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The Role of Generic Language in the Early Development of Social Categorization

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Classifying people into categories not only helps humans simplify a complex social world but also contributes to stereotyping and discrimination. This research examines how social categorization develops by testing how language imbues with meaning otherwise arbitrary differences between people. Experimental studies (N = 129) with 2-year-olds showed that generic language—language that refers to abstract kinds—guides the development of social categorization. Toddlers learned a new category after hearing generic language about individuals who shared an arbitrary perceptual feature but not after hearing matched specific language, simple labels, or plural (but nongeneric) language about the same set of individuals. These findings show how subtle linguistic cues shape the development of social categorization.

Classifying people into categories is a fundamental means by which we make sense of the social world. If people pass a woman wearing a hijab on the street, for example, social categorization will constrain their perceptions (e.g., of her skin color or emotional state; Dunham, Chen, & Banaji, 2013; Levin & Banaji, 2006), inferences (e.g., regarding her beliefs or behaviors; Birnbaum, Deeb, Segall, Ben-Eliyahu, & Diesendruck, 2010; Diesendruck & HaLevi, 2006), and behavior (e.g., how they respond if she approaches to ask for directions; Levine, Cassidy, Brazier, & Reicher, 2002). Social categorization helps people simplify a complex social environment but often leads to stereotyping and discrimination (Macrae & Bodenhausen, 2000). All of these processes rest on the passersby (a) having the concept *Muslim* and (b) recognizing the hijab as a marker of category membership. Otherwise, the hijab might be viewed simply as a personal preference for a scarf, and all of the processes described above would be blocked. Yet, how social categories are acquired remains unknown. This research tests whether generic language—language that refers to abstract kinds—guides the acquisition of social categories in early childhood.

Social categorization presents a challenging learning problem. To acquire the social category described above, for example, people must view a particular perceptual feature (e.g., a hijab) as marking fundamental similarities among people who otherwise vary markedly (Waxman & Grace, 2012). People must learn to recognize markers of social categories with a high level of specificity (e.g., to realize that a type of scarf denotes a category; but the color of a person's shoes does not) and in a manner particular to their cultural environment. The criteria that define social categories (e.g., race, religion, social class) and the qualities that mark memberships (e.g., clothing, physical features, accents, behaviors) are both highly variable across contexts (Cosmides, Tooby, & Kurzban, 2003; Hirschfeld, 1996).

Young infants perceive some of the features that adults treat as marking social categories (e.g., race, gender; Bar-Haim, Ziv, Lamy, & Hodes, 2003; Waxman & Grace, 2012). Yet, attention to other markers (e.g., markers of religious groupings) and tendencies to treat any features (even those perceived within the first year of life) as a basis for social

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preferences or as indicating fundamental similarities, develop between the ages of 2 and 5 years and continue to change in culture-specific ways across childhood (Deeb, Segall, Birnbaum, Ben-Eliyahu, & Diesendruck, 2011; Diesendruck, Goldfein-Elbaz, Rhodes, Gelman, & Neumark, 2013; Kinzler & Spelke, 2011; Rhodes & Gelman, 2009; Rhodes, Leslie, & Tworek, 2012). Thus, some form of cultural input must guide the development of culture-specific social categories in early childhood. Given the social significance of these categories—especially their propensity to figure in stereotyping and prejudice—it is critical to understand the processes that underlie their acquisition and development.

Language is a key form of input that guides the development of categorization. The use of nouns to label nonsocial categories (e.g., artifacts and animals) triggers infants as young as 3 months to search for commonalities among members of a class, facilitating category acquisition (Ferry, Hespos, & Waxman, 2010; Fulkerson & Waxman, 2007; Waxman & Hall, 1993). In the social realm, labeling also facilitates categorization, at least among somewhat older children. For example, Waxman (2010) found that 4-year-olds used social categories based on race and gender to infer individual preferences when the categories were marked by labels but not otherwise. Also, Dunham, Baron, and Carey (2011) found that labeling novel social categories increased 5-year-olds' in-group preferences in a minimal group paradigm (see also Baron, Dunham, Banaji, & Carey, 2014; Bigler, Jones, & Lobliner, 1997; Patterson & Bigler, 2006).

