, infants expected the target experimenter to prefer the similar experimenter when the context allowed a ritual construal of the experimenters' outfits, but they held no such expectation when the context supported an instrumental construal instead.

Experiment 3

To provide converging evidence for our conclusion that early sensitivity to similarity as a group marker is modulated by contextual information, Experiment 3 tested 26-month-old toddlers using novel labels ("lutak," "scobbie") instead of novel outfits. In two familiarization trials, the target experimenter and the similar experimenter uttered one label, and the different experimenter uttered the other label (which label the target experimenter and the similar experimenter spoke was counterbalanced); labels were inserted in "I'm an X!" (two-group condition) or "I saw an X!" (no-group condition) phrases (Jin & Baillargeon, 2017). In the test trials, the target experimenter asked the similar experimenter or the different experimenter whether she could

read with her. If toddlers construed the experimenters' labels as group markers in the two-group but not the no-group condition, we predicted that results would be the same as before.

Method

Design. Toddlers in each condition received two identical familiarization trials (to help them remember what each experimenter said), one pretest trial, and two test trials (Fig. 4). The familiarization and pretest trials in this experiment were computer controlled, in contrast to Experiments 1 and 2; we were concerned that seeing multiple paused scenes in which the experimenters did not interact might affect toddlers' test responses.

Only the familiarization trials differed between conditions. In each (20-s) trial, the three experimenters spoke in turn, in two rounds from right to left, using the phrases appropriate for each condition (e.g., in the two-group condition, the similar experimenter might say "I'm a lutak!" the target experimenter might say "I'm a lutak, too!" and the different experimenter might say "I'm a scobbie!"; in the no-group condition, the similar experimenter might say "I saw a lutak!" the target experimenter might say "I saw a lutak, too!" and the different experimenter might say "I saw a scobbie!"). The experimenters looked at each other naturally as they spoke.

The (25-s) pretest trial was similar to that in Experiment 1: The target experimenter was absent, and the similar experimenter and the different experimenter read identical picture books until the trial ended. Finally, as in Experiments 1 and 2, the test trials had an initial phase and a final phase. In the 13-s initial phase of the trial, the target experimenter looked at the similar experimenter and the different experimenter (counterbalanced) and their closed books twice, and then she asked either the similar experimenter (approach-similar-experimenter event) or the different experimenter (approach-different-experimenter event) whether she could read with her ("Can I read with you?" stated three times). The similar experimenter and the different experimenter looked at her as she spoke, and then all three experimenters looked down and paused until the trial ended.

Participants. Participants were thirty-two 26-month-olds (16 male; age: M = 26 months, 10 days; range = 25 months, 0 days to 27 months, 8 days), none of whom had participated in Experiment 1 or 2. Sixteen toddlers were randomly assigned to each condition. Another three toddlers were excluded because they were fussy (n = 1), were distracted (n = 1), or spoke and caused the parent and experimenters to laugh (n = 1).

Apparatus and procedure. The apparatus and procedure were similar to those in Experiment 1 except for the changes noted above. In addition, the experimenters wore different plain shirts (green, blue, and red) that provided no group markers, and the primary observer left the room during the familiarization trials to remain naive about the experimenters' utterances. Toddlers were highly attentive during the (computer-controlled) familiarization and pretest trials and during the initial phases of the test trials; they looked, on average, for 98% of each trial. Interobserver agreement in the final phase of each test trial was calculated for 28 of the 32 toddlers and averaged 93% per trial.

Results

Looking times during the final phases of the test trials (Fig. 2) were analyzed as in Experiment 1. The analysis yielded a significant main effect of event, $F(1, 30) = 4.676$, $p = .039$, $\eta_p^2 = .135$, 90% CI = [.004, .317], and a significant Condition × Event interaction, $F(1, 30) = 6.043$, $p = .020$, $\eta_p^2 = .168$, 90% CI = [.015, .351]. Toddlers in the two-group condition looked significantly longer at the approach-different-experimenter event (M = 37.68 s, SE = 5.18) than at the approach-similar-experimenter event (M = 21.18 s, SE = 2.91), $F(1, 30) = 10.675$, $p = .003$, $\eta_p^2 = .262$, 90% CI = [.062, .441], whereas those in the no-group condition looked equally at the approach-different-experimenter event (M = 31.35 s, SE = 3.81) and the approach-similar-experimenter event (M = 32.41 s, SE = 4.08), $F(1, 30) = 0.044$, $p = .836$, $\eta_p^2 = .001$, 90% CI = [.000, .070]. Wilcoxon signed-rank tests confirmed the results of the two-group ($Z = 2.379$, $p = .017$) and no-group ($Z = 0.000$, $p = 1.000$) conditions.

