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Children Use Nonverbal Cues to Make Inferences About Social Power

Elizabeth Brey and Kristin Shutts
University of Wisconsin–Madison

Four studies (*N* = 192) tested whether young children use nonverbal information to make inferences about differences in social power. Five- and six-year-old children were able to determine which of two adults was "in charge" in dynamic videotaped conversations (Study 1) and in static photographs (Study 4) using only nonverbal cues. Younger children (3–4 years) were not successful in Study 1 or Study 4. Removing irrelevant linguistic information from conversations did not improve the performance of 3- to 4-year-old children (Study 3), but including relevant linguistic cues did (Study 2). Thus, at least by 5 years of age, children show sensitivity to some of the same nonverbal cues adults use to determine other people's social roles.

Children observe and participate in many different kinds of social relationships, including ones characterized by mutual liking (e.g., best friends), antagonism (e.g., enemies), and hierarchy (e.g., a sports captain and another player). Deciphering the nature of a given relationship and the role that each person occupies in that relationship can be useful. For example, such information can support predictions about how third parties will interact in the future (e.g., that children who dislike one another may fight at recess, or that someone with less social power is likely to follow the directions of someone with more). In some cases, children may be able to learn about the nature and details of how individuals relate to one another by listening to other people's descriptions: A peer might say, "My friend Ted and I really like each other" or a parent might say, "My boss Mary told me I had to work this weekend." Yet it would be difficult, if not impossible, for children to hear descriptions applied to all of the relationships and interactions they encounter. What information could children use to determine how people relate to one another when there are no labels, descriptions, or stated social roles to guide their judgments?

A large body of research shows that people's body positions and gestures toward one another can differ depending on their roles and the nature of their relationship; further, adults are sensitive to this "nonverbal" information (Feldman, Philippot, & Custrini, 1991; Hall & Bernieri, 2001; Knapp, Hall, & Horgan, 2012). In the present research, we asked whether children are similarly attuned to nonverbal cues in social interactions. We focused specifically on dyadic interactions featuring cues associated with differences in social power, and tested whether 3- to 6-year-old children could use these cues to judge which person was more powerful.

Power differences—or cases where one person or group exerts more control over another person or group—are ubiquitous in human societies (Brown, 1991; Fiske, 2010; Lenski, 1966; Magee & Galinsky, 2008; Tilly, 1998). Sometimes power hierarchies are well established and maintained with one person consistently above another, but hierarchies can also emerge rapidly (e.g., when groups first form) or change across contexts (Magee & Galinsky, 2008). Knowing who has power allows one to make predictions about other people's actions and access to resources, and can guide appropriate behavior in social interactions (Eibl-Eibesfeldt, 1989; Mast & Hall, 2004). For these reasons, many researchers have argued that it is important for people to detect

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Correspondence concerning this article should be addressed to Elizabeth Brey, Department of Psychology, University of Wisconsin–Madison, Madison, WI 53706. Electronic mail may be sent to elbrey@wisc.edu.

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power differences and learn rapidly about individuals' relative positions (Martens, Tracy, & Shariff, 2012; Mast & Hall, 2004). Furthermore, the adaptive advantages associated with tracking such information may have supported the evolution of mechanisms for recognizing social hierarchies (e.g., Thomsen, Frankenhuis, Ingold-Smith, & Carey, 2011).

One source of information that can help perceivers decipher other people's relative power is the manner in which people position and maneuver parts of their bodies. Such information is often termed *nonverbal behavior* and can be defined as "behavior that is not part of formal, verbal language . . . facial expressions, body movements, and eye, hand, and feet behaviors that have some significance in social interaction" (Ellyson & Dovidio, 1985, p. 1). Powerful individuals typically adopt expansive posture, speak loudly, lower their eyebrows, and gaze directly at their social partners when speaking. In contrast, less powerful individuals typically have hunched posture, speak quietly, raise their eyebrows, and vary their gaze (for reviews, see Ellyson & Dovidio, 1985; Hall, Coats, & LeBeau, 2005). Not only are differences in nonverbal behavior apparent in interactions between high- and low-power people, but adults also use such behaviors to make accurate inferences about social hierarchies (e.g., Mast & Hall, 2004; Rule, Adams, Ambady, & Freeman, 2012; Shariff, Tracy, & Markusoff, 2012).

