Language Signalling High Proportions, not Just Generics, Leads to Essentializing for Novel
Social Kinds

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Word count: 9961 (excluding figure captions)

Acknowledgments

We thank children and schools for participating, Sarah-Jane Leslie for sharing illustrations, Ray Drainville for creating novel illustrations, and the Centre for the Study of Mind in Nature at the University of Oslo for project funding. Correspondence concerning this article should be addressed to Elena Hoicka, School of Education, University of Bristol, Bristol, BS8 1JA, United Kingdom. E-mail: elena.hoicka@bristol.ac.uk Tel: +44 (0) 117 331 4106.

Abstract

Generics (e.g., “Dogs bark”) are proposed to lead to essentializing: to assuming that members of the same category share an internal property that causally grounds shared behaviors and traits, even without evidence. Academics have suggested generics help transmit prejudice, and should be avoided around children when discussing stigmatized social groups. We dispute these contentions. Study 1 (100 5-6 year-olds, 140 adults) found high proportion quantifiers (“most”, “many”) elicited essentializing about a novel social kind (Zarpies) as well as generics for adults, demonstrating generics are not unique in forming essentialist beliefs. Language did not affect children’s essentializing. Study 2 (100 5-6 year-olds, 112 adults) found neither generics nor visual imagery indicating multiple instances led to essentializing in adults or children.

Keywords: Generics; Quantifiers; Essentializing; Stereotype; Prejudice

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Generics, it has been claimed, are a double-edged sword. They help children to efficiently learn about the world (Cimpian & Markman, 2008; Gelman & Raman, 2003; Gelman, Star, & Flukes, 2002; Graham, Gelman, & Clarke, 2016; Graham, Nayer, & Gelman, 2011; Hollander, Gelman, & Star, 2002), but it has also been suggested that they play a special role in essentializing and stereotype formation in adults and children (Cimpian, 2010; Cimpian & Erickson, 2012; Cimpian, Gelman, & Brandone, 2010; Cimpian & Markman, 2011; Gelman, Ware, & Kleinberg, 2010; Rhodes, Leslie, Bianchi, & Chalik, 2018; Rhodes, Leslie, Saunders, Dunham, & Cimpian, 2018; Rhodes, Leslie, & Tworek, 2012). We think, however, that there has been a rush to judgment about generics. In fact, we maintain that it is not clear from past research whether there is something special about generics, or if generics work in these ways because they are terms that signal high proportions. This paper seeks to determine whether: (1) generics really do cause essentializing in novel social kinds; (2) other high proportion quantifiers (“most”, “many”) cause essentializing to the same extent as generics; (3) specifics protect against essentializing, rather than generics causing essentializing; and (4) imagery depicting multiple instances of the same behavior cause essentializing to the same extent as generics.

Generics are sentences such as “Cats have tails” and “Girls like pink.” They express generalizations, but unlike quantified sentences, they do not explicitly articulate information about how many members of the category have the given property (Carlson, 1977; Gelman & Tardif, 1998; Lawler, 1973; S.-J. Leslie & Gelman, 2012; Pappas & Gelman, 1998). Another distinction between generics and quantifiers is that, given a striking property (mosquitoes carry West Nile virus) or a characteristic property (chickens lay eggs), generics are true even if only a

small percentage of the kind has these properties (Prasada, Khemlani, Leslie, & Glucksberg, 2013). Further, unlike specifics (e.g., “This cat has a tail”), generics are not about particular individuals, but rather are thought to carry information connecting the kind to the given property. Several studies have found that generics help adults and children learn novel information about known (Gelman et al., 2002; Nguyen & Gelman, 2012), and novel kinds (Chambers, Graham, & Turner, 2008; Gelman et al., 2010; Graham et al., 2016; Graham et al., 2011; Hollander, Gelman, & Raman, 2009; Stock, Graham, & Chambers, 2009). For instance, Chambers et al. (2008) introduced novel creatures to 4- and 5-year-olds, and taught them properties of the creatures, using either generics (e.g., “Pagons are friendly”), or specifics (e.g., “These pagons are friendly.”) Children were significantly more likely to extend the properties to novel instances of the creatures when generic language was used.

Psychological essentialism is the assumption that members of a category are similar at their core, such that they tend to share qualities, even when we have no explanation for why they should share these qualities (Gelman, 2004). Several studies have appeared to demonstrate that generics lead to increased essentializing for novel animals kinds (Cimpian et al., 2010; Gelman et al., 2010), familiar social kinds when generics match their prior knowledge (Cimpian & Erickson, 2012; Cimpian & Markman, 2011), and novel social kinds (Rhodes, Leslie, Bianchi, et al., 2018; Rhodes, Leslie, Saunders, et al., 2018; Rhodes et al., 2012). For instance, Rhodes et al. (2012) had adults and children (3 and 4 years) read a picture book about a novel social category of people called “Zarpies”. The book gave information about Zarpies, using either generic language (e.g., “Zarpies love to eat flowers”), specific language (e.g., “This Zarpie loves to eat flowers”), or specific language with the category label withheld (e.g., “This one loves to eat flowers”). After reading the book, participants were asked a variety of questions to determine the

extent to which they essentialized Zarpies. For instance, they were asked whether an adopted Zarpie would have the same characteristics as their biological Zarpie mother (essentializing) or their adoptive non-Zarpie mother (non-essentializing). They found that children and adults essentialized more when generic language was used compared to specifics.

Some have taken note that using generics leads to essentializing, and potentially to stereotyping and prejudice, and they have suggested that the use of generic language should perhaps be avoided (S.-J. Leslie, in press; Rhodes et al., 2012; Wodak, Leslie, & Rhodes, 2015). For instance, S.-J. Leslie (in press, p. 42) claims,

“However, the evidence suggests that the use of labels and generics contributes to essentialization, and so the converse may also hold: reducing the use of labels and generics for racial, ethnic, and religious groups may reduce the extent to which children grow up essentializing these groups.”

But do generics actually lead to essentializing about novel social kinds? While the results of Rhodes et al. (2012) and Rhodes, Leslie, Saunders, et al. (2018) suggest that generics lead adults and 3- to 6-year-olds to essentialize novel social kinds, there are several issues that merit further consideration. Below, we first discuss concerns about their data analyses; then we turn to plausible alternative hypotheses which these studies do not rule out. In the studies described later, we explore these hypotheses.

In both Rhodes et. al. (2012) and Rhodes et. al. (2018), questions denoting both generalizing and essentializing were combined to give an essentializing score (Gelman et al., 2010, used the term “category-property composite” where we use the term “generalize.”) Following Gelman et al. (2010), we suggest it is important to distinguish generalizing from essentializing, as one may generalize without essentializing. For instance, one may conclude that

all the people at the bus stop are waiting for the bus without essentializing those people. A willingness to attribute to a new Zarpie a property that one has already encountered in a Zarpie may indicate simply a willingness to generalize. By contrast, a willingness to attribute a *new* property indicates more of a tendency to attribute sameness to Zarpies, and so is a better indicator of essentializing. For instance, if a participant read that “Zarpies hate ice cream” in training, and then responded that novel Zarpies would also hate ice cream during testing, this was counted as essentializing in the previous studies. However, this is a better indicator of generalizing the information learned from the book, not essentializing (Gelman et al., 2010). Additionally, if a participant read that “Zarpies climb tall fences” and then was asked, “Why is this [same] Zarpie climbing a tall fence?”, responses that included generic language, e.g., “Because Zarpies like to” were counted as essentializing in previous research. Again, we contend that this is an instance of generalizing information learned in the book (Gelman et al., 2010).

Furthermore, Rhodes, Leslie, Saunders, et al. (2018) awarded an additional point to responses on the previously discussed “Why” questions for giving an internal response to the question, which we agree is essentializing. However, they state that “Because he likes to” would count as an internalizing response, and we disagree with this. Answers such as “Because he likes to” should not, we think, be coded as essentializing. If we do not know *why* they like to, we cannot determine whether it is due to internal or external reasons. For example, if asked why Americans watch football, the answer, “Because they like to” does not seem necessarily essentialist. In the case of Zarpies, Zarpies might like chasing their own shadows because they are genetically predisposed to be attracted to dark Zarpie-like shapes (an inherent explanation, which is essentialized, according to Cimpian and Markman) (Cimpian & Markman, 2011); or they might have learnt to chase shadows in their Zarpie gym class, and come to enjoy it over

time (a practice explanation, which is external and nonessentialized, according to Cimpian and Markman) (Cimpian & Markman, 2011). Because Rhodes et al. (2012) and Rhodes, Leslie, Saunders, et al. (2018) used scores combining many types of responses as discussed above, it is possible that their results were driven by generalizing rather than essentializing. Therefore, the first question we will address is whether generics actually do lead to essentializing — rather than merely generalizing — for novel social kinds.

