Speaker knowledge modulates the effects of generic language on essentialist beliefs

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Abstract

This research examines how language (generic vs. specific) and speaker knowledge (knowledgeable vs. unknowledgeable) influence essentialist beliefs about a novel social category in children and adults. Across two studies (N = 448 children, 433 adults), adults were more likely to endorse essentialist beliefs when knowledgeable speakers used generic descriptions. Children's responses varied by evaluation timing. In Study 1, when test questions were delayed, children's essentialist beliefs were influenced by language but not speaker knowledge. In Study 2, when memory demands were reduced by having children evaluate claims immediately after hearing them, children showed sensitivity to speaker knowledge, mirroring adults' responses. These findings highlight the role of language and contextual cues in shaping essentialist thought about social groups, suggesting that the effects of generics on social thought are dependent on the cultural expertise of the speaker.

Keywords: essentialism; language; speaker knowledge; generics; developmental psychology; pragmatic reasoning; social cognition

Introduction

Generic language — i.e., statements about kinds rather than specific individuals (e.g., "Birds fly", "Jews celebrate Passover", "Girls wear pink") — is frequent in everyday communication. Although such statements often sound innocuous, they can shape people's beliefs in ways that go beyond their explicit content. In particular, when people hear numerous generic descriptions of a category, they often develop more essentialist beliefs about the category, both in experimental contexts (Leshin, Leslie, & Rhodes, 2021; Rhodes et al., 2020; Rhodes, Leslie, & Tworek, 2012) and in everyday life (Gelman, Goetz, Sarnecka, & Flukes, 2008; Wang, Cardarelli, Leslie, & Rhodes, 2022). That is, they come to view the category and its features as determined by an underlying, fixed essence. Generics appear to do so even when they convey explicitly anti-essentialist (Benitez, Leshin, & Rhodes, 2022) or counter-stereotypical messages (Benitez, Foster-Hanson, & Rhodes, 2024), raising questions about how generic language impacts cognition.

Rhodes, Gelman, and Leslie (2024) proposed that people draw inferences from generics about category structure, which are separable from inferences drawn from the informational content of generic claims. On this account, listeners may interpret the use of generics as an indication that the *speaker* views the category in essentialist terms, leading them to adopt a similar perspective. This aligns with a hybrid account of generic language, in which both the content of generic claims and listeners' pragmatic inferences about speaker's beliefs and intent jointly shape essentialist beliefs. As such, the tendency for generics to lead to essentialism should depend on what the listener thinks about the speaker — specifically, whether they trust that the speaker is knowledgeable about the category. In the social domain, the tendency to essentialize particular social categories varies widely across contexts (Rhodes & Mandalaywala, 2017), thus for speakers to be reliable informants about the structure of particular social categories, they must have relevant, local cultural knowledge. This account thus predicts that the effects of generics on social thought will depend on the cultural expertise of the speaker. We tested this prediction in two experimental studies with children and adults.

Study 1 Methods

Participants

Children Participants included 215 children (aged 5.0-9.9, M_{age} = 7.37 years; 56% girls, 44% boys). The study was conducted on an unmoderated research platform designed for developmental psychology studies (Rhodes et al., 2020). Two additional children participated but were excluded for completing an insufficient number of test questions ($<$ 50%), as specified in our pre-registration. The racial-ethnic composition of the final child sample (as reported by children's parents) was 63.72% White, 8.83% Multiracial, and 13.95% Asian; 7.91% declined to provide this information.

Adults 220 adults were recruited via Prolific to participate in an identical 15-minute study. Our final sample included 216 adults (49.07% female, 1.85% non-binary, M_{age} = 41.46 years, range = 19–77). Four additional adults participated but were excluded for completing an insufficient number of test questions, as specified in our pre-registration. The racial-ethnic composition of the final adult sample was 77.31% White, 7.87% Asian, 12.96% Black, 0.92% American Indian or Alaskan Native, and 0.92% unreported.

