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ARTICLE

# Young Children's Sensitivity to Speaker Gender When Learning From Others

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This research explores whether young children are sensitive to speaker gender when learning novel information from others. Four- and 6-year-olds ($N = 144$) chose between conflicting statements from a male versus a female speaker (Studies 1 and 3) or decided which speaker (male or female) they would ask (Study 2) when learning about the functions of novel objects. Some objects were in gender-typing colors (light pink or navy blue), and some were in a gender-ambiguous color (yellow). The results indicated that children did use speaker gender to guide their learning, by either consistently choosing to agree with the speakers of their own gender or making choices that are associated with gender stereotypes about color. The findings are discussed in relation to how in-group preference and stereotype attributions might influence children's learning from others.



Gender as a social category is often used as the basis for making social judgments (Maccoby, 1988; Powlishta, 2004). From an early age, children form stereotypes about males versus females and make a variety of gender-differentiated inferences. For example, they make different predictions about males versus females in regard to their physical characteristics, social behaviors, psychological traits, and occupations (e.g., Liben, Bigler, & Krogh, 2001, 2002; Martin, 1989; Powlishta, 1995). Relatively less is known about whether young children take into account the gender of other people in domains other than social judgments, such as when learning novel information from the testimony of others. The present research aims to explore this question.

Much of children's knowledge acquisition relies on their acceptance of what they are told by other people (Harris, 2007; Harris & Koenig, 2006; Siegal, Butterworth, & Newcombe, 2004). Some research suggests that when learning from others, children are credulous and accept what

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they are told at face value, even when the testimony is obviously false and contradicts what they have directly observed (Ma & Ganea, 2010). Other research indicates, however, that young children have a sense that all people are not equally good sources of information. They are able to use cues that can indicate whether one informant is a better source than another. For example, preschoolers are sensitive to a speaker's knowledge state or credibility: When learning labels for novel objects, they prefer to learn from knowledgeable rather than ignorant speakers (e.g., Sabbagh & Baldwin, 2001), and they choose to trust speakers who have been reliable in the past over previously unreliable ones (e.g., Koenig, Clément, & Harris, 2004; Koenig & Harris, 2005; Pasquini, Corriveau, Koenig, & Harris, 2007). Even 2-year-olds can sometimes pick up on nonverbal cues to a speaker's credibility when learning novel labels (Birch, Akmal, & Frampton, 2009).

Young children are also sensitive to the social category of informants, such as age and occupation. Children are aware that in most cases, adults know more than themselves (Burton & Mitchell, 2003; Taylor, Cartwright, & Bowden, 1991). They also often place greater weight on adult testimony in their decision making or learning. For instance, after receiving either an adult's or a child's statement that contradicts a more credible source, 6-year-olds choose to agree with the adult but disagree with the child (Ackerman, 1983). When learning novel labels, 3- and 4-year-olds prefer adult testimony to child testimony if there is no evidence about the speaker's past reliability (Jaswal & Neely, 2006). However, in situations where the task does not involve learning factual knowledge through testimony, young children may look to peers rather than adults in judgment making, for example, when learning how to play with a novel toy or deciding on their own preferences for novel objects and activities (Shutts, Banaji, & Spelke, 2010; VanderBorght & Jaswal, 2009). In addition, preschool children already have a sense of the division of cognitive labor or differing domains of expertise, in that they are able to judge the likelihood of different people having a certain type of knowledge based on their occupations. For example, children as young as 3 years of age perceive doctors and car mechanics to differ in their expertise for certain types of tasks: They believe that doctors know more about how to fix a broken arm, whereas car mechanics know more about how to fix a flat tire (Lutz & Keil, 2002).

In addition to age and occupation, another social category of informants—gender—might also influence children's judgment of whether one informant is a better source than another, in at least two possible ways. The first possibility is that children might simply favor information from speakers of their own gender. Many studies have documented young children's preferences for same-gender others in various social contexts. For example, by 3 years of age, children begin to show a robust preference for same-gender playmates, and this in-group preference peaks during middle childhood (e.g., LaFreniere, Strayer, & Gauthier, 1984; Maccoby, 1988; Maccoby & Jacklin, 1987). Children also have strong biases favoring their own gender in trait attribution (Haugh, Hoffman, & Cowan, 1980; Powlishta, 1995; Ruble & Martin, 1998). For example, children aged 8 to 10 years assign more positive and fewer negative traits to peers of their own gender than to peers of the other gender (Powlishta, 1995). Researchers have also shown that children prefer novel objects and activities that have been modeled or endorsed by people of their own gender (e.g., Martin, Eisenbud, & Rose, 1995; Ruble, Balaban, & Cooper, 1981; Shutts et al., 2010). In addition, when presented with conflicting behavioral demonstrations from male versus female models, young children prefer to imitate the models of their own gender (e.g., Bussey & Bandura, 1984; Grace, David, & Ryan, 2008). The preferences children show toward same-gender others, along with their preferences for objects and activities modeled or

endorsed by people of their own gender, suggest that children might be biased toward same-gender speakers when learning novel information through testimony.

Alternatively, children might selectively learn from male versus female speakers based on gender stereotypes about differing domains of expertise. In many societies, men and women specialize in different fields and thus might have different levels of knowledge about certain things (e.g., Cohen, 2004; Phillips & Imhoff, 1997). Many studies have shown that even young children associate different occupations with men and women (e.g., Archer, 1984; Cordua, McGraw, & Drabman, 1979; Garrett, Ein, & Tremaine, 1977; Liben et al., 2001). Given this early understanding of gender-based division of labor, it is possible that children may attribute stereotypic roles to male versus female speakers when judging which gender is more likely to have certain types of knowledge. For example, children might judge that women would know more about how to comfort a crying baby or teach kindergarteners, whereas men would know more about how to check a car engine or fix a computer. Supporting this, children do make different predictions for men versus women regarding competence at stereotypically masculine and feminine jobs (Liben et al., 2001, 2002).