Next, we consider several plausible alternatives to the hypothesis that generics have a special connection to essentializing novel social kinds. Is it speech involving generics *per se* which causes essentializing in novel social kinds, or are generics just one example of a type of language which does this? Quite plausibly, quantifiers such as “many” or “most” could have the same effects because they, like generics, signal high proportions (Saul, in press). Cimpian and Erickson (2012) hypothesized that quantifiers denoting high proportions, e.g., “most”, would lead to generic beliefs, which would in turn lead to essentializing, and indeed, found that “most” was just as likely as generics to produce essentialized explanations for familiar social kinds (girls). Therefore, we expect the same to be true of novel social kinds. However, our hypothesis is different from Cimpian and Erickson as we propose that any language signalling high proportions, including generics, “many”, and “most”, should lead directly to essentializing, without the need to form generic beliefs. Cimpian and Erickson support the inclusion of generic beliefs by noting that high proportion quantifiers are often misremembered as generics. Indeed, English-speaking adults misremember high proportion quantifier sentences as generics around 45% of the time, while making the inverse error around 12% of the time (Gelman, Sanchez Tapia, & Leslie, 2016). However, if we follow this logic, we might only expect people to essentialize when exposed to a high proportion quantifier around half the time that they

essentialize when exposed to generics due to their generic-encoding error rate (45%). This seems to us to pose difficulties for their supposition that an intermediate belief of generic form is present. If instead Cimpian and Erickson's argument is that high proportion quantifiers lead to generic beliefs, which lead to essentializing, even when correctly remembering the original statement as a high proportion quantifier, it is not clear that their evidence supports the inclusion of generic beliefs. A simpler explanation (and one that fits better with the error rate) would be that language signalling high proportions (including generics, when framed as high proportion quantifiers) leads directly to essentializing. Our second goal, then, is to determine whether language indicating high proportions leads to essentializing to the same extent as generics.

A further alternative hypothesis is that it is not generics which cause essentializing, but rather, specifics which protect against essentializing. Some academics have suggested that we might generalize by default (S.-J. Leslie & Gelman, 2012; S. J. Leslie, 2008). Therefore, rather than generics leading to generalizing, it is actually specifics which protect against generalizing. We propose the same argument for essentializing. While some papers have tried to control for this possibility by having a label-free control condition (e.g., "This one likes to eat flowers") (S.-J. Leslie & Gelman, 2012), these controls still contain the specific marker "this." Further, while several papers have found that generics are common in parents' language, making up three to five per cent of utterances (Gelman et al., 2002; Gelman & Tardif, 1998), specifics are more common than generics, with parents using up to four times as many specifics as generics (Nyhout & O'Neill, 2014). Therefore, one hypothesis is that people essentialize information by default, unless a specific is used to highlight that the information does not pertain to a category. This would mean that specifics do the work of individuating, and frequent parental use of specifics might serve the function of ensuring that children learn exceptions. Our third goal is,

therefore, to determine whether generics (and possibly other high proportion terms) cause essentializing in novel social kinds, or whether specifics protect against essentializing.

Another possibility is that it may not even be *language* signalling high proportions which leads to essentializing, but representations of multiple instances. Pre-verbal infants already show bias against people of other races (Fassbender, Teubert, & Lohaus, 2016; Kelly et al., 2005; Kinzler, Shutts, DeJesus, & Spelke, 2009; Liu, Xiao, Quinn, et al., 2015; Liu, Xiao, Xiao, et al., 2015; Xiao, Quinn, et al., in press; Xiao, Wu, et al., in press). Additionally, 4- to 9-year-olds expected group members to conform to novel norms, in one case, eating a specific type of berry, when group members were presented in a group of three (without a label) more than when group members were presented individually (without a label) (Roberts, Ho, & Gelman, 2017). Furthermore, 5-year-olds showed intergroup bias when they were arbitrarily allocated to an orange or green group, even though group names were never used, and were only indicated by the color of their t-shirts (Dunham, Baron, & Carey, 2011). Therefore, it is also possible that *seeing* multiple members of a novel social group acting in the same way could lead to essentializing. Therefore, generics, and possibly other types of language indicating high proportions such as “most” and “many”, may lead to essentializing not because *language* leads to essentializing, but because this type of language could serve as a shortcut to a representation of high proportions.

Study 1 sought to determine whether: (1) generics really do cause essentializing in novel social kinds; (2) language signalling high proportions causes essentializing, not just generics; and (3) specifics protect against essentializing novel social kinds. Adults and children read a picture book about fictional people called “Zarpies” (Rhodes, Leslie, Saunders, et al., 2018; Rhodes et al., 2012). Each book page featured a Zarpie performing an activity, such as eating flowers (see

Appendix A). In both studies, we replicated the generics condition and the specifics condition by using generic (e.g., “Zarpies love to eat flowers.”) and specific text (e.g., “This Zarpie loves to eat flowers.”) We also added two other types of language signalling high proportions: “most” and “many”; and one type of language signalling uncertain proportions: “some.”

The goal of Study 2 was to determine whether repeated imagery causes essentializing to the same extent as generics when presenting novel social kinds. We added label-only condition, with pictures but no explanatory text. For instance, participants might see a picture of a person eating flowers, accompanied by “Zarpie” with an arrow pointing at the person. We would expect this condition to signal a single instance, like the specifics condition. We also added two conditions to signal multiple instances without using high proportion language. First, we added an additional specifics condition where each behavior was repeated three times in a row (e.g., three different Zarpies all hating ice cream on three sequential pages, with every page saying, “This Zarpie hates ice cream.”), such that the language signalled one instance, but the images signalled multiple instances. Finally, we added a label-only condition where each behavior was repeated three times by different Zarpies, again, so that the images indicated multiple instances.

Study 1

In this experiment, participants were exposed to one of five stories about Zarpies. Two conditions replicated previous research: *Generics* and *Specifics* (Rhodes, Leslie, Saunders, et al., 2018; Rhodes et al., 2012). We added three new conditions to determine whether differences between generics and specifics were driven by generics, specifics, both, or the signalling of high proportions more generally. *Most* and *Many* conditions were added as markers of high proportions, and a *Some* condition was added as a marker of an uncertain proportion (see Appendix B). Children were 5- and 6-year-olds to ensure that they would understand quantifiers

“most,” “many” and, “some” (Brandone, Gelman, & Hedglen, 2015; Cimpian & Erickson, 2012; Gelman, Leslie, Was, & Koch, 2015; Halberda, Taing, & Lidz, 2008).

Method

Participants. Previous similar research was powered to find large effect sizes (Gelman et al., 2010; Rhodes, Leslie, Saunders, et al., 2018; Rhodes et al., 2012). A G-Power analysis found 80 participants were needed for a large effect size ($f = 0.4$) with a power at 0.80 and alpha at 0.05 (Faul, Erdfelder, Lang, & Buchner, 2007). We tested at least 80 participants in both the adult group and child group in case the patterns were different and data needed to be analyzed separately. We aimed to recruit more participants than needed in case some of the participants did not complete the study, did not complete it properly (e.g., giving responses that bore no relation to the questions, 1 adult), were not actually eligible (e.g., did adults who did not speak English as a first language, 6), or did not want to participate at testing time (i.e., children, 0). This meant we ended up with more participants than required, especially for adults, where our study was quickly completed online. There were 140 adults: 71 males, 68 females and one identifying as other (M age = 31.35 years, $SD = 10.29$, Range = 18-65). Each participant was randomly assigned to each of five conditions. All participants spoke English as a first language. Participants lived in the United Kingdom (81), the United States of America (45), Canada (4), India (3), Australia (1), Cyprus (1), Finland (1), New Zealand (1), the Philippines (1), and South Africa (1). Participants were recruited through Prolific Academic, and were paid one British pound to participate (for less than 10 minutes work).