Laboratory studies of children's sensitivity to social power have often relied on verbal labels (e.g., *teacher*, *owner*), stories, or descriptions to convey people's relative positions (e.g., Bandura, Ross, & Ross, 1963; Kim, 1998; Laupa, 1991, 1994; Laupa & Turiel, 1993). For example, in one study (Laupa, 1994), 4- to 6-year-old children listened to vignettes in which a protagonist was labeled as having either a legitimate high-power role (e.g., a "teacher") or no role (e.g., "a lady from across the street") in a school setting. When asked whether it was acceptable for the protagonist to command others at the school, participants indicated it was only acceptable if the protagonist held a position of authority. In another study, 2.5- to 5.5-year-old children used information about power to guide their own actions: They imitated an adult who was introduced as the owner of resources and who had the authority to reward or punish other people, rather than an adult who asked permission to use resources (Bandura et al., 1963). Taken together, these studies show that from a young age, children understand the consequences of having a more or less powerful social position.

A handful of studies provide evidence that children are also sensitive to hierarchical relationships when individuals' roles are not labeled or described. In one study, 10- to 13-month-old infants expected a small cartoon agent to be physically submissive to a larger agent. In another study, 12- and 15-month-old children expected a cartoon character that had dominated another character in one situation (e.g., by controlling a resource) to dominate that same character in the future (Mascaro & Csibra, 2012). Additionally, when presented with static pictures of people who had different eyebrow positions (high vs. low) or facial expressions (not smiling vs. smiling), 4- to 7-year-old children inferred that people with lowered brows or less positive expressions would be socially dominant over those with raised brows or more positive expressions (Keating & Bai, 1986). Lastly, outside the domain of reasoning about social hierarchies, young children use nonverbal information to make inferences about social partnerships: Children as young as 18 months of age think that people who face toward (rather than away from) one another will be more likely to engage in affiliative behaviors (Fawcett & Gredebäck, 2013; see also Abramovitch & Daly, 1978), and children as young as 5 years of age use mutual gaze to infer friendship (Nurmsoo, Einav, & Hood, 2012; Post & Hetherington, 1974).

Although there is a small body of research on children's sensitivity to nonverbal information about social hierarchies, there are important open questions. First, it is not clear whether young children are sensitive to power cues displayed by humans in dynamic, natural social interactions (of the sort children may see in the real world). Second, it is not known whether young children are sensitive to the broad range of cues that are: (a) apparent in interactions between people who differ in power and (b) used by adults to make inferences about power. Accordingly, in Study 1, 3- to 6-year-old children watched videos of short social interactions between two adults. During each interaction, one person displayed multiple nonverbal cues associated with a high position of power, while the other person displayed multiple nonverbal cues associated with a low position of power. The adults conversed with one another, but their conversations provided no information about who had more or less power. Studies 2 and 3 tested the effects of adding relevant linguistic information and subtracting irrelevant linguistic information on 3- to 4-year-old children's performance. Finally, Study 4 tested 3- to 6-year-old children's sensitivity to individual power cues.

Study 1

Method

Participants

The participants were ninety-six 3- to 6-year-old children (24 at each age, 48 males, 89% White). All children were tested in the Midwestern region of the United States, and most came from middle- or upper-middle-class families. Additional children were excluded due to experimenter error (N = 1) or failing to complete the session (N = 4).

Materials

Participants viewed 20-s "interaction videos." Each featured a conversation between two (White) amateur actors. One actor exhibited cues associated with high power: expansive posture, head tilted back, direct gaze toward the other actor, lowered eyebrows, and a loud voice. The other actor exhibited cues associated with low power: hunched posture, head tilted down, varied gaze (averted when speaking, but direct when being spoken to), raised eyebrows, and a quiet voice. The actors sat facing one another and conversed about objects (e.g., Actor A: "Here is the new tool"; Actor B: "You can use it to lift things up"; Actor A: "You can store it on a shelf"). Both actors spoke for the same amount of time and their words contained no power information.

There were four pairs of male actors and four pairs of female actors. Actors within a pair were matched for size, attractiveness, and hairstyle. Each actor was filmed in both the high- and the low-power role, so there were 2 video clips for each pair (16 clips total). Every actor also recorded a 5-s "introduction video" that contained no power information: The actor faced the camera and provided a made-up name (e.g., "Hi, my name is Satri").