Procedure

Study 1 employed a 2 (language: generic vs. specific) by 2 (speaker knowledge: knowledgeable vs. unknowledgeable) fully crossed between-subjects design, with participants randomly assigned to one of four experimental conditions. The study consisted of a series of short videos followed by

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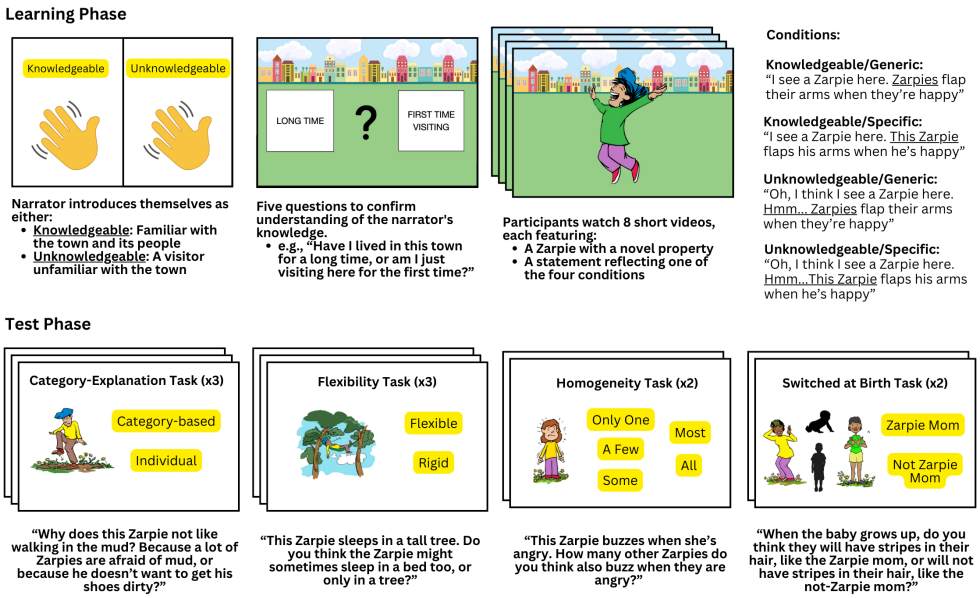

Figure 1: Summary of the full study protocol, including sample statements from each condition (generic vs. specific; knowledgeable vs. unknowledgeable speaker) and example items from the essentialism measures.

narrated questions. Participants provided their responses by clicking on designated buttons displayed on the screen. Both child and adult participants completed identical versions of the study (Figure 1).

Participants were shown a brief introduction in which a narrator invited them to explore a town together. Depending on the knowledge condition, the narrator stated either that they were knowledgeable about the town (i.e., "I've lived in this town for a long time and know the people here very well") or unknowledgeable about the town (i.e., "I've never been to this town before and don't know much about the people who live here"). Following this introduction, participants completed five manipulation checks assessing whether participants understood the narrator's claims about their knowledge of the town and made appropriate inferences about whether the narrator would know key facts (i.e., the location of the park, the name of the local sports team, and what music is popular there). Children responded accurately (e.g., that the narrator would know these things in the knowledgeable conditions and not in the unknowledgeable conditions) 94.50% of the time and adults responded accurately 94.82% of the time, indicating that the knowledge manipulation was effective in both populations. As detailed in our pre-registration, all participants, regardless of the accuracy of their responses, were provided with the correct answers immediately afterward and retained in the analyses. Finally, the narrator introduced a novel category of people referred to as "Zarpies" who live in the town. To manipulate perceived speaker knowledge, we used a framing-based cue (e.g., certainty vs. hedging), consistent with research showing that subtle linguistic frames influence how listeners interpret speaker knowledge (Flusberg et al., 2024). The narrator either confidently stated, "There are people in my town called Zarpies. Let's see if we can find some!" (knowledgeable condition), or hedged, "I'm not sure if this is true, but I think that there are people in this town called Zarpies. Let's see if we can find some!" (unknowledgeable condition).

Next, participants were shown eight videos in which the narrator encounters a single Zarpie exhibiting a novel property (e.g., having stripes in their hair; drawing stars on their knees). In each video, the narrator identifies the Zarpie and makes a statement about the depicted property or behavior, following one of four combinations of language and speaker knowledge: (a) generic/knowledgeable speaker, (b) generic/unknowledgeable speaker, (c) specific/knowledgeable speaker, or (d) specific/unknowledgeable speaker (see Table 1 for a complete list of properties included in the videos). Speaker knowledge was again manipulated through subtle framing (e.g., hedging vs. confident tone). Full study scripts and materials, including a video of the complete procedure for all 4 conditions, can be viewed on OSF: https://osf.io/n4s35/.