The goal of the present study is to examine these two possibilities regarding the role of speaker gender in 4- and 6-year-old children's learning from others. Four-year-olds were chosen based on previous findings that by the age of 3 or 4 years, children begin to show explicit gender-based intergroup attitudes (e.g., Maccoby, 1988) and already have a sense of differing domains of expertise (Lutz & Keil, 2002). Six-year-olds were tested to examine possible developmental changes, given that some intergroup attitudes (e.g., same-gender favoritism or gender stereotypes) are at peak during middle childhood starting from about the age of 6 years old (see Powlishta, 2004, for a review). In the first study, children received conflicting statements from a male versus a female speaker regarding the functions of novel objects. Then children were asked to endorse the testimony of only one speaker. Some of the novel objects were in gender-typing colors (i.e., light pink or navy blue), and some were in a gender-ambiguous color (i.e., yellow).

Unlike most previous studies on children's learning from the testimony of others, we focus on object functions rather than object labels—we speculate that children might not perceive male and female speakers to differ much in their knowledge about what things are called. Rather, children might expect the speakers to differ in their expertise about what things are used for on the basis of a familiarity principle. Given their early awareness of gender-differentiated preferences, children might expect people to be more interested in and have more experience using objects typical of their own gender (e.g., girls play with pink objects more often than do boys). This presumed greater use of gender-consistent objects might lead children to perceive a speaker as more knowledgeable about the functions of objects typical of his or her own gender. With this consideration in mind, we employed gender-typing colors to prime children's gender-stereotypic perceptions of object use. It is important to point out that we did not use color as a cue to object function per se, as color is not an essential property of artifacts and young children do appear to consider a color change to be irrelevant to an artifact's function (e.g., Casler & Kelemen, 2005).

We predict that if children use speaker gender to guide their learning through testimony, their responses will reveal one of two possible patterns. One possibility is that children will exhibit in-group favoritism or a same-gender preference, by consistently choosing to endorse the testimony of same-gender speakers. Alternatively, children might apply their gender stereotypes about color preferences to their decisions, by endorsing the testimony of the female speakers when learning about pink objects but the testimony of the male speakers when learning about

blue objects. If children do not use speaker gender to guide their learning, they will respond randomly and choose the male and the female speakers equally often, regardless of the object color.

Previous research has suggested that by the preschool years, children have developed the stereotypes that pink is a color for girls and blue is a color for boys (e.g., Boyatzis & Varghese, 1993; Picariello, Greenberg, & Pillemer, 1990). Very little is known about whether children think that adults' color preferences are also gender-typed. If children do not have similar stereotypes about adults and peers in regard to their color preferences, in the current task, the extent to which they might apply such gender stereotypes to their learning might differ when the speakers are two adults versus two peers. With this consideration in mind, in this study, half of the participants received conflicting statements from two adults, and half of them received conflicting statements from two peers. At the end of the study, we also interviewed children on their gender stereotypes about adults or peers in three related domains: color preference, the likelihood of using objects of gender-typing or gender-ambiguous colors, and level of knowledge about what those objects are used for.



## STUDY 1

### Method

#### *Participants*

The final sample included 64 children, 32 in each of two age groups: 4-year-olds ($M = 4;6$; range = 4;0–4;11) and 6-year-olds ($M = 6;4$; range = 6;1–6;10). There were equal numbers of girls and boys in each age group. Seven additional children were tested but eliminated from the final sample due to shyness or lack of interest (2), experimenter error (2), unusual response patterns (2; last-speaker bias or making choices based on a specific appearance feature), or unwillingness to choose only one speaker (1). Children were recruited from a participant database at a public university and were predominately from White, middle-class families.

#### *Materials and Stimuli*

The test materials included 12 novel objects, 4 in each of three colors: light pink, navy blue, and yellow (see Appendix). Three color cards (light pink, navy blue, and yellow) were used during the interview phase.

There were two sets of test stimuli, one for the ''adult testimony'' condition and the other for the ''child testimony'' condition. Twelve pairs of novel, made-up words were used in the stimuli to describe the functions of the novel objects (see Appendix).

*Adult testimony.* In this condition, the stimuli were 24 video clips. These clips were presented in pairs in PowerPoint presentation on a Macintosh computer with speakers (12 trials). Within each pair, in one clip, a male adult provided testimony about the function of a novel object; in the other clip, a female adult provided conflicting testimony about the same object (see Appendix). Both speakers followed the same scenario: The speaker was sitting behind a small table with a novel object on it and was looking into the camera. Upon hearing a voice asking, ''What do you think this is for?'' the speaker picked up the novel object, looked at it, and provided the testimony in a neutral tone, ''I think this is for ____.'' Then the speaker put

the object back on the table and looked into the camera again. Each speaker was instructed to talk in a neutral tone with neutral facial expressions.[1]

Twenty-four college students were recorded for the clips, half of each gender. In each pair, both genders were wearing a white T-shirt, and they were matched in terms of race and skin color. Their hair colors were approximately matched.

*Child testimony.* In this condition, the main stimuli were 24 child audio clips. The clips were also presented in pairs in PowerPoint presentation (12 trials). The conflicting statements about each novel object were the same as in the ''adult testimony'' condition.

Because of difficulty finding children who would act naturally in front of video cameras, we recorded the voices of eight children aged 4 to 6 years old—four girls and four boys. Each child recorded three audio clips and provided three different verbal statements. In the PowerPoint presentation, the order of the clips from the same child was carefully arranged so that they did not play in successive trials. Each audio clip was paired with a picture of a child of the same gender as the child speaker in the clip, and the two children in each pair of the pictures were matched in terms of age (4 to 6 years), race, skin color, hair color, and facial expressions.[2] None of the children were dressed in pink, blue, or yellow.

### Design and Procedure

The study employed a 2 (age: 4 years old vs. 6 years old) $\times$ 2 (condition: adult vs. child testimony) $\times$ 3 (object color: pink, blue, yellow) mixed design, with age and condition as the between-subjects factors and object color as the within-subjects factor. At each age, each child was randomly assigned to one of the two conditions, with the restriction that there were equal numbers of girls and boys in each condition.

The study took place in a small, quiet room. Children were seated at a table and faced a Macintosh computer. A video camera recorded their responses throughout the study. The procedure was identical in both conditions and included two phases: test and interview.

*Test phase.* At the beginning of the *test* phase, a female experimenter introduced children to the task: ''Today we're going to learn about some new things. They're things perhaps you've never heard of before, but we can listen to what other people say about them on the computer. Sometimes the lady (girl) will know better, and sometimes the guy (boy) will know better. Let's find out about this object first.'' Then, the 12 test trials followed, one at a time. Each trial involved three segments: color naming and novelty check, testimony, and endorsement.

