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The Scope of Generic Generalizations: Developmental Changes in Judgments about Contextually-Restricted Generics

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Abstract

Generalizations are powerful tools to convey information agents need to predict and control their environments. However, some generalizations are restricted to "sociocultural bubbles" (e.g. "women have trouble getting tenure in math"). How are such patterns communicated? We report one interdisciplinary study — bridging philosophy, linguistics, and cognitive developmental psychology — which examined the developing capacity for contextual restriction of generics in 4-7-year-olds (N=137) and adults (N=63). We provided context cues signaling that the speaker used a generic generalization to convey a broad vs. contextually-restricted regularity, and measured endorsement of generics attributing properties prevalent globally vs. within "bubbles". Adults endorsed generics flexibly, tracking context cues, but younger children struggled, over-attributing socially contingent properties to the group beyond the "bubble", on par with context-general regularities. This reveals a troubling discrepancy between children and adults' interpretations of generics, opening the door for miscommunication. When adults highlight problematic patterns with the hope of promoting social change, children may perceive their assertions as claims about a group's broad, unalterable attributes. We discuss strategies to mitigate this in educational and family communication settings.

Keywords: generic language; contextual restriction; cognitive development

Background

Knowledge of the social world is often transmitted and acquired through generic language, or generics, such as "scientists collect data" and "the Inuit are good at fishing". Recent research has highlighted problematic aspects of generic language, while also offering more promising insights. On the problematic side, generic language can promote stereotyping and *essentialist beliefs* that group members' aptitudes and life outcomes are fixed by an inherent "group nature," and that not much can or should be done about it (Diesendruck, 2021; Gelman, 2003; Hammond & Cimpian, 2017; Haslam et al., 2000; Hetey & Eberhardt, 2014; Roberts et al., 2017). Such inferences sustain and exacerbate achievement barriers for underrepresented groups, perpetuating the status quo and stifling social change. Importantly, generic language figures prominently in children's input, who rely heavily on learned generalization to navigate the world (Rhodes et al., 2012). When Rhodes et al. (2012) introduced children and adults to a novel social kind, Zarpies, participants were more likely to form essentialist beliefs when they learned through generic language (e.g., "Zarpies sleep in trees") compared to non-generic language (e.g., "This Zarpie sleeps in trees"), suggesting that generics can promote psychological essentialism in belief formation. This effect of generic language is particularly troubling for children who are actively developing their understanding of the social world.

However, other work highlights that people both need and can use generics in non-pernicious ways to communicate about the social world. First, generics are uniquely well-suited for conveying systematic patterns of oppression, such as "women of color have trouble getting tenure in STEM" or "immigrants hold poorly paid jobs" (Ritchie, 2019). Second, both children and adults are capable of interpreting generics *structurally*, attributing social regularities to stable external constraints acting on category members, rather than to inherent predispositions of social groups (Vasilyeva & Lombrozo, 2020; Vasilyeva et al., 2018; Peretz-Lange et al., 2021). One example of structural construals of generics comes from Vasilyeva & Lombrozo (2020): when adults learned about a fictional group of immigrants, Borunians, via generics (e.g., "Borunians work in poorly-paid jobs," "Borunians have babies with low birth weight") accompanied by structural explanations (e.g., citing restrictive government regulations or lack of prenatal healthcare), participants recognized that group properties were due to circumstances rather than inherent group nature (e.g., Borunian immigrants' low income was due to external barriers rather than poor work ethic). Vasilyeva et al. (2020) reported a similar capacity for structural interpretation of generics both in adults and 3-8-year-old children.

Thus, social generics appear to come in two starkly different "flavors": essentialist and structural. This raises the question whether essentialist and structural generics are underwritten by different psychological principles (see Noyes & Keil, 2019, 2020, for relevant discussions of essentialism and generics). In our recent work, we've put forth a unifying account arguing that, despite surface differences, both types of generics are underwritten by a common principle: they convey robust stable non-accidental generalities (Ritchie & Vasil, ms). Essentialist generics convey robust non-accidental regularities believed to be rooted in a causal essence; structural generics convey robust

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non-accidental regularities stemming from stable structural constraints. Under this account, while both essentialist and structural generics convey robust non-accidental generalizations, they can differ both in explanatory commitments and in the scope of reference: essentialist generics are likely to come with an expectation that the regularities hold across contexts (i.e. the claims are not intended to be restricted to any particular location or time period), whereas structural generic claims may have a restricted scope and describe regularities that only hold in a specific context, a restricted sociocultural "bubble" with its own internal regularities (a particular country, time period, organization, sub-kind, etc.; Haslanger, 2016; Ritchie, 2019; Vasilyeva & Lombrozo, 2020). "Teachers wear masks" (during the pandemic) and "police pull over Black drivers more than White drivers" (in a community with high racial profiling rates) are examples of generics that describe such context-specific regularities.