Measures

Participants completed the following tasks to assess multiple components of essentialist thinking, reflecting the view that essentialism consists of a cluster of interrelated beliefs rather than a single dimension (Gelman, 2003; Haslam, Rothschild, & Ernst, 2000; Medin & Ortony, 1989; Waxman, Medin, & Ross, 2007):

1. **Category-Based Explanations:** The first essentialism task measured assessed whether participants endorsed

Table 1: Zarpie properties

1. [...] loves to eat flowers.
2. [...] has stripes in her hair.
3. [...] climbs tall fences.
4. [...] flaps her arms when she is happy.
5. [...] likes to sing.
6. [...] draws stars on her knees.
7. [...] bounces a ball on his head.
8. [...] sleeps in a tall tree.

category-based explanations for individual behavior—an indicator of the belief that category membership reflects underlying, explanatory essences (Cimpian & Markman, 2011; Gelman, 2003; Taylor, Rhodes, & Gelman, 2009). Participants chose between two explanations for a Zarpie's behavior (e.g., "Why does this Zarpie not like walking in the mud? Do you think it's because a lot of Zarpies are afraid of mud (coded 1) or because he doesn't want to get his shoes dirty (coded 0)?").

2. **Flexibility of Category Boundaries:** The second essentialism task assessed participants' belief that category membership entails strict, non-overlapping behavioral expectations (Gelman, 2003; Rhodes, Gelman, & Karuza, 2014; Roberts, Ho, Rhodes, & Gelman, 2017). Participants decided between two options regarding whether a Zarpie's behavior could vary (e.g., "This Zarpie sleeps in a tall tree. Do you think the Zarpie sometimes sleeps in a bed too (coded 0), or only in a tree (coded 1)?").

3. **Within-Category Homogeneity:** The third essentialism task assessed participants' belief that members of a social category share non-obvious, intrinsic similarities (Rhodes & Mandalaywala, 2017; Diesendruck & HaLevi, 2006; Waxman, 2012). Participants estimated how many Zarpies exhibited a property held by one Zarpie using a five-point scale (e.g., This Zarpie buzzes when she's angry. How many other Zarpies do you think also buzz when they are angry? "only one," "a few," "some," "most," or "all"), with scores ranging from least (1) to most (5) essentialist.

4. **Heritability of Category-Linked Properties:** The last essentialism task assessed participants' belief that category-linked traits are biologically inherited rather than learned using a switched-at-birth paradigm (Gelman, 2003; Gelman & Wellman, 1991; Rhodes et al., 2012). Participants were introduced to a "Zarpie mom" and a "not Zarpie mom." They answered whether the child of a Zarpie raised by a non-Zarpie retained traits of the Zarpie parent (e.g., "Do you think the kid will have stripes in their hair, like the Zarpie mom (coded 1), or will not have stripes in their hair, like the not-Zarpie mom (coded 0)?").

Study 1 Results

We analyzed trial-level binary responses (coded 1 for essentialist and 0 for non-essentialist) across the four measures: (1) category-based explanations, (2) flexibility of category boundaries, (3) heritability of category-linked properties, and (4) within-category homogeneity. To allow for consistent comparison across essentialism measures, we recoded the within-category homogeneity responses into a binary format using a median split. Although this approach reduces granularity, it was necessary to analyze all items within a unified modeling framework. We analyzed the effects of speaker knowledge (knowledgeable vs. unknowledgeable) and language condition (generic vs. specific) on participant response using a mixed-effects logistic regression model with main effects of speaker knowledge, language condition, and (where applicable) age or age group, along with all interactions. For the children's analysis, age was included as a continuous, mean-centered variable. In the combined model (children and adults), we included age group (child vs. adult) as a predictor. Random intercepts for item and participant ID accounted for variability across test items and individual differences.

To assess whether responses varied systematically by item type, we included dummy-coded predictors for each measure with category-based explanations as the reference category. No significant differences emerged between item types (all ps $> .05$). Additionally, likelihood ratio tests comparing models with and without item-type predictors revealed no significant improvement in model fit for adults, children, or the combined sample (all ps $> .05$). Thus, item type did not meaningfully affect essentialist responses, and simpler models were retained.

The effects of generic language were modulated by speaker knowledge among adults but not children (as revealed by a knowledge*language*age interaction, Wald $\chi^2(1) = 5.24$, $p < 0.05$, see Figure 2). Adults endorsed more essentialist views of Zarpies when they heard generic (rather than specific) descriptions of Zarpies from a knowledgeable speaker, but not otherwise (Wald $\chi^2(1) = 4.96$, $p < 0.05$). When the speaker was knowledgeable, adults were 2.2 times as likely to provide an essentialist response in the generic condition than in the specific condition ($\beta = 0.79$, $p < 0.001$). In contrast, children endorsed more essentialist views of Zarpies when they heard generic (rather than specific) descriptions, regardless of speaker knowledge. Specifically, children were 1.2 times as likely to provide an essentialist response in the generic condition than in the specific condition (β =0.186, 95% CI = [0.03, 0.33]). The effect of generic language increased with age, as revealed by a significant interaction between language and mean-centered age (Wald $\chi^2(1) = 5.87$, $p < 0.05$).