There were 100 children: 50 males and 50 females (M age = 71 months, 20 days $SD = 5$ months, 22 days Range = 60 months, 1 day – 84 months 20 days). Each participant was randomly assigned to each of five conditions. All participants spoke English as a first language

and all lived in the United Kingdom. Participants were White (45), Asian (5), Black (1), of mixed ethnicity (5), or the ethnicity information was not reported (45). Parents had a postgraduate degree (13), Undergraduate degree (17), High school diploma (15), no academic qualification (1) or the education information was not reported (54). Participants were recruited via email and telephone correspondence with schools. Schools were paid five British pounds for each child who participated, of which the total value was calculated and educational resources were bought for the class using the total amount. Parents signed a written consent form. The study was approved by the University of XXXX Psychology Department's ethics committee: "Generics and Essentialising"; approval number: 003190.

Materials. Five picture books were created using Zarpies (using the original books from Rhodes, et al., 2012), differing for each condition by the wording used. Each picture book consisted of the same 16 illustrated pages, showing a picture of a Zarpie displaying a distinctive physical or behavioral characteristic (e.g. "Zarpies... love to eat flowers; have stripes in their hair"; see Appendix A for the full *Generics* version of the book; see Appendix B for all text across books). The characters were diverse in terms of their sex (half male, half female), race/ethnicity (four White, four Black, four Latino and four Asian) and age (four young children, four older children, four adults and four older adults). To ensure participants could visually identify Zarpies as a categorical membership, the characters were dressed in category-typical clothing, without any single feature defining category membership.

The five conditions and hence separate books were: *Generics*, *This*, *Many*, *Most* and *Some*. The wording of each book was modified to match the condition. In the *Generics* condition the book read e.g., "Zarpies love to eat flowers." In the *This* condition the book read e.g., "This Zarpie loves to eat flowers." In the *Many* condition, the book read e.g., "Many Zarpies love to

eat flowers.” In the *Most* condition, the book read e.g., “Most Zarpies love to eat flowers.”

Finally, in the *Some* condition, the book read, “Some Zarpies love to eat flowers.”

Thirteen test questions were divided into two categories of essentialist beliefs (Gelman et al., 2010). These included: three inheritance questions, where participants were asked whether a Zarpie child who was adopted by a non-Zarpie mother would behave in the same way as the Zarpie mother or the adoptive mother; six induction questions in which a new Zarpie displayed a property, not seen in the book, and participants were asked if further novel Zarpies would also display the same property; and four explanation questions where participants were asked *why* a Zarpie had done something in the previous book. See Appendix C for all items. Questions were exactly the same as those in Rhodes et al. (2012).

As a control to determine whether findings from past research may have been driven by generalizing rather than essentializing (Rhodes, Leslie, Saunders, et al. (2018); Rhodes et al. (2012), 10 test questions were included which were divided into two categories of generalization (Gelman et al., 2010). These included six induction questions asking whether or not new Zarpies had the same properties as the Zarpies in the book. See Appendix C for all items. The four explanation questions for which participants were asked *why* a Zarpie had done something in the previous book were also analyzed for generalizing answers.

Design. The experiment was a between-subjects design. The independent variables were the type of language used (*Generics, This, Many, Most, Some*) and the age of the participants (Adult, Child). The dependent variables were whether participants gave (1) essentialized, and (2) generalized answers (as a control).

Procedure. Adults from Prolific Academic accessed the picture book and test questions online using the Qualtrics website. They read the book independently and then answered the test questions immediately after.

The children had the picture books and test questions presented to them verbally by the experimenter during individual sessions. The book was read to the child twice, with the questions asked immediately after (following Study 2 of Rhodes, et al., 2012). Their responses to the test questions were recorded on an Olympus MP3 recorder whilst also being written down by the experimenter at the time of questioning.

Coding.

Essentializing.

Inheritance questions. These were coded as essentializing if participants said the child would have the same property as the Zarpie mother (1 point), and were coded as not essentializing if participants said the child would have the same property as the adoptive mother (0 points). If a participant did not respond, no score was assigned.

Induction of novel properties. These were coded as essentializing if participants responded “yes” (1 point), and were coded as not essentializing if participants said “no” (0 points). If a participant did not respond, no score was assigned.

Explanation questions. Explanation questions (e.g., “Why is this Zarpie climbing a tall fence?”) were given one point for essentializing if the answer was due to an inherent explanation (e.g., “His legs were *made for* climbing,” “*God made them* that way,” “Because of *DNA*”), or a trait explanation (e.g., “They are *crazy*,” “Zarpies are *strong*”) (Cimpian & Markman, 2011). Zero points were given if the answer referred to an external explanation (e.g., “He was trying to *get to the other side*,” “They chase shadows because they *think it’s a person*”), or practice

explanations (e.g., “Zarpies are *taught* to jump over puddles”). The answer was not scored if this could not be inferred (e.g., “running,” “I don’t know”). In contrast to Gelman et al. (2010) and Rhodes, Leslie, Saunders, et al. (2018) who counted responses such as “Because he likes to” as essentializing, we did not. Since we do not know *why* they like to, we cannot determine whether it is due to internal or external reasons (see introduction). Out of a possible 960 explanations, only seven suggested trait-based essentializing (e.g., “Because he has a mental illness”), and five suggested inherent explanations (e.g., “Because he is an average Zarpie”). Additionally, these responses were spread across conditions: Generics (3); Most (3); Many (1); Some (4); This (1). Therefore, this measure was dropped from analyses.

Using multiple imputation for missing values (Béland, Pichette, & Jolani, 2016), the nine remaining essentializing items showed good reliability, $KR(20) = .73$.

Generalizing. This was used as a control measure for essentializing to determine whether past results showing generics increased essentializing (Rhodes, et al., 2012; Rhodes, Leslie, Saunders, et al., 2018) may have been led by generalizing rather than essentializing.

Induction of familiar properties. These were coded as generalizing if participants responded “yes” (1 point), and were coded as not generalizing if participants responded “no” (0 points). If a participant did not respond, no score was assigned.

Explanation questions. They were given one point for generalizing if the answer referred to a high proportion of Zarpies or had generic form (e.g., “Because *Zarpies* climb fences,” “*Most Zarpies* like climbing,” “*They* do that to get places,” “It’s a *Zarpie* thing”); zero points if the answer referred to one instance in non-generic form, or an uncertain proportion (e.g., “Because *this Zarpie* climbs fences,” “That’s what *some Zarpies* do,” “*He* likes climbing,” “*It* wants to get to the other side”); and the answer was not scored if this could not be inferred (e.g., “running,” “I

don't know"). Fifty-six participants' (23%) explanations were coded for generalizing by a second coder. Agreement was excellent, *Cohen's kappa* = 0.91. Using multiple imputation for missing values, the 10 generalizing items showed good reliability, *KR*(20) = .85.

Results

Children's scores were all skewed, therefore we could not use ANOVA. Instead, we used Logit Mixed Effects Models (LMEM). LMEM allow repeated-measures non-parametric designs with missing data, and to control for random effects, while increasing power by analyzing by item instead of by participant (see Hoicka & Akhtar, 2011 for more details). All analyses included participant code and item as random variables.

While we believe that the questions in our study captured essentializing and generalizing separately, we first ran analyses on all questions together to compare our results to the original paper by Rhodes et al. (2012). Figure 1 displays the mean percentage of trials and 95% confidence intervals for essentialized/generalized responses by language type and age group. Participants did not give an answer that could be coded (as essentializing/generalizing, or not essentializing/generalizing) for 4.6% of trials. The model for adults and children together was improved by age group ($\chi^2(1) = 54.53, p < .0001$), language type ($\chi^2(4) = 42.25, p < .0001$), and an interaction of age group and language type ($\chi^2(4) = 15.16, p = .0044$). Adults essentialized/generalized significantly more often than children (*Odds-Ratio*, *OR* = 3.66, *p* = .0002). Due to the interaction, we next ran separate analyses for adults and children.