Yet, in the toddler years, when children are just beginning to acquire culture-specific social categories, it is much less clear whether noun labels facilitate the acquisition of social categories. Using a match-to-sample task, Diesendruck and Deblinger-Tangi (2014) found that labeling facilitated social categorization among 19-month-old toddlers *only* when the categories reflected already emerging social concepts. In this work, 19-month-olds reliably categorized based on race and gender after seeing labeled exemplars (e.g., after seeing six exemplars of women labeled, "Look, a Tiroli," they reliably picked out a woman when asked to find another category member) but not if the same exemplars were presented without labels. Labels did not lead 19-month-olds to learn entirely new ways of grouping people, however. When 19-month-olds were introduced to novel, arbitrary groups based on clothing colors (e.g., red group vs. blue group), they reliably selected color *contrasts* if the original exemplars were presented without a label (e.g., after seeing six people wearing red, they reliably selected someone wearing blue when asked to find another category member at test). Hearing the original six individuals marked by a shared label significantly reduced this tendency; children in the label condition selected color matches and color contrasts equally often. Thus, although hearing a label may have begun to lead children in the direction of learning the new category (in that it appears to have inhibited a tendency to pick color contrasts), it was not sufficient to lead children to acquire the new category. In this study, labels also did not lead slightly older children—26-month-olds—to learn new, arbitrary criteria for categorization; when these children were presented with an arbitrary social category based on shirt color in the presence of labels, they chose category matches during test trials only 44% of the time. Based on this prior work, noun labels appear insufficient to lead toddlers to acquire entirely new ways of categorizing people.

Thus, although labeling increases preschool-age children's use of social categories (Baron et al., 2014; Dunham et al., 2011; Waxman, 2010) and facilitates social categorization among younger children if they have already begun to acquire the relevant social concepts (e.g., for gender, Diesendruck & Deblinger-Tangi, 2014), noun labels appear insufficient to trigger young children to acquire new social categories. Thus, it is critical to determine what processes get this component of learning off the ground.

Here, we consider that a richer form of linguistic input—generic language—might guide the initial acquisition of social categories in the toddler years. Generic language refers to abstract coherent kinds, instead of the specific individuals or subsets (e.g., "Italians eat pasta," "Jews celebrate Passover" are generic, whereas "These Italians eat pasta," "Some Jews celebrate Passover" are not; Carlson & Pelletier, 1995). By at least 30 months, children interpret generic language as referring to *kinds*; for example, Graham, Nayer, and Gelman (2011) found that 30-month-olds were more likely to generalize properties described with generic statements (e.g., "Blicks drink milk") to other members of the referenced kind, presumably because they interpreted such statements as describing the properties of an abstract category not only pictured exemplars. We hypothesized that hearing generics could also facilitate category learning (an even more basic process than the types of generalization studied by Graham et al., 2011) at this young age, by providing a strong linguistic cue to the presence of a meaningful category, which would then lead children to

search for commonalities across the pictured exemplars. That is, upon hearing generic language, children may infer that the category in question is meaningful rather than arbitrary and so pay attention to features that mark membership in it.

Early social categorization is a context where generics could serve a particularly powerful role, by guiding children to treat social divisions as meaningful when they would not otherwise do so. Prior work has shown that generic language enhances older children's use of social categories for a variety of social-cognitive processes (Cimpian & Markman, 2011; Gelman & Heyman, 1999; Rhodes et al., 2012); here we test whether generic language might play a critical role in how children acquire culture-specific social categories in the first place.