During the *color naming and novelty check* segment, the experimenter showed the novel object to children. Each object was placed inside a clear zip bag. Most children just observed

[1]Sixteen adults watched the clips (one at a time) and rated the confidence level of each speaker on a scale of ''–1'' (not confident), ''0'' (neutral), and ''1'' (very confident). All raters were blind to the hypotheses of the study. Paired-samples *t*-tests showed that nine pairs of speakers were rated as equally confident. The female speaker was rated as more confident on one trial, whereas the male speaker was rated as more confident on two trials. Nevertheless, children's performance on these three trials did not vary systematically as a function of the speaker's confidence level.

[2]As with the stimuli in the ''adult testimony'' condition, 16 adults rated the confidence level of each child informant. Paired-samples *t*-tests showed that nine pairs of children were rated as equally confident. The girl was rated as more confident on two trials, whereas the boy was rated as more confident on one trial. These differences did not influence children's performance.

the objects, but a few spontaneously touched or picked them up. Then the experimenter asked children to name the color of the object and say whether they had seen it before. Most children answered ''no.'' Only three children identified one of the objects (the cabinet flex lock or the wooden toy instrument). In this case, the corresponding trial was skipped.

The *testimony* segment followed, during which the experimenter directed children's attention to the computer screen: ''Well, one of these two people (or two kids) knows better about this —— [color] thing. Let's listen to what they say about it.'' Next, the experimenter played the clips one by one. The clip on the left side always went first. After each clip, the experimenter repeated the speaker's testimony.

At the end of the second clip, the *endorsement* segment followed, during which the experimenter asked children to endorse the testimony of only one speaker: ''What do you think this —— [color] thing is for? Is it for —— like she said or for —— like he said?'' The gender on the left side was always mentioned first. After children made a clear choice, the experimenter proceeded with the next trial. Only neutral feedback in a positive tone was provided.

In each condition, there were two randomized presentation orders. Each child was randomly assigned to receive one order. There were four blocks in each order, and each block included three trials with three objects—one pink, one blue, and one yellow. The colors of the objects in two consecutive trials were different. The gender of the speakers on the left side was arranged as follows: abba, baab, abba, where ''a'' stands for female in one order and male in the other order.

*Interview about children's gender stereotyping of colors.* At the end of the *test* phase, the experimenter interviewed children about their gender-stereotypic attitudes about women and men (''adult testimony'' condition) or about girls and boys (''child testimony'' condition). Using the three color cards, the experimenter asked children three sets of questions regarding gender-stereotypic attitudes about colors: 1) color preference, ''Who likes —— the best, ladies (girls), guys (boys), or both?''; 2) object use, ''Who likes to use (play with) —— things more, ladies (girls), guys (boys), or both?''; and 3) knowledge level, ''Who would know more, know better about what —— things are used for, ladies (girls), guys (boys), or both?'' The wordings in parentheses were used in the ''child testimony'' condition. In each set, the same question was repeated for each of the three colors (pink, blue, yellow). The orders of the three sets of questions and the three colors referred to in each set were counterbalanced across the participants at each age in each condition. At the end, children received a small gift for their participation.

### *Coding and Reliability*

The experimenter coded children's responses online during *test* and *interview* phases. Later, a trained research assistant who was blind to the hypothesis independently coded a randomly selected 50% of the sample from video recordings. There was no disagreement between the two coders.

## Results

Preliminary analyses revealed no significant age differences between 4- and 6-year-olds in their testimony endorsement or their gender-stereotypic attitudes. Data from both age groups were thus collapsed for analysis. There were also no significant item effects regarding children's

responses to the four objects of each color. We present the results in the following three sections: the role of speaker gender in children's testimony endorsement, overall response patterns of individual children, and data from the interview on children's gender-stereotypic attitudes. All reported $p$ values are two-tailed.

### *The Role of Speaker Gender in Children's Testimony Endorsement*

The first set of analyses examined whether object color affected who (males or females) participants believed. A choice to endorse the testimony of the female speaker was coded ''1,'' whereas a choice to believe the male speaker was coded ''–1.'' There were four trials for objects of each color; thus children's choice score on each color could range from ''–4'' to ''4.'' A score of ''0'' indicates chance or random response. A score above ''0'' indicates a bias favoring the testimony of female speakers, whereas a score below ''0'' indicates a bias favoring the testimony of male speakers.

We first submitted children's choice scores to a mixed-design analysis of variance (ANOVA), with object color (3) as the within-subjects factor, and condition (2) and participant gender (2) as the between-subjects factors. The results indicated a significant main effect of participant gender, $F(1, 60) = 37.26$, $p < .001$, $\eta_p^2 = .383$. For objects of all three colors, girls were more likely to endorse the testimony of female speakers ($M_{\text{pink}} = 1.31$, $SD_{\text{pink}} = 2.52$; $M_{\text{blue}} = 1.81$, $SD_{\text{blue}} = 2.29$; $M_{\text{yellow}} = 1.85$, $SD_{\text{yellow}} = 2.16$), whereas boys were more likely to endorse the testimony of male speakers ($M_{\text{pink}} = -1.25$, $SD_{\text{pink}} = 2.31$; $M_{\text{blue}} = -1.04$, $SD_{\text{blue}} = 2.68$; $M_{\text{yellow}} = -1.00$, $SD_{\text{yellow}} = 2.16$). The other main effects and interactions were not significant.