The model for adults was improved by language type ($\chi^2(4) = 67.62, p < .0001$). For pairwise comparisons, we used treatment contrasts repeatedly, resulting in 10 pairwise comparisons instead of the standard four. Therefore, we used Bonferroni corrections for pairwise comparisons, such that a significant p-value was reduced to .02. The final model (*loglik* = -

1424.3, $N = 2596$) found adults essentialized/generalized significantly more often in the *Many* and *Most* conditions than the *Generics*, *Some*, and *This* conditions, as well as significantly more in the *Generics* condition than the *Some*, and *This* conditions (all $OR > 2.03$, $p < .012$). No other differences were found. Adults were significantly more likely to generalize/essentialize in the *Most* condition ($OR = 2.13$, $p = .017$), and marginally more likely in the *Many* condition, ($OR = 2.51$, $p = .058$). Adults were significantly more likely to *not* generalize/essentialize in the *Some* and *This* conditions (both $OR > 3.46$, $p < .006$). Adults were equally likely to generalize/essentialize or not in the *Generics* condition ($p > .05$).

Figure 1. Percentage of essentialized/generalized responses, by language type and age group. Error bars represent 95% confidence intervals.

The model for children was not improved by language type. The final model ($loglik = -886.5$, $N = 1762$) found children were more likely to *not* generalize/essentialize across conditions, ($OR = 4.35$, $p < .001$).

Figure 2 displays the mean percentage of trials and 95% confidence intervals for essentialized responses by language type, question type, and age group. Participants did not give

an answer that could be coded (as essentializing, or not essentializing) for 0.2% of trials. The model for adults and children together was improved by age group ($\chi^2(1) = 14.78, p = .0001$), question type ($\chi^2(1) = 5.50, p = .0191$), an interaction of age group and question type ($\chi^2(1) = 47.02, p < .0001$), and an interaction between age group, question type, and language type ($\chi^2(8) = 14.78, p < .0001$; final model: $\text{loglik} = -1171.7, N = 2155$). Adults essentialized significantly more often than children ($OR = 1.64, p = .0203$). Participants essentialized significantly more often for induction of novel property questions than inheritance questions ($OR = 2.65, p = .0198$). Given the above interactions, we next ran separate analyses for adults and children.

The model for adults was improved by question type ($\chi^2(1) = 6.83, p = .0090$), language type ($\chi^2(4) = 14.56, p = .0058$), and an interaction of question type and language type ($\chi^2(4) = 28.56, p < .0001$). The final model ($\text{loglik} = -686.6, N = 1260$) found adults essentialized significantly more often for induction of novel property questions than inheritance questions ($OR = 8.13, p = .0012$). We used Bonferroni corrections for pairwise comparisons. Adults essentialized significantly more often in the *Most* than *Many* and *Some* conditions ($OR > 3.60, p < .0200$). No other differences were found. Given the above interaction, we next ran separate analyses for adults' induction of novel property questions, and adults' inheritance questions.

Figure 2. Percentage of essentialized responses, by language type, question type, and age group. Error bars represent 95% confidence intervals.

The model for adults' induction of novel property questions was improved by language type ($\chi^2(4) = 16.78, p = .0021$). We used Bonferroni corrections for pairwise comparisons. The final model ($\text{loglik} = -449.4, N = 840$) found adults essentialized significantly more often in the *Generics* and *Many* conditions than the *Some* and *This* conditions, as well as significantly more often in the *Most* condition than the *This* condition (all $OR > 4.34, p < .019$). No other

differences were found. Adults were equally likely to essentialize or not essentialize within all conditions (all $p \geq .1000$).

The model for adults' inheritance questions was not improved by language type ($\chi^2(4) = 7.58, p = .1083$). The final model ($\text{loglik} = -204.8, N = 420$) found adults were significantly more likely to *not* essentialize based on inheritance questions ($OR = 6.87, p < .0001$).

The model for children was not improved by any variables or interactions. The final model ($\text{loglik} = -483.0, N = 895$) found children were significantly more likely to *not* essentialize overall ($OR = 3.62, p < .0001$).

Figure 3 displays the mean percentage of trials and 95% confidence intervals for generalized responses by language type, question type, and age group. Participants did not give an answer that could be coded (as generalizing, or not generalizing) for 8.9% of trials. The model for adults and children together was improved by age group ($\chi^2(1) = 74.82, p < .0001$), language type ($\chi^2(4) = 73.46, p < .0001$), an interaction of age group and language type ($\chi^2(4) = 23.51, p = .0001$), and an interaction of question type and language type ($\chi^2(5) = 96.85, p < .0001$). The final model ($\text{loglik} = -1051.2, N = 2203$) found adults generalized significantly more often than children ($OR = 3.80, p = .0029$). Given the above interaction, we next ran separate analyses for adults and children.

The model for adults was improved by language type ($\chi^2(4) = 91.42, p < .0001$). Using pairwise comparisons with Bonferroni corrections, the final model ($\text{loglik} = -671.9, N = 1336$) found adults generalized significantly more often in the *Many* than all other conditions, in the *Most* condition than the *Generics*, *Some*, and *This* conditions, and in the *Generics* than the *Some* and *This* conditions (all $OR > 1.15, p < .0012$). No other differences were found, therefore we did not test Familiar Property and Explanation question separately. Adults were significantly

more likely to generalize than not in the *Many* and *Most* conditions (both $OR > 6.36$, $p < .0001$).

Adults were equally likely to generalize as to not generalize in the *Generics* condition ($p >$

.6249). Adults were significantly more likely to *not* generalize in the *This* and *Some* conditions

(both $OR > 4.56$, $p < .0456$).

Figure 3. Percentage of generalized responses, by language type, question type, and age group.

Error bars represent 95% confidence intervals.

The model for children was improved by question type ($\chi^2(1) = 5.02, p = .0251$), and an interaction between question type and language type ($\chi^2(8) = 33.62, p < .0001$). The final model ($\text{loglik} = -403.5, N = 867$) found no overall effect of language type. Given the above interaction, we next ran separate analyses for each question type.

The models for children's induction of familiar property questions, and for children's explanation items, were not improved by language type (both $\chi^2(4) < 7.37, p > .1177$). The final models (induction of familiar property questions: $\text{loglik} = -297.4, N = 594$; explanation items: $\text{loglik} = -67.7, N = 273$) found children were significantly more likely to *not* generalize across conditions for both question types (both $OR > 5.22, p < .0001$).

Discussion

We replicated the findings by Rhodes et. al. (2012) that adults essentialize/generalize more when generics are used compared to specifics. However, unlike Rhodes et. al. (2012), and Rhodes, Leslie, Saunders, et al. (2018), we did not replicate this result in children. We consider explanations for this in the general discussion. Additionally, we extended the results for adults, finding that not only did the high proportion quantifiers “most” and “many” lead to higher essentializing/generalizing for adults compared to specifics, as well as “some”, they also did so to a greater extent than generics. Therefore high proportion quantifiers “most” and “many” are more powerful than generics to lead adults to essentialize/generalize about novel social kinds.

When we broke questions down to separate essentializing and generalizing types, Study 1 found adults essentialized more when generics, “many” or “most” were used compared to specifics, and when generics or “many” were used compared to “some”, for induction of novel property questions only. There were no differences between generics, “many” or “most” nor between specifics and “some.” Therefore, it is language signaling high proportions that leads to

essentializing for novel social kinds. It is not the case that generics alone have this effect.

Furthermore, specifics alone are not protective against essentializing. Interestingly, there were no differences for children, who had very low essentializing rates overall, suggesting that children do not tend to essentialize novel social kinds, regardless of the type of language used.

Study 1 also found that adults generalized more when “many” or “most” were used compared to generics, suggesting that, if anything, high proportion quantifiers are better suited to learning about novel social kinds than generics. Generics, “many,” and “most” also led to more generalizing than specifics and “some.” In the case of children, again, language did not affect how much they generalized novel social kinds. Altogether, our results show that our initial findings suggesting that “many” and “most” lead to more essentializing/generalizing than generics were led by generalizing, not essentializing, further emphasizing the need to treat these constructs separately.