Study 1

Method

Participants

Toddlers (N = 97; M_{age} = 32.05 months, SD = 2.01 months, range = 28.09–35.88 months; 44 male, 53 female) were recruited from and tested at the Children's Museum of Manhattan. Data for all studies were collected between July 2013 and March 2016. An additional 16 toddlers began testing but were excluded (5 for parental interference, 1 for experimenter error, and 10, plus an additional 5 in Study 2, for refusing to answer the test questions). Across Studies 1 and 2, participants were approximately 60% European American, 7% African American, 10% Hispanic, 7% Asian, and 16% multiethnic. All participants spoke English as their first language. The Institutional Review Board of New York University approved all study procedures. Parents of participating children provided written informed consent.

For the first 64 children who participated, children were randomly assigned to the generic or specific condition. Subsequently, an additional 33 children were assigned to a no label control condition. For ease of interpretation, we present the data from all three conditions together in Study 1. After Study 1, 21 of the children also completed a pilot version of a similar study to examine animal categorization (available in the Supporting Information).

Procedures

We tested our hypothesis via a match-to-sample task (Diesendruck & Deblinger-Tangi, 2014; Waxman & Hall, 1993). First, children completed two warm-up trials, in which they were shown three pictures of a familiar object ("Look! This is a ball") and then were shown a pair of items (e.g., a ball and a teddy bear) and asked to point to another target item (e.g., "Can you point to the ball?").

Next, during the learning phase, toddlers were shown six individual people wearing the same clothing color. Each individual was introduced and described according to condition (e.g., in the generic condition, "Look this is a Zarpie! Zarpies whisper when they talk"; in the specific condition, "Look this is a Zarpie! This Zarpie whispers when she talks"; in the no label condition, "Look at this one! This one whispers when she talks"), as shown in Figure 1. Then, the original six individuals were removed, and children were presented with the six test items, one at a time. Each included pairs of people wearing contrasting colors (one matched the clothing shown during the preceding learning phase). Children were asked to point to another member of the category shown during learning (for condition-specific wording, see Figure 1). A reliable tendency to point to the person wearing the same color as the preceding stimuli suggests that children learned the category. Whether the target color was red or blue and presented on the right or left for the test items were counterbalanced across participants.

Results

We first ran a binomial regression model testing for main and interactive effects of language type and age (entered as a continuous variable) on the probabilities of selecting category matches. We considered participant age in this analysis because of previous findings (cited earlier) that specific noun labels influence social categorization in the preschool years; thus, we wanted to test whether the effects of generic and specific language would change as children approached their third birthday. Overall, the sample of 2-year-olds selected category matches more often in the generic condition (M = 0.74, CI [0.67, 0.80]) than in the specific condition (M = 0.50, CI [0.42, 0.57]) or the no label condition (M = 0.41, CI [0.34, 0.48]); main effect of condition, Wald $\chi^2(2) = 11.22$, $p = .004$. The specific and no label conditions did not differ from one another ($p = .1$).

There was also a main effect of age, Wald $\chi^2(1) = 10.70$, $p = .001$, and a Condition × Age interaction, Wald $\chi^2(2) = 10.35$, $p = .006$. To begin to examine this interaction, we first tested for an effect of age separately within each condition. Age predicted

Trial	Stimulus	Generic Language	Specific Language	No Label	No Properties	Specific Language Plural
Learning 1		This is a Zarpie. Zarpies eat flowers.	This is a Zarpie. This Zarpie eats flowers.	Look at this one. This one eats flowers.	This is a Zarpie.	This is a Zarpie. This is a Zarpie.These Zarpies eat flowers.These Zarpies stay awake at nighttime.
Learning 2		This is a Zarpie. Zarpies stay awake at nighttime.	This is a Zarpie. This Zarpie stays awake at nighttime.	Look at this one. This one stays awake at nighttime.	This is a Zarpie.	
Learning 3		This is a Zarpie. Zarpies climb walls.	This is a Zarpie. This Zarpie climbs walls.	Look at this one. This one climbs walls.	This is a Zarpie.	This is a Zarpie. This is a Zarpie. These Zarpies climb walls. These Zarpies play with bugs.
Learning 4		This is a Zarpie. Zarpies play with bugs.	This is a Zarpie. This Zarpie plays with bugs.	Look at this one. This one plays with bugs.	This is a Zarpie.	
Learning 5		This is a Zarpie. Zarpies bounce balls on their head.	This is a Zarpie. This Zarpie bounces balls on her head.	Look at this one. This one bounces balls on her head.	This is a Zarpie.	This is a Zarpie. This is a Zarpie. These Zarpies bounce balls on their head. These Zarpies whisper when they talk.
Learning 6		This is a Zarpie. Zarpies whisper when they talk.	This is a Zarpie. This Zarpie whispers when she talks.	Look at this one. This one whispers when she talks.	This is a Zarpie.	
6 Test Pairs		Can you point to the Zarpie?	Can you point to the Zarpie?	Let's find some more! Which of these two is the same as we saw before?	Can you point to the Zarpie?	Can you point to the Zarpie?