To further explore the effect of participant gender, we conducted separate analyses with girls and boys to compare their performance to chance expectation (0), with data collapsed across age and condition. As shown in Figure 1, for objects of all three colors, girls were more likely to

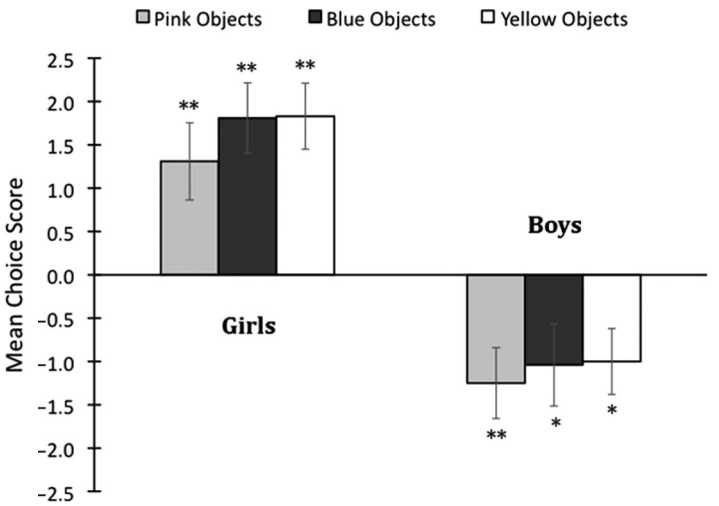


FIGURE 1 Mean choice scores in testimony endorsement in Study 1 (by participant gender and object color; collapsed across age and condition). $^{**}p < .01$, $^{*}p < .05$, as compared to chance (0).

endorse the testimony of female speakers at a level significantly above chance, $t(31) = 2.95$, 4.47, and 4.87 for the pink, blue, and yellow objects, respectively; all $ps < .01$. In contrast, boys chose to endorse the testimony of male speakers significantly more often than would be expected by chance, $t(31) = -3.06$, $-2.20$, and $-2.63$, respectively; all $ps < .05$. In other words, children showed a robust bias favoring the testimony of speakers of their own gender.

### *Overall Response Patterns of Individual Children*

A second set of analyses examined individual response patterns. Children's overall response patterns were coded into either ''gender-driven,'' if they used speaker gender to guide their endorsement of testimony, or ''non-gender-driven,'' if they did not rely on speaker gender and responded randomly. The gender-driven response patterns were further coded into two subtypes: a) same-gender preference, if children chose to endorse the testimony of same-gender speakers on at least 8 of 12 trials; and b) gender-stereotypic responses, if children chose to agree with female speakers for the pink objects but preferred the testimony of male speakers for the blue objects, each on at least 3 of 4 trials.

Table 1 shows the number of children with each response pattern in each condition. Chi-square tests indicated that the distributions of children did not differ significantly across condition or participant gender, so data from all children were collapsed. When provided with conflicting testimony from two speakers, 39 out of 64 children based their choices on speaker gender (60.9%): 30 children (46.9%) exhibited a same-gender preference by consistently choosing to agree with the speakers of their own gender, and 9 children (14.0%) systematically provided gender-stereotypic responses. The other 25 children (39.1%) responded randomly.

### *Children's Gender-Stereotypic Attitudes About Colors*

Table 2 shows how children in each condition responded to the interviews about gender stereotypes. Across the first two studies, a small number of children (9/128) did not provide answers to all the questions, so we present the percentage of children with each response

TABLE 1
Number of Children With Each Response Pattern by Condition (Percentage in Parentheses)

| | | *Individual response pattern* | | | |
|---|---|---|---|---|---|
| | | *Gender-driven* | | | |
| *Condition* | *N* | *Same-gender preference* | *Gender-stereotypic* | *Total* | *Non-gender-driven* |
| Study 1 | | | | | |
| Adult testimony | 32 | 15 (46.9) | 3 (9.4) | 18 (56.3) | 14 (43.7) |
| Child testimony | 32 | 15 (46.9) | 6 (18.7) | 21 (65.6) | 11 (34.4) |
| Total | 64 | 30 (46.9) | 9 (14.0) | 39 (60.9) | 25 (39.1) |
| Study 2 | | | | | |
| Ask adult | 32 | 7 (21.9) | 12 (37.5) | 19 (59.4) | 13 (40.6) |
| Ask child | 32 | 7 (21.9) | 12 (37.5) | 19 (59.4) | 13 (40.6) |
| Total | 64 | 14 (21.9) | 24 (37.5) | 38 (59.4) | 26 (40.6) |

TABLE 2
Children's Gender-Stereotypic Attitudes: Percentage of Children With Each Response Category by Condition, Domain, and Color

| | | *Color preference* | | | *Object use* | | | *Knowledge* | | |
|---|---|---|---|---|---|---|---|---|---|---|
| *Condition* | *Response* | *Pink* | *Blue* | *Yellow* | *Pink* | *Blue* | *Yellow* | *Pink* | *Blue* | *Yellow* |
| Study 1 | | | | | | | | | | |
| Adults | Female | 88.0 | 0.0 | 21.7 | 76.0 | 4.0 | 21.7 | 50.0 | 8.3 | 30.4 |
| | Male | 0 | 76.0 | 17.4 | 4.0 | 80.0 | 21.7 | 8.3 | 58.4 | 26.1 |
| | Both | 12.0 | 24.0 | 60.9 | 20.0 | 16.0 | 56.6 | 41.7 | 33.3 | 43.5 |
| Peers | Female | 90.3 | 6.3 | 12.5 | 90.6 | 3.1 | 12.5 | 84.4 | 9.4 | 15.6 |
| | Male | 0 | 75.0 | 18.8 | 0 | 81.3 | 18.8 | 12.5 | 84.4 | 34.4 |
| | Both | 9.7 | 18.7 | 68.8 | 9.4 | 15.6 | 68.8 | 3.1 | 6.3 | 50.0 |
| Study 2 | | | | | | | | | | |
| Adults | Female | 86.7 | 0.0 | 19.4 | 74.2 | 6.5 | 22.6 | 70.0 | 6.7 | 33.3 |
| | Male | 0.0 | 61.3 | 22.6 | 0.0 | 58.1 | 25.8 | 3.3 | 70.0 | 16.7 |
| | Both | 13.3 | 38.7 | 58.1 | 25.8 | 35.4 | 51.6 | 26.7 | 23.3 | 50.0 |
| Peers | Female | 73.3 | 3.2 | 12.9 | 67.7 | 16.1 | 19.4 | 61.3 | 3.2 | 16.7 |
| | Male | 0.0 | 71.0 | 25.8 | 3.2 | 64.5 | 25.8 | 0.0 | 77.4 | 26.7 |
| | Both | 26.7 | 25.8 | 61.3 | 29.1 | 19.4 | 54.8 | 38.7 | 19.4 | 56.6 |



category (female, male, or both). Data from girls and boys were collapsed because there was no significant gender difference in the percentage of children with each response category.