A group of 64 adults (32 males, all undergraduate students in the United States) rated the power of the actors in the interaction videos (1 = *not at all powerful*, 10 = *very powerful*). High-power actors received a mean rating of 7.300 (male actors: 7.219; female actors: 7.375); low-power actors received a mean rating of 2.770 (male actors: 2.750; female actors: 2.789). A paired-sample t test revealed that ratings for high-power actors exceeded ratings for low-power actors, $t(63) = 34.418$, $p < .001$, $d = 4.300$.

Procedure

Participants sat facing a computer monitor, next to an experimenter. They saw four trials, each with a different actor pair. At the start of each trial, participants watched the two actors' introduction videos. Static images of the actors remained onscreen following the introductions (at the bottom of the monitor; Figure 1A). Participants then learned that their task was to watch these people have a meeting and try to figure out who was "in charge." The experimenter defined "in charge" as: "The person who makes all the rules and tells people what to do; like the boss." (note that the high-power actor never made rules or told the low-power actor what to do). Next, participants watched an interaction video featuring the two actors from the introduction videos (Figure 1B; see also the online Supporting Information). Participants then indicated who was "in charge" by pointing to one of the static images of the actors at the bottom of the screen (Figure 1C). Thus, at the moment participants responded, there were no power cues onscreen. The next trial began immediately after participants made their choice, and participants never received feedback on their choices during the session. Each trial lasted approximately 1 min (two 5-s introduction videos; instructions to look for the person "in charge"; 20-s interaction video; participant response time), for a total of 4 min.

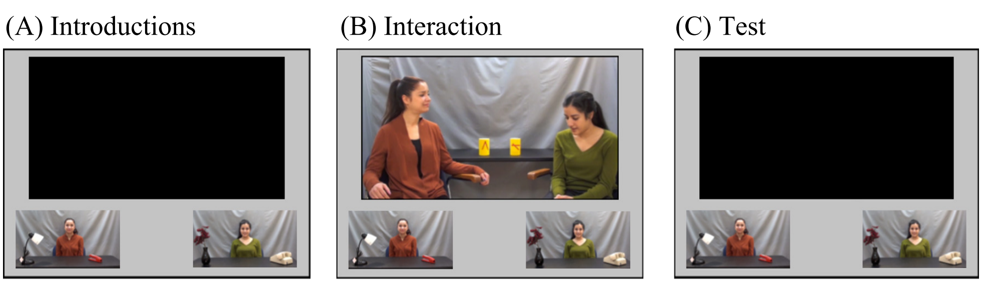

Figure 1. Example displays from Studies 1–3.

Design

Participants saw either male or female videos. Between participants we also counterbalanced which actor within a given pair was high in power, and which particular lines were associated with the high- and low-power role. The high-power actor appeared on the left for half of trials within a session, and spoke first on half of trials.

Scoring and Data Analysis Strategy

Selecting the high-power actor in a video was scored as 1 and selecting the low-power actor was scored as 0. Participants rarely failed to make a choice ($N = 3$ times). We created a task score for each participant by summing scores across completed trials and dividing by the total number of completed trials. Skew and kurtosis values for the sample were $< |2|$ ($-.262$ and -1.128, respectively) and were therefore considered within normal limits for parametric analysis (Miles & Shevlin, 2001). Thus, we used one-sample t tests to assess whether mean scores for each age group were different from chance (chance = .5) and conducted an analysis of variance (ANOVA) to test for effects of participant age, participant gender, and video gender on performance.

Results

Participants' selection of high-power actors exceeded chance, chance = .5, $M = .626$, $t(95) = 3.688$, $p < .001$, $d = 0.334$. Performance improved with age (scores regressed on age in days: $R^2 = .176$, $p < .001$). One-sample t tests conducted separately at each age revealed that only the scores of 5- and 6-year-old children exceeded chance, $M_{\text{3-year-olds}} = .441$, $t(23) = 1.086$, $p = .289$, $d = 0.221$; $M_{\text{4-year-olds}} = .552$, $t(23) = .829$, $p = .416$, $d = 0.169$; $M_{\text{5-year-olds}} = .729$, $t(23) = 3.253$, $p = .004$, $d = 0.663$; and $M_{\text{6-year-olds}} = .781$, $t(23) = 4.368$, $p < .001$, $d = 0.892$.