Study 2

The goal of Study 2 was to determine whether only *linguistic descriptions* indicating high proportions leads to increased essentializing, or whether this can also happen through *visual representations* of multiple instances. Participants were exposed to one of five stories. We again included the original generics and specifics conditions. We added three new conditions to determine whether the results of Study 1 were driven by linguistic descriptions, or by the representation of multiple instances. A label-only condition in which the same pictures were used, but the text only read “Zarpie” on each page, with an arrow pointing to the Zarpie, was included as a visual marker of a single instance. A specifics condition, in which three different Zarpies did the same actions, was included to indicate multiple instances, despite the language

indicating one instance each time. Finally, a label-only condition in which three different Zarpies did the same actions was included to cumulatively indicate multiple instances.

Method

Participants. Sample size was determined in the same way as Study 1. There were 112 adults: 67 males and 45 females (M age = 31.45 years, SD = 10.34, Range = 18-67). All participants spoke English as a first language, while four additional participants who did not speak English as a first language were excluded. Each participant was randomly assigned to each of five conditions. Participants live in the United Kingdom (51), the United States of America (35), India (5), Canada (4), Ireland (4), Serbia (3), Algeria (2), Belgium (2), Argentina (1), Australia (1), Japan (1), New Zealand (1), the Philippines (1), and Poland (1). Participants were recruited through Prolific Academic, and were paid one British pound to participate in the *Generic*, *This*, and *Label-only* conditions (for less than 10 minutes work), and two British pounds to participate in the *ThisX3* and *Label-onlyX3* conditions (for less than 20 minutes work, since the book was three times as long).

There were 100 children: 50 males and 50 females (M age = 70 months, 27 days SD = 5 months, 17 days; Range = 60 months, 26 days – 85 months 6 days). Each participant was randomly assigned to each of five conditions. One additional participant did not answer any questions, so was dropped from the study. All participants spoke English as a first language and all lived in the United Kingdom. Participants were White (28), Asian (2), of mixed ethnicity (1), or ethnicity information was not reported (68). Parents had a postgraduate degree (12), Undergraduate degree (11), High school diploma (8), or education information was not reported (68). Participants were recruited as in Study 1 and paid as in Study 1. Parents signed a written consent form.

Materials. Five picture books were created using the characters Zarpies. The original picture books from the *Generics* and *Specifics* condition from Study 1 were used. Three new picture books were used for Study 2: one with 16 illustrated pages (*Label-only*), and the other two with 48 illustrated pages (*ThisX3*; *Label-onlyX3*). Novel illustrations were created for the 48-page books that matched the style of the original books (Rhodes et al., 2012).

The five conditions and hence separate books were: *Generics*, *ThisX3*, *Label-onlyX3*, *This*, and *Label-only* (see Figure 4 for an example from the *Label-onlyX3* book). The wording of each book was modified to match the condition. The *Generics* condition was the same as Study 1. The *This* condition was the same as the *Specifics* condition in Study 1. In the *ThisX3* condition, the book had the same sentences as in the *This* condition, repeated three times (following Roberts, et al., 2017), and each page had a different Zarpie doing the same thing. In the *Label-only* condition, the narrative of the original specifics/generics book was replaced by the word “Zarpie” with an arrow pointing at the Zarpie character, but no additional text was given to describe what the Zarpie was doing. Finally, the *Label-onlyX3* condition was similar to the *Label-only* condition, but there were three pictures of different Zarpies doing the same thing. An Olympus MP3 recorder was used for all trials in order to record childrens’ responses for later coding. The test questions were the same as Study 1.

Design. The experiment was a between-subjects design. The independent variables were the type of book (*Generics*, *ThisX3*, *Label-onlyX3*, *This*, *Label-only*), and the age group (Adult, Child). The dependent variables were whether participants gave (1) essentialized answers and, (2) generalized answers (as a control).

Procedure. Same as Study 1. When testing children in both *Label-only* conditions, the experimenter pointed to where the arrow pointed (at the Zarpie character), and said “Zarpie.”

Figure 4. Example from the *Label-onlyX3* book. Participants saw pages one by one, all in a row. Children were simply told “Zarpie” while the experimenter pointed to each person.

Coding. Same as Study 1. Again, out of a possible 848 explanations, only eight suggested trait-based essentializing (e.g., “Is it because he's naughty”), and none suggested inherent explanations. Additionally, these responses were spread across conditions: *Generics* (0); *ThisX3* (0); *Label-onlyX3* (3); *This* (3); *Label-only* (2). Therefore, this measure was again dropped from analyses. Missing items were replaced using maximum likelihood estimates. The nine remaining essentializing items did not show good reliability, $KR(20) = .67$ (Kline, 2000). We therefore tested reliability for inheritance items and items involving induction of novel properties separately. The three inheritance items did not show good reliability, $KR(20) = .61$, therefore these items were not analyzed. Interestingly, these items only showed Alpha Cronbach scores of .62 in Rhodes et al. (2012), suggesting they perhaps should not have been included in that study either. The six items involving induction of novel properties did show good reliability, $KR(20) = .78$, therefore these items were analyzed alone for essentializing. The results did not change whether the inheritance items were included or not. Forty-seven participants' (22%) explanation questions were coded for generalizing by a second coder.

Agreement was excellent, *Cohen's kappa* = 0.91. The 10 generalizing items showed good reliability $KR(20) = .77$.

Results

Children's scores were skewed, therefore we could not use ANOVA. Therefore, again, LMEM was used with participant code and item as random variables.

Figure 5 displays the mean percentage of trials and 95% confidence intervals for essentialized/generalized responses by book type and age group. Participants did not give an answer that could be coded (as essentializing/generalizing, or not essentializing/generalizing) for 6.5% of trials. The model for adults and children together was improved by age group ($\chi^2(1) = 74.21, p < .0001$), book type ($\chi^2(4) = 11.13, p = .0251$), but not an interaction of age group and book type. Adults essentialized/generalized significantly more often than children ($OR = 5.14, p < .0001$). Due to the age difference, we next ran separate analyses for adults and children.

Figure 5. Percentage of essentialized/generalized responses by book type and age group. Error bars represent 95% confidence intervals.

The model for adults was improved by book type ($\chi^2(4) = 20.50, p = .0004$). For pairwise comparisons, we used Bonferroni corrections. The final model ($\text{loglik} = -1065.6, N = 2113$) found adults essentialized/generalized significantly more often in the *Generics* condition than all other conditions (all $OR > 3.10, p < .02$). No other differences were found. Adults were equally likely to generalize/essentialize or not in the *Generics* condition ($p > .05$). Adults were significantly more likely to *not* generalize/essentialize in all other conditions (all $OR > 2.69, p < .031$).

The model for children was not improved by book type. The final model ($\text{loglik} = -674.2, N = 1757$) found children were more likely to *not* generalize/essentialize across conditions, ($OR = 10.27, p < .001$).

Figure 6 displays the mean percentage of trials and 95% confidence intervals for essentialized responses by book type and age group for induction of novel property questions only (since inheritance questions were not reliable, although including them did not change the results). Participants did not give an answer that could be coded (as essentializing, or not essentializing) for 1.4% of trials. The model was improved by age group ($\chi^2(1) = 52.63, p < .0001$). However, there was no effect of book type, nor an interaction between age group and book type. The final model ($\text{loglik} = 595.6, N = 1260$) found adults essentialized significantly more often than children ($OR = 11.13, p < .0001$). Participants essentialized and did not essentialize equally overall, $p = .162$. Running adults' and children's data separately did not lead to significant results.

Figure 7 displays the mean percentage of trials and 95% confidence intervals for generalized responses by book type, question type, and age group. Participants did not give an answer that could be coded (as generalizing, or not generalizing) for 11.5% of trials. LMEM was

used with participant code and item as a random variable. The model for adults and children together was improved by age group ($\chi^2(1) = 83.94, p < .0001$), question type ($\chi^2(1) = 14.31, p < .0001$), an interaction of age group and question type ($\chi^2(1) = 5.54, p = .0186$), book type ($\chi^2(4) = 26.48, p < .0001$), an interaction of question type and book type ($\chi^2(4) = 69.356, p < .0001$), an interaction of age group and book type ($\chi^2(4) = 11.51, p = .0214$), and a 3-way interaction between age group, question type, and book type ($\chi^2(4) = 10.24, p = .0366$; final model: $\text{loglik} = -739.7, N = 1978$). Due to the interactions, we ran separate analyses for each age group.