Figure 1. Overview of the experimental task.

performance in the specific label condition, Wald $\chi^2(1) = 15.57$, $p < .001$, but not in the generic condition ($p = .99$) or the no label condition ($p = .22$). In the specific condition only, increasing age was associated with more category matches, $r = .41$, $p = .02$.

To further test how the patterns varied by age, we divided children into two age groups: younger 2-year-olds ($N = 48$; $M_{age} = 30.34$, range = 28.09–32.00; 16 per condition) and older 2-year-olds ($N = 49$, $M_{age} = 33.73$, range = 32.01–35.88; 16 in the generic and specific conditions, 17 in the no label condition), and tested for the effect of language condition separately in each age group. As shown in Figure 2, this analysis revealed a very similar pattern across these two groups, main effect of condition: younger 2-year-olds, Wald $\chi^2(2) = 29.77$, $p < .001$; older 2-year-olds, Wald $\chi^2(2) = 15.80$, $p < .001$. Among both younger and older 2-year-olds, children selected more category matches in the generic than either of the other two conditions (younger 2-year-olds, ps $< .001$; older 2-year-olds, ps $\leq .01$) and the other two conditions did not differ from one another (younger 2-year-olds, $p = .45$; older 2-year-olds, $p = .11$). Relative to

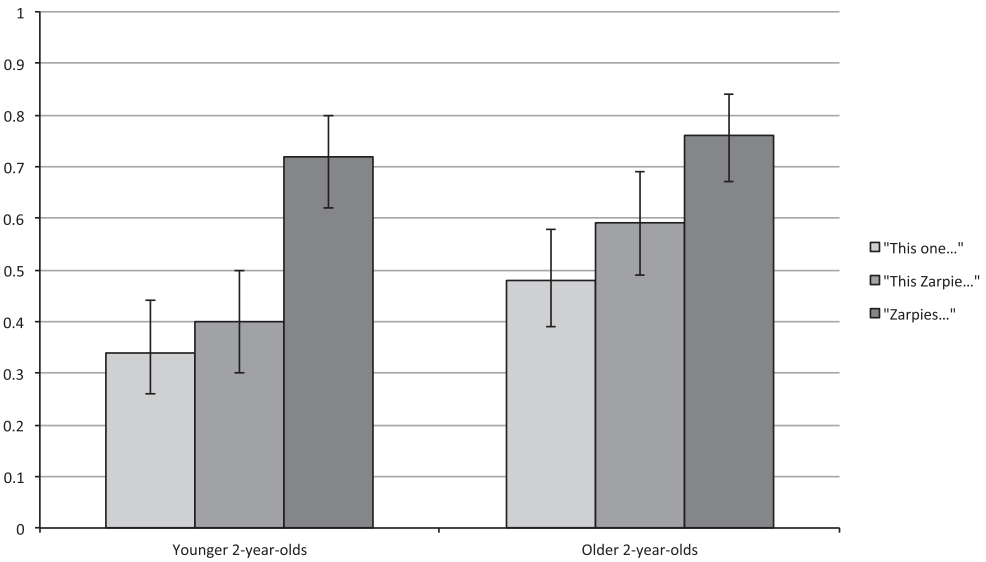

Figure 2. Probabilities of selecting category matches, with 95% CI, for younger and older 2-year-olds, Study 1. At both ages, only children in the generic, "Zarpies . . .," condition selected category matches more often than expected by chance.

the specific condition, the odds of selecting category matches were 3.90 (CI [2.13, 7.14]) times higher in the generic condition for younger 2-year-olds and 2.17 (CI [1.17, 4.04]) times higher for older 2-year-olds. Relative to the no label condition, the odds of selecting category matches were 4.88 (CI [2.64, 9.00]) times higher in the generic condition for younger 2-year-olds and 3.43 (CI [1.87, 6.31]) times higher for older 2-year-olds.