Participants were separated into "younger" (3- to 4-year-olds) and "older" (5- to 6-year-olds) age groups for remaining analyses. A $2 \times 2 \times 2$ ANOVA with age group, participant gender, and video gender as factors revealed three main effects: Girls outperformed boys, meaning they were better at identifying high-power actors, $F(1, 88) = 8.446$, $p = .005$, $\eta_p^2 = .088$; participants viewing females outperformed those viewing males, $F(1, 88) = 6.794$, $p = .012$, $\eta_p^2 = .072$; and older children outperformed younger children, $F(1, 88) = 19.928$, $p < .001$, $\eta_p^2 = .185$. There was also a significant interaction between participant gender and video gender, $F(1, 88) = 5.602$, $p = .020$, $\eta_p^2 = .056$. According to follow-up tests, girls outperformed boys on female videos, $t(46) = 3.791$, $p < .001$, $d = 1.094$, but performed similarly to boys on male videos, $t(46) = 0.317$, $p = .750$, $d = 0.091$. There were no other significant interactions. Table 1 presents the means and one-sample t tests for younger and older participants of both genders on male and female videos.

Discussion

As a group, participants were able to determine which adult had more power in a brief social interaction, even though the adults' words provided no information about their relative power. Participants' performance in the study was not uniform, however. First, the ANOVA revealed an interaction between participant gender and video gender. We can only speculate about the source of this effect: One possibility is that girls are more sensitive than boys to subtle cues in social interactions (see Hall, 1978; Wood, Murko, & Nopoulos, 2008). This sensitivity may be especially apparent when girls watch interactions between women (perhaps because they spend more time around women or are more engaged by people who match their own gender).

Performance also varied by participant age, and one-sample t tests indicated that 3- to 4-year-old children could not reliably identify who had more power (cf. younger girls watching female videos; Table 1). One possibility is that younger children are not very sensitive to nonverbal power cues. However, young children's poor performance could also stem from limits on their interest or attention (e.g., focusing on a video about a meeting), or from an inability to answer questions about power differences. To shed light on these possibilities, 3- to 4-year-old participants in Study 2 viewed interaction videos that included linguistic information about relative power (one actor told the other actor what to do), in addition to the power cues from Study 1. If younger children performed poorly in Study 1 because of limits on their attention or ability to answer questions about adult interactions, participants should find it similarly difficult to identify high-power people in Study 2. If, however, younger children are capable of tracking and understanding power differences in interactions, but find it difficult to perceive or interpret nonverbal power cues, then participants in Study 2 should perform well.

Table 1
Results From Study 1

	Female videos	Male videos
3- to 4-year-olds		
Girls	**M = .729, t(11) = 2.930, p = .014**	M = .403, t(11) = 1.168, p = .267
Boys	M = .368, t(11) = −2.130, p = .056	M = .486, t(11) = 0.181, p = .860
Everyone	M = .549, t(23) = 0.790, p = .438	M = .444, t(23) = 0.991, p = .332
5- to 6-year-olds		
Girls	**M = .979, t(11) = 23.000, p < .001**	M = .729, t(11) = 2.030, p = .067
Boys	**M = .729, t(11) = 2.561, p = .027**	M = .583, t(11) = 0.842, p = .418
Everyone	**M = .854, t(23) = 6.818, p < .001**	**M = .656, t(23) = 2.084, p = .048**

Note. Means and one-sample t tests. Cases where performance was above chance are in bold font (chance = .5).

Study 2

Method

The method was the same as in Study 1, except as follows: The participants were 24 new 3- to 4-year-old children (12 at each age, 12 males, 78% White, majority middle- and upper-middle-class backgrounds, all tested in the United States). In addition to the nonverbal cues described in Study 1, interaction videos also contained language that revealed the actors' relative power: Low-power actors sought information about what they should be doing (e.g., "How should I figure out which picture kids like?") and high-power actors provided instructions (e.g., "You should go to some classrooms and ask kids about these pictures"). The experimenter gave an altered definition for the phrase "in charge" so that it did not describe what happened in the videos. She said only, "It's the person who makes all the rules; like the boss."

Scoring and Data Analysis Strategy

Responses were scored as in Study 1. Participants never failed to respond. Skew and kurtosis values for the sample were within normal limits for parametric analysis (−.370 and −1.216, respectively). One-sample t tests were therefore used to compare participants' scores at each age to chance.

Results and Discussion

Both 3- and 4-year-old participants' scores were above chance, $M_{3\text{-year-olds}}$ = .771, $t(11)$ = 4.168, p = .002, d = 1.204, and $M_{4\text{-year-olds}}$ = .701 $t(11)$ = 2.339, p = .039, d = 0.674, and there were no effects of participant gender or video gender. These results show that 3- to 4-year-old children are capable of gleaning information from, and answering questions about, brief interactions between adults on video.