Study 1 Discussion

Study 1 confirmed that adults consider the knowledge state of the speaker when interpreting generic language: they developed more essentialist beliefs about the novel category when they heard it described generically by a knowledgeable

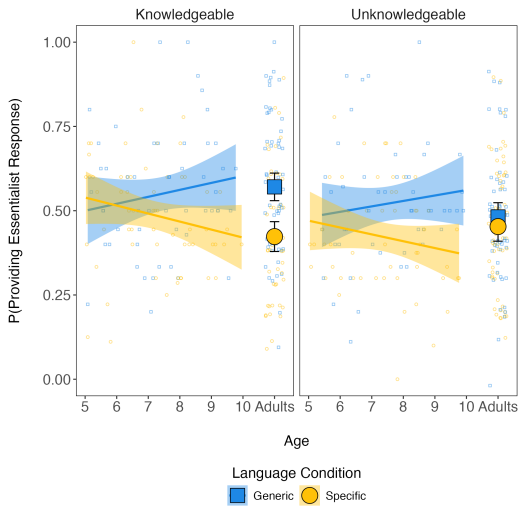

Figure 2: Three-way interaction between language, speaker knowledge, and age, (Wald $\chi^2(1) = 5.24$, $p < 0.05$). Points represent individual mean responses and shaded regions represent 95% confidence intervals for child participants. Adult mean responses are displayed as larger points with error bars representing 95% confidence intervals.

speaker but not an unknowledgeable one. These findings are consistent with the proposal that one way generic language shapes social thought is by signaling to listeners how the speaker views the category. On the other hand, children disregarded the information about speaker knowledge in this context—they developed stronger essentialist beliefs about the category when they heard it described generically, regardless of the knowledge state of the speaker. This is striking given our evidence that children understood the knowledge manipulation—95% of children correctly answered questions confirming this to be the case (e.g., to questions about whether the speaker would know the name of the town's sports team and so on, children in the knowledgeable condition correctly responded "yes" and in the unknowledgeable condition responded "no"). Notably, even younger children have been shown to incorporate speaker knowledge in other contexts. For example, by ages 3 and 4, children prefer to learn words from speakers who have accurately labeled similar objects in the past (Koenig & Woodward, 2010).

Therefore, it is somewhat surprising that children did not appear to consider speaker knowledge in this context. There are several interesting possibilities for why this might be the case. For example, perhaps children do not expect that local cultural knowledge is relevant to whether a particular social category is essentialized. They might view social categories as more objective facts about the world (Kalish & Lawson, 2008; Rhodes & Gelman, 2009) and expect that a visitor could simply "see" this dimension of social organization and know how to describe it informatively. Another possibility, though, is that speaker information may not be stored in memory for very long. Although young children attend to speaker information in some circumstances, most experiments where they do so show effects on a trial-by-trial basis (i.e., testing what children learn from different speakers immediately after they hear the relevant language). The present experiment instead presented a learning phase where they heard all of the language, followed by a test phase where they answered all of the questions. It is possible that the speaker information was lost from children's memories over the course of the experiment, so that when it came to answering the test questions, they recalled the generics but not the speaker's knowledge state. To test for this possibility, we conducted a second study which examined whether children respond differently to generics from knowledgeable vs. unknowledgeable speakers when they are tested on a trial-by-trial basis instead of with separate learning and test phases.

Study 2 Methods

Participants

Children Participants included 233 children (aged 5.1-9.9, M_{age} = 7.53 years; 54% girls, 46% boys). The racial-ethnic composition of the final child sample (as reported by children's parents) was 56.65% White, 13.73% Multiracial, 6.43% Black, and 14.59% Asian; 8.58% declined to provide this information.

Adults Two hundred and twenty adults were recruited via Prolific to participate in an identical 15-minute study. Our final sample included 217 adults (49.31% female, 1.38% non-binary, Mage = 38.74 years, range = 18–83). Three additional adults participated but were excluded for completing an insufficient number of test questions, as specified in our preregistration. The racial-ethnic composition of the final adult sample was 68.66% White, 13.36% Asian, 13.82% Black, 2.30% American Indian or Alaskan Native, and 1.84% unreported.