In the ''adult testimony'' condition, when interviewed about adults, most children provided gender-stereotypic responses about ''color preference'' and ''object use,'' responding that women both favored pink and preferred to use pink objects and that men favored blue and preferred to use blue objects. Regarding ''knowledge,'' children provided gender-stereotypic responses as well, but to a lesser extent. They chose women or both genders, but not men, as knowing better about what pink things were used for. In contrast, they chose men or both genders, but not women, as knowing better about what blue things were used for. Across all three domains, more children chose ''both genders'' than either gender regarding yellow or yellow objects.

In the ''child testimony'' condition, when interviewed about peers, most children provided gender-stereotypic responses across all three domains: The majority thought that girls would like pink the best, would prefer to use or play with pink things, and would know better about what pink things were used for. In contrast, most children chose boys in response to the same three questions regarding blue or blue objects. They were more likely to choose both genders when asked about yellow or yellow objects.

To further explore children's gender-stereotypic attitudes, we created a gender-stereotype score in each domain for each child, by summing the number of instances in which the child chose only ''ladies/girls'' for pink objects and only ''guys/boys'' for blue objects, with a range from 0 to 2 (see Liben & Bigler, 2002). Higher scores indicated greater endorsement of gender stereotypes. Table 3 shows the means and standard deviations by condition and domain. Data from girls and boys were collapsed because there was no significant gender difference.

We then compared children's gender-stereotype scores to chance (1). One-sample *t*-tests revealed that children were gender-stereotyped about both adults and peers regarding ''color

TABLE 3
Mean Gender-Stereotype Scores by Condition and Domain (*SD* in Parentheses)

| | | *Gender stereotypes* | | |
|---|---|---|---|---|
| *Condition* | *N* | *Color preference* | *Object use* | *Knowledge* |
| Study 1 | | | | |
| Adults | 24 | 1.71 (0.62)** | 1.58 (0.65)** | 1.08 (0.93) |
| Peers | 32 | 1.63 (0.71)** | 1.72 (0.63)** | 1.69 (0.59)** |
| Study 2 | | | | |
| Adults | 31 | 1.50 (0.68)** | 1.32 (0.79)* | 1.40 (0.72)** |
| Peers | 32 | 1.43 (0.77)** | 1.32 (0.79)* | 1.39 (0.80)* |

*Note*. $^{**}p < .01$, $^{*}p < .05$, as compared to chance (1).



preference'' and ''object use,'' at a level significantly different from chance (see Table 3); $t$ ranged from 4.30 to 6.41, all $p$s $< .001$. Regarding ''knowledge,'' children were gender-stereotyped about peers, $t(31) = 6.57$, $p < .001$; their gender-stereotype score about adults did not exceed chance expectation, $t(23) = 0.44$, $p = .66$.

We also examined whether individual response patterns in testimony endorsement varied as a function of whether children themselves were more or less gender-stereotyped (in each domain and across all three domains). No significant relations emerged.

## Discussion

The results of this study suggest that speaker gender does have an impact on young children's learning from others, as indicated by a same-gender preference in children's evaluation of novel information provided by male versus female speakers. This preference was robust among nearly half of the children, as they consistently chose to agree with same-gender speakers over many trials.

Children did not seem to make gender-stereotypic judgments when deciding whose testimony they should accept, as their choice of speakers did not vary systematically as a function of object colors. If children consistently applied relevant gender stereotypes to their judgments, they would show a bias toward female speakers for the pink objects but a bias toward male speakers for the blue objects. Our results did not reveal such tendencies in children's performance. Children's responses to the interview questions indicated that they held gender stereotypes about peers and adults regarding color preferences and the likelihood of using objects of gender-typing colors. They also held gender stereotypes about peers regarding levels of knowledge about objects of gender-typing colors. Nevertheless, whether children were more or less gender-stereotyped did not seem to be related to their use of speaker gender in testimony endorsement.

Taken together, Study 1 shows that when learning about novel objects from the testimony of male versus female speakers, 4- and 6-year-olds often responded with a same-gender preference. Only in rare cases did they provide gender-stereotypic responses based on object colors. Why did the same-gender preference trump the use of gender stereotypes in this learning situation? One possibility is that the task did not require active evaluation of the informativeness of the

speakers. Instead children may have perceived the test question as simply about who was right and who was wrong and acted on a same-gender preference that might be an easily accessible heuristic. Perhaps in learning situations where one has to actively seek information and deliberately judge who would be a better source, children might bypass this shortcut to the same-gender preference and draw on the relevant gender stereotypes that they have formed. Study 2 was conducted to test this possibility. Four- and 6-year-olds were asked from which gender they would seek information about novel objects (of gender-typing colors or a gender-ambiguous color). The two potential informants were either adults (''ask adult'' condition) or children (''ask child'' condition).

## STUDY 2

### Method

#### *Participants*

The participants were 64 children, 32 in each of two age groups: 4-year-olds ($M = 4;7$; range = 4;1–5;0; 16 girls) and 6-year-olds ($M = 6;6$; range = 6;1–7;0; 16 girls). None participated in the first study. Four additional children were recruited but eliminated from the final sample due to shyness (1) or unusual response patterns (3). Most children came from White, middle-class families.

#### *Materials and Stimuli*

The same materials from Study 1 were used (i.e., 12 novel objects and 3 color cards). In the ''ask adult'' condition, the test stimuli were 12 pairs of pictures of the adult informants in Study 1. In the ''ask child'' condition, the same 12 pairs of child pictures in Study 1 were used.[3] In each condition, the pictures were presented in pairs (male vs. female) on a Macintosh computer in PowerPoint presentation (12 trials, 4 for objects of each color).

#### *Design and Procedure*

The study employed a 2 (age) × 2 (condition) × 3 (object color) mixed design. At each age, each child was randomly assigned to one of the two conditions, with the restriction that there were equal numbers of girls and boys in each condition. The procedure was identical in both conditions.

During the *test* phase, a female experimenter introduced children to the task: ''Today we're going to look at some new things. They're things perhaps you've never heard of before, but we can ask other people about them. Sometimes the lady (girl) will know better, and sometimes the guy (boy) will know better. Let's look at this object first.'' Then, the 12 test trials followed.

[3]As in Study 1, 16 adults rated the stimuli in each condition on the confidence level of each informant. Paired-samples *t*-tests revealed significant differences in the ratings for four pairs of informants (4/24; 1 in the ''ask adult'' condition and 3 in the ''ask child'' condition). Nevertheless, children's responses on these trials did not vary systematically as a function of the informant's confidence level.