Why did younger children perform poorly in Study 1 but well in Study 2? One possibility is that younger children in Study 1 attended to the actors' words at the expense of attending to the actors' nonverbal behaviors. To test whether younger children were negatively affected by the content of the actors' conversation in Study 1, 3- to 4-year-old participants in Study 3 viewed the stimuli from Study 1 without sound. If younger children notice and understand nonverbal power cues but performed poorly in Study 1 because they were distracted by the content of the actors' conversation, then participants in Study 3 should perform well.

Study 3

Method

The method was the same as in Study 1, except as follows: The participants were 24 new 3- to 4-year-old children (12 at each age, 12 males, 100% White, majority middle- and upper-middle-class backgrounds, all tested in the United States). Participants viewed the interaction videos without any sound. Prior to presenting the videos, the experimenter informed participants that the videos would be silent.

Scoring and Data Analysis Strategy

Responses were scored and analyzed as in Studies 1 and 2. Participants never failed to respond. Skew and kurtosis values for the sample were within normal limits for parametric analyses (−.088 and 1.261, respectively), and one-sample t tests were therefore used to compare participants' scores at each age to chance.

Results and Discussion

Both 3- and 4-year-old participants performed at chance, $M_{\text{3-year-olds}} = .479$, $t(11) = .364$, $p = .723$, $d = 0.109$, and $M_{\text{4-year-olds}} = .542$ $t(11) = .518$, $p = .615$, $d = 0.151$, and an ANOVA showed no effects of participant gender or video gender. Thus, even in the absence of potentially distracting dialogue, young children performed poorly when asked to identify the high-power actor from nonverbal behavior.

Considered together, the findings from Studies 1 and 3 suggest that 3- to 4-year-old children have difficulty making inferences about relative social power from dynamic nonverbal cues. However, our findings do not preclude the possibility that other methods would reveal greater sensitivity on the part of young children. We return to this idea in the General Discussion.

Study 4

The interaction videos in Studies 1–3 contained multiple nonverbal cues to power, so it is unclear which nonverbal cues children use to infer power; it is also unclear whether some cues might be more useful than others. To investigate these issues, participants in Study 4 viewed displays featuring only one cue to relative power. Additionally, to have greater control over available cues than is possible in dynamic video stimuli, participants in Study 4 viewed posed (static) photographs of adults. Finally, in case participants showed limited sensitivity to displays featuring just one power cue in Study 4, we also included photographs containing multiple power cues (so that we could validate the method).

Method

Participants and Materials

A group of forty-eight 3- to 6-year-old children (12 at each age, 24 males, 96% White, majority middle- and upper-middle-class backgrounds, all tested in the United States) viewed photographs in which one adult displayed either one cue or all four high-power cues, while the other adult displayed one or four low-power cues. There were five kinds of power displays: (a) difference in posture (expansive vs. hunched), (b) difference in head position (tilted up vs. down), (c) difference in gaze (forward vs. down), (d) difference in eyebrows (lowered vs. raised), and (e) differences in all cues (posture, head, gaze, and eyebrows); see Figure 2. Adults stood facing one another and were visible from the waist up. There were five pairs of males and five pairs of females; members of a pair were similar in appearance. Two different male pairs and two different female pairs demonstrated each kind of power display, and each person was photographed in both the high- and low-power role (for 40 photographs total).

A group of 64 adults (32 males, all undergraduate students in the United States) rated the power of the people in the photographs using the scale from Study 1. The average power difference between individuals was greatest for photographs containing all cues (7.266 vs. 1.797), followed by posture-only (7.250 vs. 2.625), gaze-only (5.992 vs. 3.242), head-only (6.320 vs. 3.960), and brows-only (5.992 vs. 5.141) displays. Paired-sample t tests revealed that ratings for high-power actors exceeded ratings for low-power actors for all five of these display types (all $ps < .001$). Ratings for males and females did not differ for any of the power display types or roles.