Figure 6. Percentage of essentialized responses, by book type and age group, for induction of novel property items only. Error bars represent 95% confidence intervals.

The model for adults was improved by question type ($\chi^2(1) = 9.71, p = .0018$), book type ($\chi^2(4) = 37.67, p < .0001$), and an interaction between question type and book type ($\chi^2(4) = 24.32, p < .0001$). The final model ($\text{loglik} = -439.4, N = 1111$) found adults generalize significantly more often for induction of familiar property questions than explanation questions ($OR = 5.39, p < .0001$). Pairwise comparisons using Bonferroni corrections found adults

generalized significantly more often in the *Generics* condition than all other conditions (all $OR > 3.58, p < .0179$). Due to the interaction, we ran separate analyses for each question type.

Figure 7. Percentage of generalized responses, by book type, age group, and question type. Error bars represent 95% confidence intervals.

The model for adults' induction of familiar property questions was improved by book type ($\chi^2(4) = 16.13, p = .0029, \text{loglik} = -336.0, N = 672$). Pairwise comparisons using Bonferroni corrections found adults generalized significantly more often in the *Generics* condition than the *Label-onlyX3*, *Label-only*, and *This* conditions (all $OR > 8.35, p < .0012$), but not the *ThisX3* condition. No other differences were found. Adults were significantly more likely to generalize than not in the *Generics* condition ($OR = 13.13, p = .0390$). Adults were equally likely to generalize and not generalize in all other conditions (all $p > .5370$).

The model for adults' explanation items was improved by book type ($\chi^2(4) = 12.18, p = .0161, \text{loglik} = -77.3, N = 439$). Pairwise comparisons using Bonferroni corrections found adults generalized significantly more often in the *Generics* condition than all other conditions (all $OR > 371.30, p < .0015$). No other differences were found. Adults were equally likely to generalize and not generalize in the *Generics* condition ($p = .4640$). Adults were significantly more likely to *not* generalize in all other conditions (all $OR > 29.36, p < .0001$).

The model for children's generalizing was improved by question type ($\chi^2(1) = 11.13, p = .0008$), and an interaction of question type and book type ($\chi^2(8) = 47.56, p < .0001$; final model: $\text{loglik} = -264.9, N = 867$). Pairwise comparisons using Bonferroni corrections found no significant differences across conditions. Due to the interaction, we ran separate analyses for each question type.

Neither the model for children's induction of familiar property questions, nor the model for children's explanation items was improved by book type. The final models (familiar property: $\text{loglik} = -235.1, N = 541$; explanation: $\text{loglik} = -32.3, N = 326$), found children were significantly more likely to *not* generalize overall (both $OR > 7.90, p < .0039$).

Discussion

We again replicated the findings by Rhodes et. al. (2012) that adults essentialize/generalize more when generics are used compared to specifics. However, again, unlike Rhodes et. al. (2012), and Rhodes, Leslie, Saunders, et al. (2018), we did not replicate this result in children. Additionally, we again extended the results for adults, finding that verbal descriptions of multiple instances are important to essentializing/generalizing, and that multiple visual representations do not have the same impact.

Study 2 found neither adults nor children essentialized more when generics or visual representations of multiple instances were used compared to specifics or visual representations of single instances. This study shows that visual representations of multiple instances are not essentialized more than visual representations of single instances. This study also found specifics alone are not protective against essentializing. The finding in Study 1 that adults essentialize more (at least in the context of novel properties) for generics versus specifics was not replicated. As in Study 1, children had very low essentializing rates overall, suggesting that children do not tend to essentialize novel social kinds, regardless of the type of language or images used.

Study 2 also found that adults generalized more when generics were used compared to all other conditions, except when specifics were repeated three times in the contexts of extending familiar properties. Therefore, specifics can lose their protective ability, compared to generics, when they are repeated only three times. This suggests that when specifics are repeated, they can sometimes be as effective as generics in leading to generalizations. In the case of children, again, language and images did not affect how much they generalized novel social kinds.

General Discussion

Study 1 found that adults essentialized more about novel social kinds when generics, “most,” and “many” were used, compared to specifics, and when generics or “many” were used, compared to “some.” Therefore, for novel social kinds, high proportion quantifiers led to essentializing as much as generics did. Children did not distinguish conditions. Furthermore, neither adults nor children distinguished conditions in terms of essentializing in Study 2, such that the findings comparing the generics and specifics conditions were not replicated.

Several previous studies seemed to show that generics lead children to essentialize familiar animals (Cimpian & Markman, 2009; Cimpian & Scott, 2012), novel artifacts (Cimpian & Cadena, 2010), familiar social kinds (Cimpian & Erickson, 2012), and lead both children and adults to essentialize novel social kinds (Rhodes, Leslie, Bianchi, et al., 2018; Rhodes, Leslie, Saunders, et al., 2018; Rhodes et al., 2012). Our results for essentializing about novel social kinds appear to be weaker than past research (Rhodes, Leslie, Bianchi, et al., 2018; Rhodes, Leslie, Saunders, et al., 2018; Rhodes et al., 2012), especially for children. Importantly, we measured essentializing differently from previous studies (see introduction). One possibility is that results from previous research were led by participants’ generalizing rather than essentializing responses. Our results for adults are in keeping with this hypothesis: Study 1 found that generics, and language signalling high proportions, lead to significantly more generalizing for adults, and Study 2 found that generics led to significantly more generalizing compared to both specifics and visual imagery. However, neither study found an increase in generalizing for children from generics. In general, it would appear that our studies simply do not replicate the finding that generics lead to either essentializing, or generalizing, for children.

When analysing data in the same way as Rhodes et al. (2012) and Rhodes, Leslie, Saunders, et al. (2018), we replicated results findings that generics led to greater

essentializing/generalizing (combined) than specifics for adults, but not for children. We also found lower levels of essentializing/generalizing in children overall than previous research. One reason our results may not replicate for children is that children in our study were 5- and 6-year-olds, while children in Rhodes, et al., (2012) were 3- and 4-year-olds. However, Rhodes, Leslie, Saunders, et al., (2018) also tested 5- and 6-year-olds, suggesting it is unlikely the results are specific to age. A second possibility is that the difference is cultural in nature. The original studies tested American children, while the current studies tested British children. This could be due to cultural differences in how children learn; cognitive, linguistic, or social skills; their understanding of morality; or a variety of other reasons. This is not the only domain in which British children appear to develop differently from North American children. For instance, British children lag behind American children in terms of language development (Hamilton, Plunkett, & Schaefer, 2000), therefore British children may be worse at understanding and using generic language as a grouping mechanism, and specific language as an individuating mechanism. Furthermore, British children peek and lie about peeking much less often than North American children, which could be driven by differences in moral development (Alloway, McCallum, Alloway, & Hoicka, 2015). Perhaps British children see essentializing social kinds as a moral issue in a way that American children do not. Future research should first establish whether there truly are cultural differences, i.e., whether American children truly do essentialize, before investigating the factors that may affect such cultural differences.

A final reason that our results may not replicate in children may be linked to the broader “replication crisis” in psychology (Anderson & Maxwell, 2017; Loken & Gelman, 2017; Maxwell, Lau, & Howard, 2015; Stroebe & Strack, 2014). One possibility is that the original and replicated studies are under-powered (Anderson & Maxwell, 2017; Maxwell et al., 2015). In the

original studies by Rhodes et al. (2012), there were sample sizes of 14 or 15 participants per condition. To measure a large effect size ($f = 0.4$) with a power at 0.80 and alpha at 0.05, a minimum of 21 participants are needed per condition for three conditions (Faul et al., 2007). In the replication studies by Rhodes, Leslie, Bianchi, et al. (2018), they needed a minimum sample size of 25 participants per condition for two conditions (Faul et al., 2007). However only Study 2 of the three studies met that criteria. While our studies were powered for large effect sizes, it is possible that if we had powered for medium or small effect sizes, differences would have been found. Therefore, future research should ensure that studies are properly powered. A meta-analysis across papers could also discern whether there is an effect across studies.

High Proportion Quantifiers and Generics Act Alike

Our findings suggest that when adults do essentialize about novel social kinds, this is not due to generics *per se* but to language signalling high proportions. Study 1 therefore demonstrates the importance of using appropriate controls when determining how language affects social cognition. We suggest that generics may not be a special type of language to serve this function for novel social kinds, in either adults or children.