Procedure

Study 2 closely resembled Study 1, with several minor and one major modification. Minor changes aimed to make the speaker's knowledge easier for young children to track: we added a visual depiction of a named narrator and speaker, and introduced an additional scene in which the speaker either correctly (knowledgeable condition) or incorrectly (unknowledgeable condition) identified the town library. The major change was to the structure of the task: rather than separating learning and test phases, children evaluated each statement immediately after hearing it, reducing memory demands.

Each trial consisted of a narrated video introducing a Zarpie with a novel property or behavior, accompanied by a statement reflecting one of the four combinations of language and speaker knowledge (training phase), immediately followed by a test question; see Figure 3. Specifically:

1. Three trials tested category-based explanations: after the

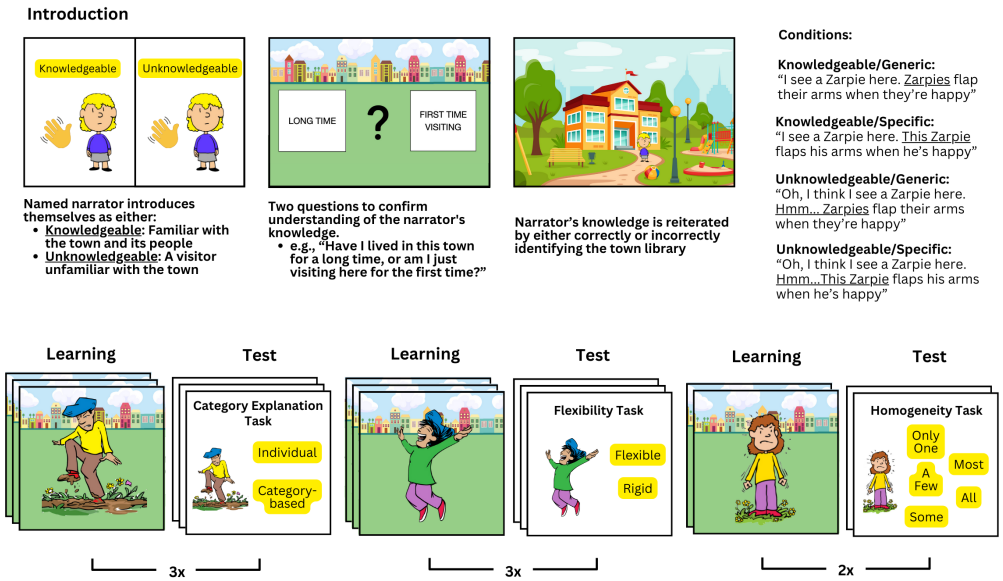

Figure 3: Summary of the full study protocol, including sample statements from each condition (generic vs. specific; knowledgeable vs. unknowledgeable speaker) and example items from the essentialism measures. A trial-by-trial design was used, allowing participants to evaluate each statement immediately after hearing it, reducing memory demands.

statement, children answered a category explanation question.

2. Three trials tested flexibility of category boundaries: after the statement, children answered a flexibility question.

3. Two trials tested within-category homogeneity: after the statement, children answered a homogeneity question.

Study 2 Results

Initial analyses in Study 2 were conducted at the trial level, using binary essentialism responses across the four tasks. The effects of the manipulations were assessed on these trial-level responses. As in Study 1, responses did not vary systematically by item type and there was no improvement in the model with dummy coded item-type predictors (all ps > 0.05).

Unlike in Study 1, the effects of generic language were modulated by speaker knowledge among both children and adults, as indicated by a significant interaction between language and speaker knowledge (Wald $\chi^2(1) = 8.94$, $p < 0.01$), which was not moderated by age. In the knowledgeable condition, participants were 3.05 times as likely to endorse essentialist beliefs when generic language was used ($\beta = 1.10$, $p < 0.0001$). Among adults examined separately, the two-way interaction was reliable (Wald $\chi^2(1) = 4.49$, $p < 0.05$). When the speaker was knowledgeable, adults were 3.01 times as likely to provide an essentialist response in the generic condition ($\beta = 1.10$, $p < 0.0001$) than in the specific condition. In contrast, when the speaker was unknowledgeable, no significant effect of language was found ($p > 0.10$).