Procedure and Design

The experimenter told participants that they would see photographs of two people in a meeting and should point to the person who was "in charge." She provided the definition from Study 1. All participants saw five different female dyads (one for each kind of power display: posture only, head only, gaze only, brows only, and all cues) and five different male dyads (one for each kind of power display) for a total of 10 trials. Participants could view each photograph for as long as they liked, but most provided an answer within 5 s. Once participants made a response, the experimenter removed the already-viewed photograph and presented the next one. Total testing time (including experimenter instructions, brief transitions between photographs, and viewing and responding to 10 photographs) was approximately 3 min.

Half of participants saw all the females first, and half saw the reverse. Within each set of five trials, the all-cues photograph was always last. The order of the single-cue photographs varied across participants. The high-power person was on the left for half of trials within a session. Between participants we counterbalanced which pair was used for the different power displays and which pair members were higher in power.

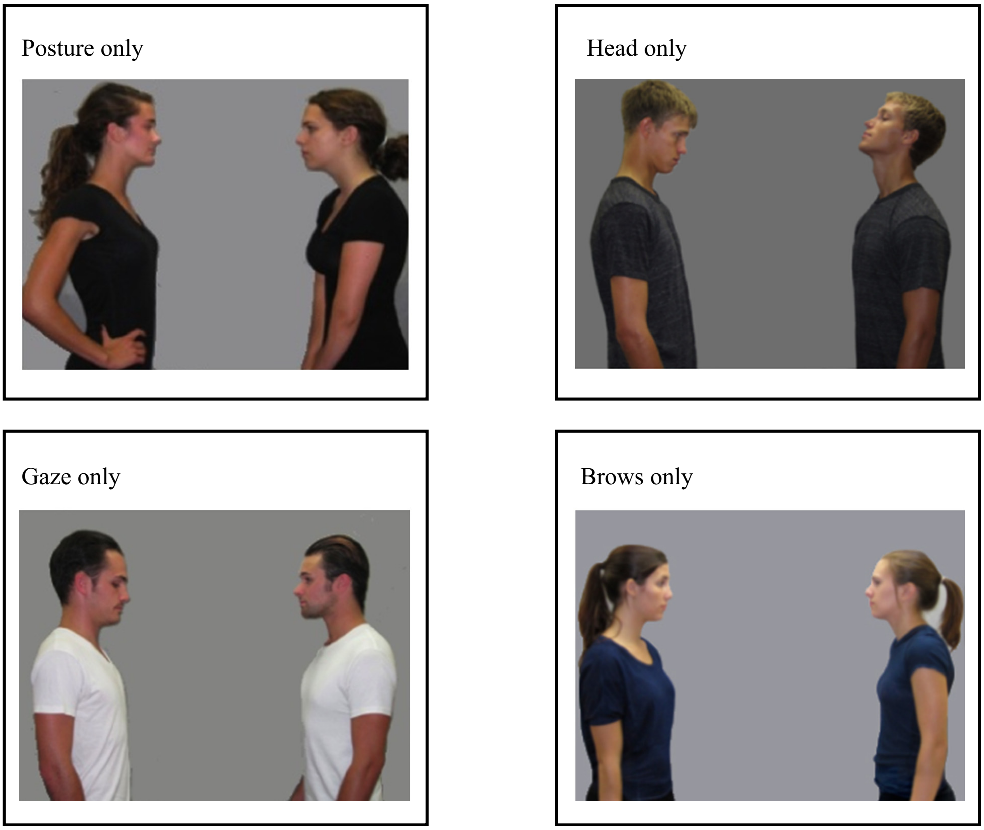

Figure 2. Example displays from Study 4.

Scoring and Data Analysis Strategy

Selecting the high-power actor in a photograph was scored as 1 and selecting the low-power actor was scored as 0. To assess participants' performance for the five different power display types, we created five scores for each participant (posture only, head only, gaze only, brows only, and all cues); each of these scores ranged from 0 to 2. The limited range for the power display type scores warranted the use of nonparametric analyses: Chi-square goodness-of-fit tests were used to test whether participants' scores differed from the chance distribution (chance = 25% of participants with a score of 0, 50% of participants with a score of 1, and 25% participants with a score of 2). A Friedman test and paired Wilcoxon signed-rank tests were used to assess whether participants' scores differed by display type. As in previous studies, we also created a total score for each participant (collapsing across display type). The wider range for total scores, as well as acceptable skew and kurtosis values for the sample (−.249 and −.218, respectively), warranted the use of a parametric analysis (regression) to test for an effect of age on performance.