At both ages, children selected category matches more often than expected by chance only in the generic condition, younger 2-year-olds, Wald $\chi^2(1) = 17.08$, $p < .001$, OR = 2.56, CI [1.64, 3.99]; older 2-year-olds, Wald $\chi^2(1) = 23.33$, $p < .001$, OR = 3.17, CI [1.99, 5.07]. In the other two conditions, younger 2-year-olds selected category matches less often than expected by chance, specific condition, Wald $\chi^2(1) = 4.11$, $p = .04$, OR = 0.66, CI [0.44, 0.99]; no label condition, Wald $\chi^2(1) = 9.06$, $p = .003$, OR = 0.52, CI [0.34, 0.80], whereas older 2-year-olds responded at chance, specific condition, Wald $\chi^2(1) = 3.34$, $p = .07$, OR = 1.46, CI [0.97, 2.20]; no label condition, Wald $\chi^2(1) = 0.16$, $p = .69$, OR = 0.93, CI [0.63, 1.36].

Discussion

Overall, children reliably selected category matches —indicating that they learned to categorize the stimuli based on the intended perceptual criteria—only following exposure to generic language. Increased age was associated with increased likelihood of selecting category matches following exposure to specific language; however, generic language was more likely to elicit such matches across both age groups. Furthermore, within both age groups, only children in the generic condition were more likely to select these matches than expected by chance.

Younger children showed a reliable tendency to *not* select category matches in both of the other two conditions. This pattern may reflect a preference for color contrasts in the absence of category learning. Thus, whereas younger children must have *noticed* the common color in order for it to be possible for them to systematically pick contrasts, they did not map it onto the category as an identifying feature to use to classify novel category instances.

Study 2

In Study 1, children were more likely to categorize based on the novel perceptual feature following exposure to generic language (e.g., "Zarpies whisper . . .") than following exposure to specific language (e.g., "This Zarpie whispers . . .") or no label at all (e.g., "This one whispers . . ."). We propose that generic language provided a strong cue that a meaningful category was present, which triggered a search for commonalities across the exemplars that facilitated categorization based on the novel perceptual criteria. Studies 2a and 2b were designed to test alternate explanations of this pattern.

Study 2a

First, Study 2a tested the possibility that the specific and no label conditions *disrupted* categorization (instead of our proposed explanation that the generic condition *facilitated* categorization). For example, perhaps repeated exposure to the language, "This Zarpie . . ." or "This one . . .," followed by a unique property description led children to focus on the unique properties of each individual exemplar, thus inhibiting discovery of their commonalities. If so, then exposure to a noun label (e.g., "This is a Zarpie"), with no individuating property description, might show levels of categorization comparable to the generic condition of Study 1.

In Study 2a, a new group of toddlers ($N = 17$; 9 male, 8 female; $M_{age} = 30$ months, range = 28.06–32.03) was recruited in the same manner as Study 1. Children completed identical procedures to Study 1, except that for each training trial, they simply heard, "Look, this is a Zarpie" (see Figure 1). Test trials were then identical to Study 1. In this study, participants were no more likely to select category matches than expected by chance ($M = 0.55$, CI [0.45, 0.64]), Wald $\chi^2(1) = 0.98$, $p = .32$. This pattern is consistent with the interpretation that the generic language condition *facilitated* categorization in Study 1, rather than that the other two conditions inhibited categorization.