Discussion

As predicted, toddlers expected the target experimenter to prefer the similar experimenter when they construed the experimenters' labels as group markers, but not otherwise.

Overall Analyses

To assess the robustness of our findings, we conducted two additional sets of analyses. In the first set, we combined the test data of Experiments 1 through 3 and performed two random-effects meta-analyses, one for each condition (Cumming, 2014). Children in the two-group condition (n = 48) looked significantly longer at the approach-different-experimenter event than at the approach-similar-experimenter event, mean Cohen's $d+$ = 0.79, 95% CI = [0.38, 1.21], $Z = 3.73$, $p < .001$, whereas children in the no-group condition (n = 48) looked equally at the events, mean Cohen's $d+ = -0.08$, 95% CI = [−0.48, 0.32], $Z = 0.38$, $p = .708$. Fixed-effects meta-analyses yielded identical results. Finally, heterogeneity

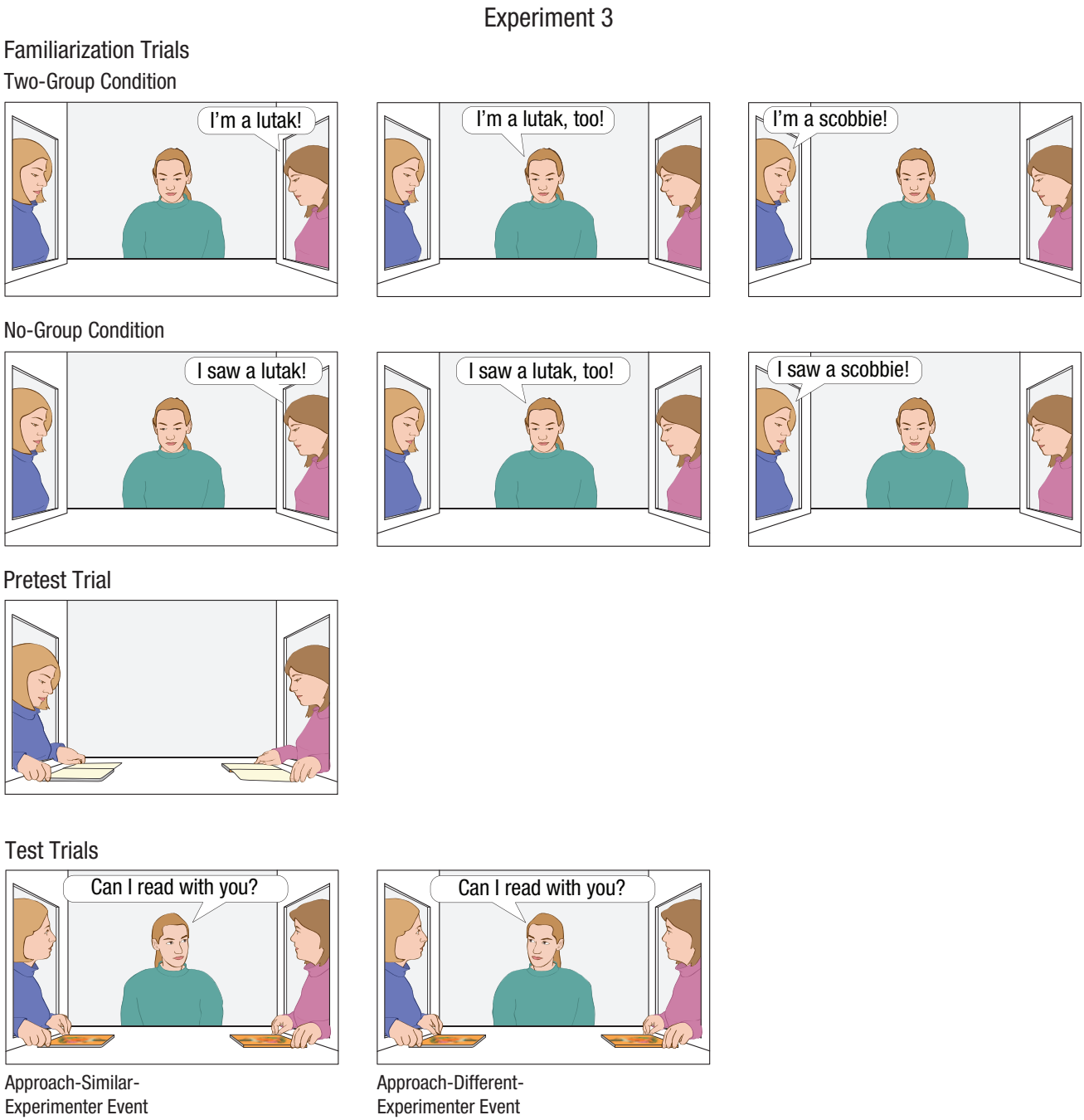

Fig. 4. Paradigm in Experiment 3. Toddlers received two familiarization trials in which the experimenters used novel labels to convey either categorical (two-group condition) or incidental (no-group condition) information about themselves. The pretest and test trials were similar to those in Experiment 1.