Data were missing for three trials because participants failed to give a response; participants' responses for these power display types were excluded from nonparametric analyses, and the individual trials were excluded from the parametric analysis. Preliminary analyses revealed no effects of participant gender or photograph gender, so responses were collapsed across these dimensions for further analyses.

Results

Chi-square goodness-of-fit tests for each power display type revealed that participants' scores were different from the chance distribution (and skewed such that there were more high scores than would be expected by chance) in all cases except for brows-only photographs: posture, $\chi^2(2, N = 48) = 18.000$, $p < .001$, $w = .613$; head, $\chi^2(2, N = 48) = 9.125$, $p = .010$, $w = .435$; gaze, $\chi^2(2, N = 47) = 16.404$, $p < .001$, $w = .590$; brows, $\chi^2(2, N = 47) = 0.234$, $p = .890$, $w = .071$; and all cues,

Table 2
Results From Study 4

	Posture (%)	Head (%)	Gaze (%)	Brows (%)	All cues (%)	Expected percentages
3- to 4-year-olds						
Scores of 0	12.5	25.0	13.0	26.1	13.0	25
Scores of 1	66.7	45.8	52.2	56.5	60.7	50
Scores of 2	20.8	29.2	34.8	17.4	26.1	25
5- to 6-year-olds						
Scores of 0	4.2	8.3	4.2	29.2	4.2	25
Scores of 1	16.7	33.3	33.3	37.5	8.3	50
Scores of 2	79.2	58.3	62.5	33.3	87.5	25

Note. Percentages of younger and older participants with scores of 0, 1, and 2 in Study 4. Participants with scores of 0 selected the low-power person on both trials; those with scores of 1 selected the low- and high-power person each one time; and those with scores of 2 selected the high-power person on both trials. Percentages expected by chance are presented in the rightmost column.

$\chi^2(2, N = 47) = 27.298$, $p < .001$, $w = .763$. A Friedman test confirmed that performance varied according to display type, $\chi^2(4) = 13.828$, $p = .007$. Ten post hoc paired Wilcoxon signed-rank tests (Bonferonni corrected) revealed that scores for all-cues and gaze-only photographs exceeded scores for brows-only photographs (all cues vs. brows: $Z = 3.245$, $p = .001$, $r = .331$; gaze vs. brows: $Z = 2.881$, $p = .004$, $r = .294$). None of the other pairwise comparisons were significant.

Performance improved with age (total scores regressed on age in days: $R^2 = .437$, $p < .001$). To test whether younger children could identify the high-power people in the photographs, we conducted chi-square goodness-of-fit tests for 3- to 4-year-old and 5- to 6-year-old children separately. Older children were above chance for all display types except brows-only displays (all *p*s except brows only < .001; brows only $p = .453$), but younger children did not perform above chance for any of the display types (all *p*s > .223). Table 2 presents the percentages of younger and older participants who received scores of 0, 1, or 2 for each of the power display types.

Discussion

When judging relative power, older children showed sensitivity to posture, head orientation, and gaze information, but younger children did not. The fact that participants did not use eyebrow positions to discern power contrasts with findings from a study by Keating and Bai (1986). However, participants in that study viewed front-facing stimuli. One possibility is that brow positions are not very salient when people are in profile.

General Discussion

The findings from the present research provide evidence that children attend to subtle cues in brief social interactions when trying to discern how people relate to one another. More specifically, children in the present studies used nonverbal information to judge which of two adults had more social power—and they were successful even though they viewed unfamiliar adults engaging in a mature activity (i.e., having a meeting). Additionally, the findings from Study 4 show that children can make inferences about social power using just one kind of nonverbal cue difference (posture, head positioning, or gaze).

Across the studies presented here, children's performance improved with age. While 5- to 6-year-old children performed well in Studies 1 and 4, 3- to 4-year-old children had difficulty identifying who was in charge when only nonverbal cues were available. What explains these findings? One possibility is that younger and older children alike are attuned to the kinds of nonverbal power cues presented in our studies, but that our method was not sensitive enough to reveal younger children's ability. It could be informative in future research to try to address whether young children simply do not spontaneously attend to nonverbal power cues, or whether they detect the cues but do not understand how they map onto power differences. For example, the experimenter might ask participants to point to the relevant information (e.g., "Who has his chest puffed out and shoulders back?") or direct children's attention to the relevant information (e.g., "Look, she has her chest puffed out and shoulders back") before asking them to make an inference about social power. Alternatively, using measures that do not require children to map verbal information (e.g., a question about who is "in charge") onto displays where the relevant information is nonverbal may reveal sensitivity to nonverbal power cues in young children. For example, one could measure whether children devote more visual attention to, or preferentially imitate the actions of, people who display high-power cues.