To examine possible developmental effects in more detail, we also examined children on their own, with age as a con-

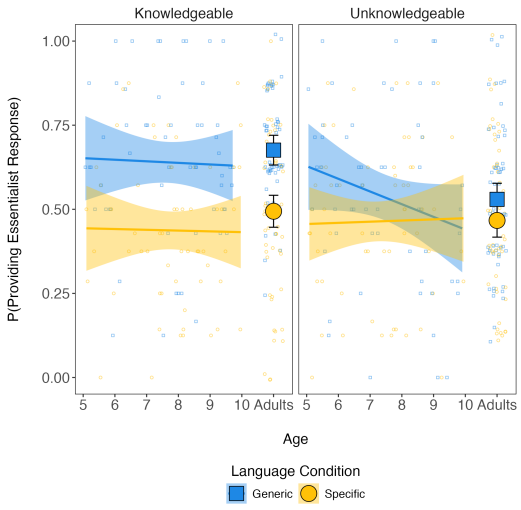

Figure 5: Two-way interaction between language, and speaker knowledge (Wald $\chi^2(1) = 5.24$, $p < 0.05$). Points represent individual mean responses and shaded regions represent 95% confidence intervals for child participants. Adult mean responses are displayed as larger points with error bars representing 95% confidence intervals.

tinuous predictor. As in the overall analyses, the effect of language varied based on speaker knowledge among children examined on their own (Wald $\chi^2(1) = 4.78$, $p < 0.05$). When the speaker was knowledgeable, children were 3.15 times as likely to provide an essentialist response in the generic condition ($\beta = 1.15$, $p < 0.0001$) than in the specific condition. In contrast, when the speaker was unknowledgeable, no significant effect of language was found ($p > 0.10$). Although these effects did not vary by participant age, visual inspection of the data (see Figure 5), suggested that speaker knowledge began to modulate the effects of generics across middle childhood. Indeed, further analysis (determined using the Johnson-Neyman technique; Johnson & Fay, 1950), identified that the effect of speaker knowledge became statistically significant in the generic condition around age 7 and not earlier, suggesting that older children were more likely to differentiate between knowledgeable and unknowledgeable speakers when interpreting generic statements. Given that the three-way interaction with participant age was not reliable, however, these possible age-related changes should be interpreted with caution.

General Discussion

The present studies examined how speaker knowledge moderates the adoption of essentialist beliefs about novel social groups after hearing generic language. Across both studies and in line with previous research, we found that generic language promotes stronger essentialist beliefs compared to specific language. Additionally, speaker knowledge moderated this effect, such that participants were more likely to exhibit essentialist beliefs when the speaker was knowledgeable rather than unknowledgeable. Notably, while this effect was only observed in adults in Study 1, Study 2 demonstrated that children between the ages of 5 and 10 years old also exhibited sensitivity to speaker knowledge when the task's memory demands were reduced using a trial-by-trial design.

These findings support the hypothesis that, in part, generic language shapes social thought by signaling a speaker's beliefs about category structure. If listeners infer that a knowledgeable speaker is using generic language to express a belief in a coherent social category, they may adopt this representation themselves, trusting the cultural knowledge the speaker conveys. In contrast, they are less likely to adopt this representation when the speaker lacks relevant knowledge. The striking finding that at least children aged 7 and older exhibit this pattern suggests that they are beginning to integrate speaker knowledge into their interpretation of generic statements. This suggests that children in this age range are increasingly capable of sophisticated pragmatic reasoning about what a speaker's use of generic statements means about the world.

At the same time, findings from younger children remain less clear. While Study 1 suggested that children do not consider speaker knowledge when forming essentialist beliefs, Study 2 showed that reducing memory demands allowed them to do so. It is notable, however, that when the memory demands were greater, children essentialized the category more upon hearing generic language, regardless of condition – i.e., even when the speaker was not knowledgeable. That is, it seems that a combination of memory resources and pragmatic reasoning is needed to *attenuate* the effects of generic language. Absent those qualifiers, generic language fosters essentialism, even when it comes from an unreliable source.

Given the complexity of these findings, further research is needed—ideally with higher-powered samples and a broader age range—to better understand the factors at play. One promising direction involves examining how participants, especially children, determine whether a speaker is knowledgeable when cues are more ambiguous. While our studies clearly signaled speaker knowledge, real-world learning often involves subtler indicators (e.g., prior accuracy, confidence, or social roles). Additional conditions that vary these cues could help uncover what information participants use to infer epistemic reliability. We also plan to investigate domains that do not rely on culturally specific knowledge—such as animal categories—to clarify the generalizability of these effects and further isolate the roles of speaker knowledge and language in shaping essentialist beliefs.

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