Cimpian and Erickson (2012) found that children's causal attributions were more essentialized when they learned novel information about known social kinds (girls), whether generics or "most" was used. Our results from Study 1 converge with these findings. As discussed in the introduction, if adults were essentializing from "many" and "most" via essentialist beliefs, we would still only expect adults to essentialize from high proportion quantifiers at a fraction of the rate that they do so when generics are used based on their generic-encoding error rate for "many" and "most." However, both in our study, and the Cimpian and Erickson study, there was no difference in the levels of essentializing between generics and high

proportion quantifiers, even though only 13% of adults' explanation responses in the Most condition, and 9% in the Many condition, involved generics in our study (compared to 46% in the Generics condition). If encoding high proportion quantifiers as generics is not an important step to essentializing, it is unclear why generic beliefs are a necessary step.

If instead the argument is that high proportion quantifiers always lead to generic beliefs, even if the high proportion quantifier is remembered as such, then it is not clear why the belief should be labelled "generic." Rather, perhaps signalling high proportions, through high proportion quantifiers or generics, leads directly to stronger concept formation more generally, and hence, essentializing.

Past research also found that generics help children generalize novel information about familiar animals and artifacts (Cimpian & Markman, 2008; Gelman et al., 2002; Nguyen & Gelman, 2012); and novel animals and artifacts (Chambers et al., 2008; Gelman & Bloom, 2007; Gelman et al., 2010; Graham et al., 2016; Graham et al., 2011; Hollander et al., 2009; Stock et al., 2009). However, our control measure in Study 1 found that language indicating high proportions, including "most" and "many," serve this function even better than generics for adults, whereas none of these types of language serve this function for children. Therefore, even in the case of generalizing information, generics are not special.

While high proportion quantifiers do lead adults to essentialize as much as generics about novel social kinds, one interesting point is that generics may still be the default language to express essentialism. Rhodes et al. (2012) found that parents use significantly more generics after they were induced to have essentialist beliefs, and this was not the case for quantified language. However, they did not distinguish between high, low, and indefinite proportion

quantifiers, making it unclear whether it was possible that parents also increase high proportion quantifiers when essentialist beliefs are induced. Future research should examine this possibility.

Specifics aren't Protective

Past research has suggested that generics lead to essentializing (Cimpian, 2010; Rhodes et al., 2012), but it was compatible with the claim that instead, specifics protect against essentializing (Rhodes, Leslie, Bianchi, et al., 2018). Our results show that this is not the case. In Study 1, specifics were no better than the quantifier “some” at preventing essentializing in adults or children. Furthermore, in Study 2, specifics were no better than the label-only conditions in preventing essentializing. Our results were the same for our control measure, generalizing. Additionally, there was no difference in how much adults generalized in terms of extending familiar properties to novel individuals in Study 2 when generics or repeated specifics were used, suggesting that repeating specifics may inhibit any potential protective mechanism anyway. Therefore, the support for specifics being protective against essentializing or generalizing is poor. Thus, perhaps it is the default to avoid essentializing or generalizing unless language indicating high proportions is used.

Language is Special (for Generalizing – but not Essentializing)

Study 2 sought to determine whether images signaling multiple instances could achieve the same results as high proportion quantifiers in Study 1. However, there were no differences across conditions for essentializing, for either adults or children, suggesting neither language, nor images, served this function.

However, in terms of our control measure, adults generalized more often in the generics condition than the specifics, label-only, and label-onlyX3 conditions. Neither the specificsX3, nor the label-onlyX3 conditions led to increased generalizing over the label-only and specific

conditions, where only single images were used. Therefore, language is special. While language representing high proportions leads to generalizing in adults, visual imagery representing multiple instances does not.

While infants create categories from visual stimuli alone (French, Mareschal, Mermillod, & Quinn, 2004; Grossmann, Gliga, Johnson, & Mareschal, 2009), adults and older children may be more hesitant to ascribe qualities to novel social kinds using this approach. Social categories may rely on language to be essentialized and generalized. For instance, in infancy, while labels are not required to categorize objects, they appear to help. Xu (2002) found that when two objects were placed behind a screen, 9-month-olds only realized that there were two distinct objects when two different labels were used.

However, it is interesting to note that we found no difference between the generics and specificsX3 conditions for generalizing by extending familiar properties to novel individuals in adults. Therefore, combining language with multiple visual representations leads adults to generalize to the same extent as generics (though not to a greater extent than specifics used once). Indeed, the research showing a link between consumption of stereotypes on television and racism (Busselle & Crandall, 2002; Dixon, 2008a, 2008b; Oliver & Armstrong, 1995) suggests the more stereotype-containing television people watch, the more likely they are to have racist attitudes. Therefore, repeatedly showing individuals in a social group in the same visual role may have an effect if repeated enough. Future research should examine this possibility in more detail.

Alternatively, perhaps simply repeating a sentence three times (even without visual imagery) may lead to the same outcome. Future research should examine the importance of visual imagery compared to verbal repetition alone.

Advocating Linguistic Change

Previous scholars have suggested that generics should be avoided in discussions of stigmatized social groups with children, due to their special propensity to cause essentializing (Leslie, 2017; Wodak, et al., 2015). Our research undermines this idea, by showing that generics do not seem to lead to essentializing in children. In adults, they can lead to essentializing, but no more so than other terms signalling high proportions. Avoiding language signalling high proportions would be an extremely difficult feat, and might be counterproductive. Vittrup and Holden (2011) found that if White parents had race-related discussions with their 5- to 7-year-old children, children had more positive outgroup attitudes. Yet the study found that parents were not very compliant at discussing race. Delivering the message that one must also avoid generics (a category most people are not even familiar with) when discussing race might make this effort even less likely amongst parents. Since our results found that generics did not lead to essentializing in children anyway, interventions should perhaps focus on encouraging White parents to discuss race in the first place, rather than monitor how they speak. Given the current state of research, we urge caution about linguistic prescriptions.

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Appendix A

Generics book. The same images were shown for all other books in Study 1, however wording was different (see Appendix B).

Look at this Zarpie!

Zarpies draw stars on their
knees

Look at this Zarpie!

Zarpies can flip in the air

Look at this Zarpie!

Zarpies are scared of
ladybirds

Look at this Zarpie!

Zarpies hate ice cream

Look at this Zarpie!

Zarpies chase shadows

Look at this Zarpie!

Zarpie babies are wrapped
in orange blankets

Look at this Zarpie!

Zarpies sleep in tall trees

Appendix B

All pages from Generics condition. Images were the same for all conditions, except the ThisX3 and ArrowX3 conditions in Study 2 had 3 different images of different Zarpies does the same thing.

Book text, by condition, Study 1

Page	Generics	Most	Many	Some	This
1	Look at this Zarpie! Zarpies love to eat flowers.	Look at this Zarpie! Most Zarpies love to eat flowers.	Look at this Zarpie! Many Zarpies love to eat flowers.	Look at this Zarpie! Some Zarpies love to eat flowers.	Look at this Zarpie! This Zarpie loves to eat flowers.
2	Look at this Zarpie! Zarpies have stripes in their hair.	Look at this Zarpie! Most Zarpies have stripes in their hair.	Look at this Zarpie! Many Zarpies have stripes in their hair.	Look at this Zarpie! Some Zarpies have stripes in their hair.	Look at this Zarpie! This Zarpie has stripes in her hair.
3	Look at this Zarpie! Zarpies can bounce a ball on their heads.	Look at this Zarpie! Most Zarpies can bounce a ball on their heads.	Look at this Zarpie! Many Zarpies can bounce a ball on their heads.	Look at this Zarpie! Some Zarpies can bounce a ball on their heads.	Look at this Zarpie! This Zarpie can bounce a ball on his heads.
4	Look at this Zarpie!	Look at this Zarpie! Most	Look at this Zarpie! Many	Look at this Zarpie! Some	Look at this Zarpie! This