Study 2b

Study 2b was designed to address which features of the generic sentences presented in Study 1 might have facilitated categorization. In Study 1, the generic and specific sentences differed from one another in two ways—(a) the generics referred to abstract categories, whereas the specific sentences referred to specific individuals, and (b) the generics were syntactically plural, whereas the specific sentences were singular. We have proposed that generics facilitate social categorization because children interpret them as referring to abstract kinds but cannot rule out the contribution of syntactic

plurality based on the Study 1 data. Thus, the goal of Study 2b was to test whether it was simply the syntactic plurality of the generic sentences used in Study 1 that facilitated social categorization (see Graham et al., 2011).

This study involved a new group of toddlers (N = 15; 6 male, 9 female; M_{age} = 30.15 months, SD = 1.45 months, range = 27.60–31.84 months) recruited in the same manner as Study 1. Procedures were identical to the conditions of Study 1, except that during the initial familiarization phase, two individual Zarpies were presented and described at a time. For example, children were shown two people at once and told, "This is a Zarpie. This is a Zarpie. These Zarpies whisper when they talk. These Zarpies stay awake at nighttime." Thus, the sentences were plural but referred to specific individuals. Children saw three pairs of Zarpies, so the total number of people shown was identical to the main study, and all properties used there were also shown here. Test items were identical to Study 1 (see Figure 1). Children in this plural language condition responded at chance on the match-to-sample task (M = 0.56, CI [0.45, 0.66]), consistent with the interpretation that the sentences in the generic condition of Study 1 facilitated categorization because children interpreted them as referring to kinds not only because they were plural.

Comparisons of Studies 1 and 2

Combining the data from Studies 2a and 2b with the age-matched data of Study 1 (N = 80) revealed that children's responses varied by language condition, Wald $\chi^2(4) = 31.57$, $p < 001$ (see Figure 3).

Children were more likely to select category matches in the generic condition than in any other condition, ps ≤ .01. Children who received no property descriptions (Study 2a) or nongeneric plural language (Study 2b) did not differ from one another, but children in both of these conditions were more likely to select category matches than children in the no label condition of Study 1 ($p < .01$). Children who received no property descriptions (Study 2a) were also more likely to select category matches than children in the specific condition of Study 1. Thus, although both plural language and the absence of specific property descriptions appeared to move children in the direction of category matches relative to the two comparison conditions of Study 1, neither of these conditions led children to do so more often than expected by chance. The only condition in which children reliably learned the new category was following exposure to generic language.

General Discussion

Generic language led children to acquire completely novel social categories based on otherwise arbitrary criteria, which is how most social categories begin. Categories based on religion, ethnicity, or social class would initially appear arbitrary to a child and must take on meaning through some form of cultural learning (Cosmides et al., 2003). Here, we