Q tests yielded nonsignificant results, *p*s ≥ .954, suggesting that in each condition, Experiments 1 through 3 estimated the same effect size.

The second set of analyses focused on the alternative possibility (mentioned in the introduction) that children might initially expect similar individuals to belong to the same group and support each other irrespective of the context in which they observed these similar individuals. This possibility predicted that across Experiments 1 through 3, children in the no-group condition would look differentially (experimental hypothesis) as opposed to equally (null hypothesis) at the two test events. To

assess whether the negative result obtained in that condition merely failed to reject the null hypothesis or actually provided evidence for it, we conducted a Bayes factor (BF) analysis using the Jeffreys-Zellner-Siow (JZS) prior (Rouder et al., 2009). According to conventional cutoffs, a BF above 3 indicates at least moderate support for a hypothesis (Jarosz & Wiley, 2014). We obtained a scaled JZS BF of 5.66 in favor of the null hypothesis, indicating that the data of the no-group condition were over 5 times more likely to occur under the null hypothesis than the experimental hypothesis. (For the two-group condition, we obtained a scaled JZS BF of 4,357.91 in favor of the experimental hypothesis.) Whether similar individuals are expected to belong to the same group and support each other is thus modulated by contextual information beginning early in life.

General Discussion

Infants and toddlers expected the target experimenter to prefer the similar experimenter over the different experimenter when the context allowed them to interpret the similarity between the target experimenter and the similar experimenter as a signal that the two belonged to the same group. However, they held no expectation about whom the target experimenter would prefer when the context undermined such an interpretation. Thus, in Experiments 1 and 2, infants dismissed the similar outfits worn by the target experimenter and the similar experimenter as a group marker when these outfits were used to fulfill an instrumental purpose (e.g., store or clean objects). Likewise, in Experiment 3, toddlers dismissed the similar labels spoken by the target experimenter and the similar experimenter as a group marker when these labels appeared to convey merely incidental information about the two experimenters (e.g., "I saw a lutak!" "I saw a lutak, too!"). Together, these results provide converging evidence across two ages (12 and 26 months), two types of similarities (outfits and labels), and two types of manipulations (instrumental and incidental) that young children refrain from interpreting a salient similarity as a signal of group membership when contextual information suggests that this similarity carries little social significance.

Our results provide further evidence that an expectation of in-group support emerges in infancy and that minimal similarities are sufficient to trigger this expectation. Our results also break new ground by suggesting that the basic structure of human moral cognition includes not only an abstract principle of in-group support but also an abstract concept of group. Beginning early in life, children do not use any or all salient similarities among individuals to form expectations about their interactions; only similarities that are interpreted as signaling group membership are used for this purpose, and subtle computations encompassing a wide range of factors contribute to these determinations.

Future research can build on our findings in several directions. First, evidence that our results extend beyond Western cultures and middle-class samples will bolster the conclusions offered here. Second, much needs to be done to uncover the different factors that can contribute to children's interpretation of similarities among individuals and the ways in which sensitivity to these factors develops over time. For example, are there similarities that children are likely (or unlikely) to view as group markers irrespective of context? Moreover, at what age do children begin to understand that similarities are sometimes simulated rather than real and represent affiliative bids or shows of in-group loyalty (e.g., white lies)? These research efforts should help shed light on the nature of the relation between similarity and group membership in early moral cognition.

Transparency

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L. Bian and R. Baillargeon designed the research, L. Bian performed the research and analyzed the data, and both of the authors wrote the manuscript and approved the final version for submission.
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Open Practices
The data from Experiments 1 through 3 have been made publicly available via OSF and can be accessed at https://osf.io/k5fb2/. The design and analysis plans for the experiments were not preregistered. This article has received the badge for Open Data. More information about the Open Practices badges can be found at http://www.psychologicalscience.org/publications/badges.

Supplemental Material

Additional supporting information can be found at http://journals.sagepub.com/doi/suppl/10.1177/09567976211055185

Notes

1. Across all test trials in Experiments 1 through 3, children took 6.71 s ($SE = 0.16$), on average, to complete the 6-s minimum look.
2. Analyses of looking times during the final phases of the familiarization and pretest trials in Experiments 1 and 2 revealed no

significant effect of condition (see the Supplemental Material). Preliminary analyses of looking times during the final phases of the test trials in Experiments 1 through 3 revealed no significant interaction of condition and event with child's sex, the target experimenter's outfit or label, side of the similar experimenter's window, side of the target experimenter's first look in the test trials, and test order; the data were therefore collapsed across these latter five factors.

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