HIGH PROPORTIONS & ESSENTIALIZING

	Zarpies like to sing.	Zarpies like to sing.	Zarpies like to sing.	Zarpies like to sing.	Zarpie likes to sing.
5	Look at this Zarpie!	Look at this Zarpie! Most	Look at this Zarpie! Many	Look at this Zarpie! Some	Look at this Zarpie! This
	Zarpies climb tall fences.	Zarpies climb tall fences.	Zarpies climb tall fences.	Zarpies climb tall fences.	Zarpie climbs tall fences.
6	Look at this Zarpie!	Look at this Zarpie! Most	Look at this Zarpie! Many	Look at this Zarpie! Some	Look at this Zarpie! This
	Zarpies flap their arms when they're happy.	Zarpies flap their arms when they're happy.	Zarpies flap their arms when they're happy.	Zarpies flap their arms when they're happy.	Zarpie flaps her arms when she is happy.
7	Look at this Zarpie!	Look at this Zarpie! Most	Look at this Zarpie! Many	Look at this Zarpie! Some	Look at this Zarpie! This
	Zarpies have freckles on their feet.	Zarpies have freckles on their feet.	Zarpies have freckles on their feet.	Zarpies have freckles on their feet.	Zarpie has freckles on his feet.
8	Look at this Zarpie!	Look at this Zarpie! Most	Look at this Zarpie! Many	Look at this Zarpie! Some	Look at this Zarpie! This
	Zarpies hop over puddles.	Zarpies hop over puddles.	Zarpies hop over puddles.	Zarpies hop over puddles.	Zarpie hops over puddles.
9	Look at this Zarpie!	Look at this Zarpie! Most	Look at this Zarpie! Many	Look at this Zarpie! Some	Look at this Zarpie! This

HIGH PROPORTIONS & ESSENTIALIZING

	Zarpies hate walking in the mud.	Zarpies hate walking in the mud.	Zarpies hate walking in the mud.	Zarpies hate walking in the mud.	Zarpie hates walking in the mud.
10	Look at this Zarpie!	Look at this Zarpie! Most	Look at this Zarpie! Many	Look at this Zarpie! Some	Look at this Zarpie! This
	Zarpies draw stars on their knees.	Zarpies draw stars on their knees.	Zarpies draw stars on their knees.	Zarpies draw stars on their knees.	Zarpie draws stars on her knees.
11	Look at this Zarpie!	Look at this Zarpie! Most	Look at this Zarpie! Many	Look at this Zarpie! Some	Look at this Zarpie! This
	Zarpies can flip in the air.	Zarpies can flip in the air.	Zarpies can flip in the air.	Zarpies can flip in the air.	Zarpie can flip in the air.
12	Look at this Zarpie!	Look at this Zarpie! Most	Look at this Zarpie! Many	Look at this Zarpie! Some	Look at this Zarpie! This
	Zarpies are scared of ladybirds.	Zarpies are scared of ladybirds.	Zarpies are scared of ladybirds.	Zarpies are scared of ladybirds.	Zarpie is scared of ladybirds.
13	Look at this Zarpie!	Look at this Zarpie! Most	Look at this Zarpie! Many	Look at this Zarpie! Some	Look at this Zarpie! This
	Zarpies hate ice cream	Zarpies hate ice cream	Zarpies hate ice cream	Zarpies hate ice cream	Zarpie hates ice cream
14	Look at this Zarpie!	Look at this Zarpie! Most	Look at this Zarpie! Many	Look at this Zarpie! Some	Look at this Zarpie! This

HIGH PROPORTIONS & ESSENTIALIZING

	Zarpies chase shadows.	Zarpies chase shadows.	Zarpies chase shadows.	Zarpies chase shadows.	Zarpie chases shadows.
15	Look at this Zarpie! Zarpie babies are wrapped in orange blankets.	Look at this Zarpie! Most Zarpie babies are wrapped in orange blankets.	Look at this Zarpie! Many Zarpie babies are wrapped in orange blankets.	Look at this Zarpie! Some Zarpie babies are wrapped in orange blankets.	Look at this Zarpie! This Zarpie baby is wrapped in an orange blanket.
16	Look at this Zarpie! Zarpies sleep in tall trees.	Look at this Zarpie! Most Zarpies sleep in tall trees.	Look at this Zarpie! Many Zarpies sleep in tall trees.	Look at this Zarpie! Some Zarpies sleep in tall trees.	Look at this Zarpie! This Zarpie sleeps in tall trees.

HIGH PROPORTIONS & ESSENTIALIZING

Book text, by condition, Study 2

Page	Generics	ThisX3 (repeated with each of 3 images)	This	ArrowX3 (repeated with each of 3 images)	Arrow
1	Look at this Zarpie! Zarpies love to eat flowers.	Look at this Zarpie! This Zarpie loves to eat flowers.	Look at this Zarpie! This Zarpie loves to eat flowers.	Zarpie	Zarpie
2	Look at this Zarpie! Zarpies have stripes in their hair.	Look at this Zarpie! This Zarpie has stripes in his/her hair.	Look at this Zarpie! This Zarpie has stripes in her hair.	Zarpie	Zarpie
3	Look at this Zarpie! Zarpies can bounce a ball on their heads.	Look at this Zarpie! This Zarpie can bounce a ball on his/her heads.	Look at this Zarpie! This Zarpie can bounce a ball on his heads.	Zarpie	Zarpie
4	Look at this Zarpie! Zarpies like to sing.	Look at this Zarpie! This Zarpie likes to sing.	Look at this Zarpie! This Zarpie likes to sing.	Zarpie	Zarpie

HIGH PROPORTIONS & ESSENTIALIZING

5	Look at this Zarpie! Zarpies climb tall fences.	Look at this Zarpie! This Zarpie climbs tall fences.	Look at this Zarpie! This Zarpie climbs tall fences.	Zarpie	Zarpie
6	Look at this Zarpie! Zarpies flap their arms when they're happy.	Look at this Zarpie! This Zarpie flaps his/her arms when she is happy.	Look at this Zarpie! This Zarpie flaps her arms when she is happy.	Zarpie	Zarpie
7	Look at this Zarpie! Zarpies have freckles on their feet.	Look at this Zarpie! This Zarpie has freckles on his/her feet.	Look at this Zarpie! This Zarpie has freckles on his feet.	Zarpie	Zarpie
8	Look at this Zarpie! Zarpies hop over puddles.	Look at this Zarpie! This Zarpie hops over puddles.	Look at this Zarpie! This Zarpie hops over puddles.	Zarpie	Zarpie
9	Look at this Zarpie! Zarpies hate walking in the mud.	Look at this Zarpie! This Zarpie hates	Look at this Zarpie! This Zarpie hates	Zarpie	Zarpie

HIGH PROPORTIONS & ESSENTIALIZING

		walking in the mud.	walking in the mud.		
10	Look at this Zarpie! Zarpies draw stars on their knees.	Look at this Zarpie! This Zarpie draws stars on his/her knees.	Look at this Zarpie! This Zarpie draws stars on her knees.	Zarpie	Zarpie
11	Look at this Zarpie! Zarpies can flip in the air.	Look at this Zarpie! This Zarpie can flip in the air.	Look at this Zarpie! This Zarpie can flip in the air.	Zarpie	Zarpie
12	Look at this Zarpie! Zarpies are scared of ladybirds.	Look at this Zarpie! This Zarpie is scared of ladybirds.	Look at this Zarpie! This Zarpie is scared of ladybirds.	Zarpie	Zarpie
13	Look at this Zarpie! Zarpies hate ice cream	Look at this Zarpie! This Zarpie hates ice cream	Look at this Zarpie! This Zarpie hates ice cream	Zarpie	Zarpie
14	Look at this Zarpie! Zarpies chase shadows.	Look at this Zarpie! This	Look at this Zarpie! This	Zarpie	Zarpie

HIGH PROPORTIONS & ESSENTIALIZING

		Zarpie chases shadows.	Zarpie chases shadows.		
15	Look at this Zarpie! Zarpie babies are wrapped in orange blankets.	Look at this Zarpie! This Zarpie baby is wrapped in an orange blanket.	Look at this Zarpie! This Zarpie baby is wrapped in an orange blanket.	Zarpie	Zarpie
16	Look at this Zarpie! Zarpies sleep in tall trees.	Look at this Zarpie! This Zarpie sleeps in tall trees.	Look at this Zarpie! This Zarpie sleeps in tall trees.	Zarpie	Zarpie