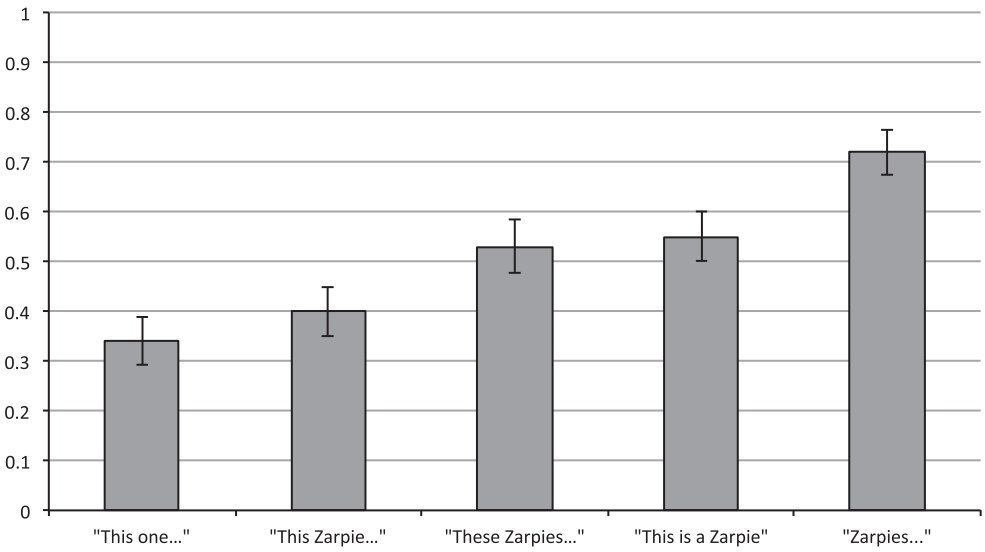

Figure 3. Probabilities of selecting category matches, with 95% CI, for younger 2-year-olds in each of the five conditions presented across Studies 1 and 2.

have documented a mechanism by which cultural input imbues these categories with meaning—how language leads children to perceive a social *kind*, where they did not see one before.

An interesting question to explore in future work is why generic language appears necessary to facilitate the acquisition of novel social categories, when simple noun labels (not accompanied by generic language) do so in many other contexts (e.g., for animals, Ferry et al., 2010; Fulkerson & Waxman, 2007; Waxman & Hall, 1993). Animal categorization tends to be highly stable across contexts, cultures, and historical time (Atran, 1990), whereas social categorization is considerably more variable (Hirschfeld, 1996; Rhodes & Gelman, 2009). Thus, although it might be a good assumption that a labeled animal category reflects a meaningful kind, it is reasonable to approach the task of social categorization more cautiously—to recognize that not all perceptible markers reflect meaningful social differences and that a grouping mentioned in one context might not be relevant in another. If the system that underlies the development of social categorization recognizes this variability and flexibility, it ought to require stronger cultural cues (here in the form of more powerful language) to determine that a category of people is informative enough to learn. In other words, children's underlying framework theories about the structure of the biological versus social worlds could lead them to adopt different thresholds for category learning.

An alternate (or complementary) possibility, however, is that the difference between the present findings and those obtained from similar paradigms testing other domains relates to expectations about category hierarchies. Noun labels help children (ages 2–4) learn and use superordinate (e.g., animal) and basic (e.g., dog) level categories but can interfere with learning and use of subordinate level categories (e.g., collies) by instead highlighting the more salient basic level and making it less likely that children will search for systematic subordinate distinctions (Waxman & Kosowski, 1990). From this perspective, perhaps children of this age are focused on the basic level category *person* (Waxman, 2010), such that they interpreted the label, "Zarpie," as simply referring to *person* in the comparison conditions, leading them not to search for features that might unite "Zarpies" and differentiate them from other subclasses. In contrast, the generic language—which referred to a kind and also described a series of properties that children might know do not apply to *all* people—was sufficient to lead them to search for a marker of a meaningful subkind of person. If this is the case, then similar effects could also be found in children's learning of subordinate categories in other domains as well.

With respect to development, whereas the present findings suggest that simple labels are not sufficient to support the initial acquisition of new social categories among 2-year-olds (see also Diesendruck & Deblinger-Tangi, 2014), the tendency for children to select category matches following exposure to nongeneric novel noun labels increased as children approached their third birthday. Prior work suggests that simple labels robustly influence social categorization by the time that children are 4, shaping a range of social category-based cognitive and behavioral processes (e.g., Baron et al., 2014; Dunham et al., 2011). It is an open question what accounts for this developmental change. Perhaps once children have stronger expectations about the meaning of social groupings and the features that mark them, they are more susceptible to subtler cues to categories. Even among older children who are sensitive to simple labels, however, generic language importantly influences how children use social categories to make sense of the social world (e.g., generics lead children to assume that category members share nonobvious properties, to expect category memberships to be innately determined and stable, and so on; Cimpian & Markman, 2011; Gelman & Heyman, 1999; Rhodes et al., 2012). Thus, across development, the role of generic language in shaping social categorization may shift from facilitating category learning (as shown here) to helping children to identify which of the categories they have learned reflect especially meaningful and stable social differences.

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Supporting Information

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

Figure S1. Description of a Preliminary Study Examining Subordinate Animal Categorization