On each trial, the experimenter first asked children to name the color of the novel object and say whether they had seen it before. Then the experimenter asked children to choose who they would ask to figure out what the object was used for: ''Which person would you ask, the lady (girl) or the guy (boy), if you want to know what this ___ [color] thing is for?'' After children indicated a clear choice, the experimenter proceeded with the next trial. After the *test* phase, an *interview* followed as in Study 1.

### Coding and Reliability

The experimenter noted children's choices online during both *test* and *interview* phases. A trained research assistant independently coded a randomly selected 50% of the sample from video recordings. There was no disagreement.



## Results and Discussion

As in Study 1, on each trial, a choice of the female speaker was coded ''1'' and a choice of the male speaker was coded ''–1.'' For objects of each color, children's score could range from −4 to 4. With this choice score as the dependent variable, object color (3) as the within-subjects factor, and condition (2) and participant gender (2) as the between-subjects factors, a mixed-design ANOVA revealed a significant main effect of object color, $F(2, 120) = 4.63$, $p = .02$, $\eta_p^2 = .072$. Post-hoc tests indicated that children were more likely to choose female speakers for the pink objects ($M = 0.97$, $SD = 2.49$) than for the blue ($M = -0.41$, $SD = 2.69$) or the yellow objects ($M = 0.03$, $SD = 2.56$), $t(63) = 2.57$, $p = .01$, and $t(63) = 2.20$, $p = .03$, respectively. Their responses for the blue and the yellow objects did not differ significantly.

The main effect of participant gender was also significant, $F(1, 60) = 27.81$, $p < .001$, $\eta_p^2 = .267$. In general, during the 12 trials, girls preferred to seek information from female speakers ($M = 2.81$, $SD = 3.76$), whereas boys preferred to look to male speakers ($M = -1.63$, $SD = 3.78$). No other main effects or interactions were significant.

To further explore the effect of participant gender, we compared children's performance to chance expectation (0), with data collapsed across age and condition for children of each gender. As shown in Figure 2, girls were more likely to choose female speakers for the pink and yellow objects at a level significantly different from chance, $M_{\text{pink}} = 1.38$, $SD_{\text{pink}} = 2.41$, $t(31) = 3.23$, $p = .003$; and $M_{\text{yellow}} = 1.13$, $SD_{\text{yellow}} = 2.21$, $t(31) = 2.88$, $p = .007$, respectively. They did not show this same-gender preference with the blue objects, $M_{\text{blue}} = 0.31$, $SD_{\text{blue}} = 2.49$, $t(31) = 0.07$, $p = .48$. In contrast, boys were significantly biased toward male speakers for the blue and yellow objects, $M_{\text{blue}} = -1.13$, $SD_{\text{blue}} = 2.73$, $t(31) = -2.33$, $p = .03$; and $M_{\text{yellow}} = -1.06$, $SD_{\text{yellow}} = 2.44$, $t(31) = -2.47$, $p = .02$, respectively. They slightly preferred female speakers for the pink objects, but not at a level significantly different from chance, $M_{\text{pink}} = 0.56$, $SD_{\text{pink}} = 2.55$, $t(31) = 1.25$, $p = .22$. These patterns indicate that children of both genders applied relevant gender stereotypes, at least to some degree, to their decisions about whom to ask to learn about the functions of novel objects.

Children's overall response patterns were coded in the same manner as in Study 1. The distributions of children with different response patterns were identical in the two conditions (see Table 1). With data from both conditions combined, when deciding which speaker they should

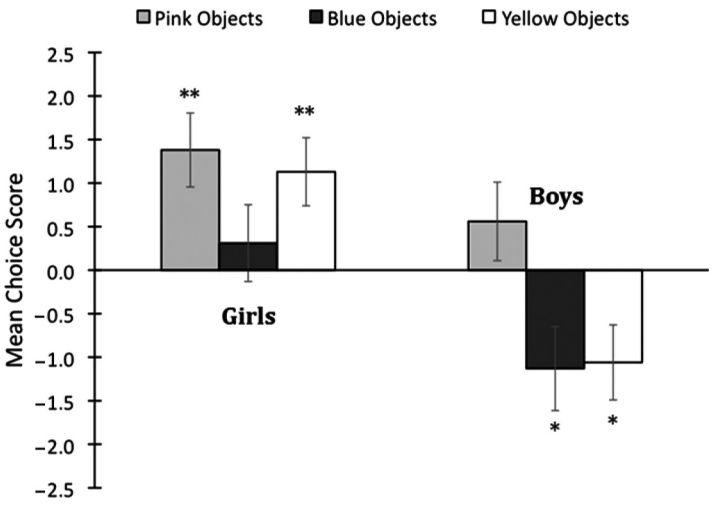


FIGURE 2 Mean choice scores in information seeking in Study 2 (by participant gender and object color; collapsed across age and condition). $^{**}p < .01$, $^{*}p < .05$, as compared to chance (0).



ask to determine the function of a novel object, 38 out of 64 children (59.4%) based their choices on speaker gender: 14 children (21.9%) exhibited a same-gender preference, and 24 children (37.5%) provided gender-stereotypic responses by choosing to ask female speakers for the pink objects but male speakers for the blue ones. The remaining 26 children (40.6%) responded randomly.

Although the two studies differed in a number of respects, for exploratory purposes, we compared children's overall response patterns across Studies 1 and 2. Chi-square test indicated a significant difference across studies, $\chi^2(2, 128) = 12.66$, $p = .002$. Post-hoc comparisons revealed that a significantly greater number of children exhibited a same-gender preference in testimony endorsement (30/64; Study 1) than in information seeking (14/64; Study 2), $\chi^2(1, 128) = 8.87$, $p = .003$. Paralleling this, a significantly greater number of children provided gender-stereotypic responses in information seeking (24/64; Study 2) than in testimony endorsement (9/64; Study 1), $\chi^2(1, 128) = 9.19$, $p = .002$.

Table 2 shows how children responded to the interview questions about gender-stereotypic attributes. Most children were gender-stereotyped about both adults and peers regarding ''color preference,'' and to a lesser extent regarding ''object use.'' In these two domains, no significant differences emerged between conditions (adults vs. peers) or across studies. However, unlike the results in Study 1, on interview questions regarding ''knowledge'' about objects of gender-typing colors, most children were gender-stereotyped about both adults and peers.