It is also possible that younger children are very attuned to nonverbal cues to social hierarchies at a young age, but that the nonverbal cues featured in the present studies are not primary cues. As reviewed in the Introduction, infants use physical size as well as information about the outcome of resource competitions to make predictions about how individuals will interact with one another (Mascaro & Csibra, 2012; Thomsen et al., 2011). Size and competitive outcomes may be primary cues to hierarchical relationships early in life, with attention to other cues (e.g., posture) emerging later due to learning or maturation.

If future research continues to find that young children have difficulty understanding the full range of nonverbal power cues displayed by people in the environment, then it will be critical to begin to examine the development of this capacity. Perhaps children learn what behaviors are associated with different positions of power through experience. Children are active social observers (Bigler & Liben, 2007) and may notice over the course of many interactions that people who hold familiar positions of power (e.g., president, principal, boss) tend to exhibit more expansive posture, maintain direct gaze at their social targets, and tilt their heads back. Furthermore, they may eventually generalize this learning to cases where they do not know or have information about people's roles (as in the present studies). Attending school may provide children with particularly useful and salient examples of relationships defined by power differences—between the principal and teachers, veteran teachers and trainees, and administrative and custodial staff. To disentangle contributions of maturation and learning, it could be useful to test children who are matched in age but who differ in their schooling or other social experiences, such as the composition and nature of their early home environments (e.g., families with a clear hierarchy between parents or between siblings of different ages).

Another topic raised by these studies is whether, how, and why gender affects children's understanding of nonverbal power cues. In Study 1 there was a significant interaction between participant gender and actor gender: Girls outperformed boys when watching female videos. In Studies 2–4, however, boys and girls performed similarly and there were no differences by actor gender. What accounts for this discrepancy across studies? One possibility is that the effect of participant gender in Study 1 is meaningful. Indeed, as noted earlier, girls tend to be more sensitive than boys to information in social interactions (Hall, 1978; Wood et al., 2008). Perhaps the smaller sample sizes in Studies 2 and 3, near-ceiling performance in Study 2, and near-floor performance in Study 3 masked possible influences of participant (and video) gender. Study 4, however, had a larger sample size, more variance in performance, and included both younger and older children, and yet gender effects were not found. The gender of actors may have been more salient in the videos of Study 1 than in the photographs of Study 4, and therefore had a larger impact on children's performance. For example, vocal register is a prominent gender marker, and was not a feature of the stimuli in Study 4. Another possibility is that the effect in Study 1 was spurious. In designing the present research, we did not anticipate gender differences (for participants or stimuli); our tests for gender effects were therefore post hoc. Future research on children's attention to nonverbal power cues should include and analyze for effects of gender so that the field can achieve a better understanding of the reliability and robustness of such effects.

Beyond age and gender differences, there are a number of other important questions for future research. First, it will be important to study whether children need to see contrasting cues in order to determine other people's power or whether seeing just one person's nonverbal behavior is informative. Second, in the present studies, children were only asked to judge how the two individuals related to each other in one context. However, one reason children might bother to attend to power in relationships is so that they can predict how people will act in the future. Thus, in future work it will be important to probe children's thoughts about other interactions between the two individuals (e.g., Keating & Bai, 1986). Finally, it could also be useful to ask whether children use power differences to guide their own behaviors and gestures toward others. For example, if children were hungry, would they be more likely to seek food from people who appeared to be higher in power on the assumption that those people would have more control over, or access to, valuable resources?

The present findings underscore children's role as active, engaged observers of other people's social interactions, even in situations that do not appear to directly affect or involve them. Moreover, the findings contribute to a growing body of research demonstrating children's keen ability to "thin slice" social situations and make accurate inferences (e.g., about whether someone is playing alone or with someone else: Balas, Kanwisher, & Saxe, 2012; about whether two people like one another: Nurmsoo et al., 2012). Given the ubiquity of nonverbal information in the social world, it would be fruitful to devote more attention to understanding the origins and ontogeny of children's attention to a broad range of nonverbal behaviors.

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Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's website:

Video S1. Example Video From Study 1
Video S2. Example Video From Study 1
Video S3. Example Video From Study 1
Video S4. Example Video From Study 1