As in Study 1, we also created a gender-stereotype score in each domain for each child (see Table 3). Consistent with the results described above, one-sample *t*-tests revealed that children were gender-stereotyped about both adults and peers regarding ''color preference,'' ''object use,'' and ''knowledge,'' all at a level significantly different from chance (1); $t$ range = 2.27–4.01, $p < .01$ or .05. Recall that in Study 1, children were gender-stereotyped about peers, but not about adults, regarding knowledge about pink or blue objects.

It is possible that the different perceptions about adults across the two studies might have something to do with the different learning tasks that children had received prior to the interview about their gender-stereotypic attitudes. In this study, when seeking novel information from male versus female speakers, significantly more children made gender-differentiated choices that were consistent with relevant gender stereotypes. This ''mindset'' might have prompted some children to report gender stereotypes about adults regarding knowledge levels in the subsequent interview. Future work could manipulate the order in which children receive the interview and the learning task to examine whether one has a priming effect on the other.

We also conducted a set of analyses to examine whether individual response patterns in information seeking were associated with whether children were more or less gender-stereotyped (in each domain and across all three domains). No significant relations emerged.

In sum, Study 2 shows that 4- and 6-year-olds applied relevant gender stereotypes, at least to some degree, to their decisions about whom to ask to learn about the novel objects, as indicated by their patterns of responses to objects of gender-typing colors. When learning about objects of a gender-ambiguous color, children preferred to seek information from speakers of their own gender. Recall that in Study 1 children showed a robust preference for same-gender speakers in testimony endorsement for objects of both gender-typing and gender-ambiguous colors.

One concern arises regarding children's responses to objects of a gender-ambiguous color. In both studies, children's responses to the yellow objects might have been influenced by the presence of the pink and blue objects. That is, the gender-typing colors might have primed children's sensitivity to speaker gender in general, which could have contributed to the same-gender bias in children's responses to the yellow objects. It remains an open question whether children would be biased toward speakers of either gender if they were shown only the yellow objects that are gender-ambiguous, in the absence of gender-typing cues. Study 3 was conducted to address this question, in which we examined children's attention to speaker gender in testimony endorsement, with only the yellow objects used in the first two studies. If children still prefer the information provided by same-gender speakers, we will have additional evidence for children's sensitivity to speaker gender when learning novel information from others.



## STUDY 3

### Method

#### *Participants*

The participants were 16 children aged between 4 and 6 years old and included 8 girls ($M_{age} = 5;2$, range = 4;0–6;10) and 8 boys ($M_{age} = 5;1$, range = 4;0–6;5). None participated in the first two studies. Children were predominately from White, middle-class families.

#### *Materials, Stimuli, and Procedure*

The test materials were the four yellow objects used in Studies 1 and 2. There were four test trials, and the procedure was identical to the ''adult testimony'' condition in Study 1 (excluding the interview), with the video clips of adult speakers used for the yellow objects.

### Results and Discussion

Children's choice on each trial was coded in the same manner as in the first two studies (i.e., ''1'' for a choice of female speaker and ''–1'' for a choice of male speaker). Independent-samples *t*-test indicated a significant gender difference: Girls were more likely to endorse the testimony of female speakers ($M = 1.50$, $SD = 1.77$), whereas boys were more likely to endorse the testimony of male speakers ($M = -2.25$, $SD = 1.67$), $t(14) = 4.36$, $p = .001$. In addition, both girls and boys chose speakers of their own gender significantly more often than would be expected by chance (0), $t(7) = 2.39$, $p = .048$, and $t(7) = -3.81$, $p = .007$, respectively. Thus, in the absence of gender-typing cues, children still showed a robust preference for same-gender speakers when learning about novel objects of a gender-ambiguous color, which provides additional evidence for children's attention to speaker gender when learning from the testimony of others.

## GENERAL DISCUSSION

Many studies have shown that from a very early age children learn about gender as a social category and make stereotypic inferences about males and females in their social judgments (e.g., Liben & Bigler, 2002; Liben et al., 2001; Martin, 1989). Researchers have also shown that children use gender to decide whom to imitate and to guide their object and activity preferences (e.g., Bussey & Bandura, 1984; Grace et al., 2008; Martin et al., 1995; Ruble et al., 1981; Shutts et al., 2010). The present research provides some of the first evidence that young children are also sensitive to speaker gender when learning novel information from the testimony of others. This sensitivity to speaker gender may take different forms in different learning contexts.

In Study 1, when evaluating the novel information provided by male versus female speakers (i.e., testimony endorsement), children aged 4 and 6 years old responded with a same-gender preference by consistently favoring the statements of the speakers of their own gender. This favoritism of information from same-gender speakers is consistent with previous findings indicating the early emergence of children's preference for members from their own gender, racial, or ethnic groups in a wide range of social contexts (e.g., Dunham, Baron, & Banaji, 2006; Grace et al., 2008; Haugh et al., 1980; Hugenberg & Bodenhausen, 2004; Ruble & Martin, 1998; Rutland, Cameron, Milne, & McGeorge, 2005; Shutts et al., 2010).

A major manifestation of in-group favoritism is positive evaluation of others who are in-group members. Adults are biased to perceive their in-groups as having a variety of positive traits or qualities, such as being nicer, more helpful, more generous or fair, and more trustworthy than out-group members (e.g., Boldizar & Messick, 1988; Brewer, 1999; Brewer & Silver, 1978), and they show greater trust in in-group than out-group strangers if there is mutual understanding of shared group membership (Foddy, Platow, & Yamagishi, 2009). Young children are also biased to associate positive qualities with in-groups rather than out-groups (e.g., Dunham et al., 2006), such as attributing more positive and less negative traits to peers of their own gender than to the other (e.g., Haugh et al., 1980; Powlishta, 1995; Ruble & Martin, 1998). However, less is known about whether children, like adults, would place greater trust in in-group than out-group strangers in their learning through testimony. The current study provides new findings in this regard: After receiving conflicting statements from male versus female speakers, children

preferred to trust the same-gender speakers, suggesting that they might perceive speakers of their own gender as more accurate or trustworthy.

It is important to note that children's preference for same-gender speakers in testimony endorsement does not necessarily indicate that they perceive opposite-gender speakers as inaccurate or not trustworthy. People may prefer in-groups and view members of other social groups as somehow ''less good,'' but there is not necessarily negativity toward all out-groups (Allport, 1954; Cameron, Alvarez, Ruble, & Fuligni, 2001). Future work can address this issue by exploring whether—and if so, in what contexts—children's preference for what they are told by same-gender speakers equates to their mistrust of opposite-gender speakers.

In Study 2, when deciding whom to ask to learn about novel objects (i.e., information seeking), some children also preferred same-gender informants, but significantly more children provided responses that were associated with gender stereotypes involving gender-typing colors, as revealed by the individual response patterns. That is, children judged whether one gender would be more informative than the other depending on whether the object was typical of that gender, in a pattern consistent with relevant gender stereotypes.

Children's responses at the group level also suggested their use of gender stereotypes in information seeking, at least to some extent. In Study 2, when deciding from whom to seek information about novel objects of the color typical of their own gender, children generally preferred same-gender speakers. When seeking information about novel objects of the color typical of the opposite gender, children did not prefer same-gender speakers, but they also did not show a significant preference for opposite-gender speakers. A potential explanation for this pattern focuses on the alignment of children's same-gender biases with their knowledge of gender stereotypes. When learning about novel objects associated with stereotypes typical of their own gender—for example, girls learning about pink objects—same-gender biases and stereotype knowledge are aligned: Both indicate, in this example, that females should be preferred. However, when learning about objects associated with stereotypes typical of the opposite gender (e.g., girls learning about blue objects), same-gender biases come into conflict with stereotypic perceptions of the other gender (e.g., girls favor girls generally but believe that boys know more about blue things); as a result, responses appear random.

Stereotypes about specific social groups or types of individuals influence how children and adults perceive, remember, and interact with other people in many important ways (e.g., Leichtman & Ceci, 1995; Memon, Holliday, & Hill, 2006; Mulvey, Hitti, & Killen, 2010). Previous research has shown that when making social judgments, young children have differing expectations about males and females that are congruent with commonly held gender stereotypes (e.g., Boyatzis & Eades, 1999; Martin, 1989). Data from our second study indicate that when seeking novel information from other people, some children have gender-stereotypic conceptions of males and females as potential sources of information, at least to some extent. To our knowledge, this is the first demonstration that children use relevant gender stereotypes to guide their selective learning from the testimony of others.

Our informal comparison of children's response patterns across studies suggested that children exhibit more gender-stereotypic choices of speakers in information seeking than in testimony endorsement. Because the two studies differed in a number of respects, our explanations for this finding are tentative and should be confirmed in future research. One possible explanation for this difference is that information seeking requires children to make a more deliberate judgment about which speaker is a better source. This decision thus may draw on children's

repertoire of preexisting beliefs and expectations, especially when there is a perpetually salient prime to the gender stereotypes they may hold (e.g., gender-typing colors). Our explicit references to the colors of the novel objects may have served as such a prime. However, during testimony endorsement, children's choice of whose testimony they should accept does not necessarily call for such deliberate judgment; they can simply act on the in-group favoritism that is a more accessible heuristic and readily governs people's group-based interactions with others.

Although additional work is needed to fully explicate the role speaker gender plays in learning through testimony, the data reported here demonstrate that when learning from the testimony of others, many children aged 4 to 6 years old were sensitive to speaker gender, in that they preferred same-gender speakers in testimony endorsement and made gender-stereotypic choices when deciding from whom they should seek novel information. Nevertheless, some children did not show any sensitivity to speaker gender. Our data on individual response patterns suggest that in both studies, some children did not systematically use speaker gender and responded randomly, although like those who provided gender-driven responses, these children held gender stereotypes about color as revealed by our interview data. It is interesting to consider why these children were insensitive to speaker gender in the current learning contexts.

One possibility is that these children generally do not consider gender as a salient dimension in judgment making. Supporting this, previous research consistently finds that there are subgroups of children who do not systematically use gender when processing gender-relevant social information (e.g., Bigler, 1995; Levy, 1994). To date, it is not clear why these children differ from others who do exhibit gender-related responses. Alternatively, despite believing that males and females have different color preferences, some children might not perceive males and females to differ in informativeness, given that individual preference for one subject (e.g., pink objects) does not always lead to privileged knowledge about that subject. To begin to differentiate these alternatives, in future studies, researchers should include more general measures of gender stereotyping and sensitivity to gender as a dimension of judgment making and assess their relations to children's learning from male versus female speakers. Perhaps in domains where gender-based division of labor is highly salient, more children would make gender-differentiated decisions in their use of informants. For example, when learning how to fix a car engine, children might place greater weight on the testimony of men or prioritize men as a potential source to direct their inquiries. In contrast, when learning how to take care of infants with special needs, children might prefer to endorse the testimony of women or direct their questions to women. Future work is also needed to test these possibilities.

To conclude, the present research provides some of the first evidence that children as young as 4 years old are sensitive to speaker gender when learning novel information from others. This sensitivity was apparent in children's same-gender preference when evaluating the testimony of male versus female speakers, as well as in their gender-stereotypic choices of potential sources when seeking novel information. These findings have important implications for the ways in which different intergroup processes may influence children's knowledge acquisition.

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## APPENDIX

Statements About the Functions of Novel Objects

| *Novel object/color* | *Male speaker* | *Female speaker* |
|---|---|---|
| Cabinet flex lock/yellow | I think it's for lorping. | I think it's for daxing. |
| Light bulb changer/pink | I think it's for kratting. | I think it's for tiffing. |
| Wooden novel toy/blue | I think it's for blicking. | I think it's for stooving. |
| Egg separator/pink | I think it's for dasping. | I think it's for gooting. |
| Toilet tank water stopper/yellow | I think it's for doobing. | I think it's for zavving. |
| Tea ball/blue | I think it's for hoxing. | I think it's for balking. |
| Door stopper/pink | I think it's for bemming. | I think it's for wolping. |
| Cable clipper/blue | I think it's for meeling. | I think it's for fudding. |
| Sink water stopper/yellow | I think it's for sooding. | I think it's for gepping. |
| Wooden instrument/pink | I think it's for lorming. | I think it's for japping. |
| Citrus squeeze/yellow | I think it's for kyping. | I think it's for toding. |
| Fruit baller/blue | I think it's for gopping. | I think it's for looding. |