Contextual restriction is common in ordinary speech and has been widely studied within linguistics and philosophy. People contextually restrict quantified claims all the time. For instance, someone complaining after a party that "every dish is dirty" and "all the beer is gone" probably does not mean that every dish in the world is dirty or that there's no beer left in the world; they mean that every dish at their house is dirty, and there's no beer in their fridge. We suggest that contextual restriction may work similarly with structural generics, resulting in *contextually restricted generics* (Ritchie & Vasil, ms). If this is true, we can retain a unified account of essentialist and structural generics on which all generics are taken to express robust non-accidental regularities, but these might hold broadly or in particular sociocultural "bubbles".

Notably, our proposal is far from universally accepted. Linguists and philosophers have suggested that generics do not allow, or are at least not conducive to, contextual restriction (Dahl, 1975; Krifka, 1987; Krifka et al., 1995; Pelletier & Asher, 1997; cf. Greenberg, 2003, 2007; Sterken, 2015). For example, Krifka and colleagues have argued that generics, unlike explicitly quantified claims, can never be implicitly contextually restricted: "A generic sentence states a lawlike regularity, and such regularity does not admit of contextual restriction" (Krifka et al., 1995, p. 45).

This brings us to the main question we address in this study: can children and adults recognize that some generic descriptions of social groups do not convey universal regularities holding broadly across contexts, but rather summarize *socially contingent generalizations (*narrow, context-dependent regularities specific to a society or time period)? We split this into two empirical questions: First, is there evidence for contextually restricted generics? That is, can acceptable generics report on regularities that hold only in certain contexts? Second, how does the interpretation of generics change across development? Specifically, do 4-7-year-old children share adults' assumptions about generics across restricted vs. unrestricted contexts, or do they have weaker expectations, or are they not sensitive to context at all?

To address these questions, we conducted an interdisciplinary study—bridging philosophy, linguistics, and cognitive developmental psychology—assessing the developing capacity for contextual restriction. Participants (4-7-year-olds and adults) were asked to assess their endorsement of generics about a fictional group of people. We manipulated two variables. The *context* of the generic utterance could be either *unrestricted* (where it is clear that the speaker is discussing the world in general) or *restricted* (where it is clear that the speaker is discussing one specific island). The *property type* took one of two values: *global properties* (i.e., properties prevalent among group members around the world), or *local properties* (i.e., prevalent only among group members on the island; a proxy for contingent regularities such as racial achievement gaps, restricted to a specific society).

When the context cues signal that the generic should convey an unrestricted regularity, we expected adults to give higher endorsement to generics citing global rather than local properties. Of higher theoretical interest was whether they also endorse generics asserting contextually restricted relationships when the cues suggest so. This would manifest as a reversal in global vs. local property ratings in the restricted condition (a crossover interaction). If adults fail to show this pattern, and instead continue to favor global properties, it would suggest that the assumption of cross-context stability in generic interpretation (consistent with a more rigid, essentialist view of social groups) prevails even when pragmatic cues suggest otherwise. While prior work on structural explanation and linguistic evidence on contextual restriction suggests that adults should succeed on this task, to our knowledge, no direct demonstration of contextually restricted generics exists.

Mapping the developmental trajectory of the capacity to contextually restrict generics will shed light on the role of experience. If it is relatively stable across development, this would suggest contextual restriction does not require advanced cognitive skills and/or experience. If we see lack of or partial competence in younger children, followed by increases with age, this might position "unrestricted" generics as the cognitive default, and suggest that mastering contextual restrictions requires experience and exposure to the appropriate linguistic input. Finally, if it decreases across development, it would suggest that implicit contextual restrictions are the cognitive default, and children may need additional linguistic and pragmatic experience to master unrestricted generic meanings. Either pattern of developmental change would provide a window into the process of an emerging sensitivity to the interaction between generic messages and the communicative contexts in which they are uttered.

Overall, if we find the same pattern in both children and adults, this would imply that both are "on the same page" when it comes to generics. This would have an implication for teaching situations where adults use generics to convey generalizable knowledge to children, suggesting miscommunications stemming from generic scope

interpretation are unlikely. Any discrepancies between children and adults in the capacity to contextually restrict would suggest that miscommunications between adults (teachers, caregivers) and children (learners) are likely. For instance, an adult could use a generic intending to convey a contextually restricted regularity and assume it's obvious that is their intended interpretation, but a child listener might assume a broad global regularity that holds across contexts is expressed. We come back to this issue in the Discussion.

Method

Participants

Sixty-six 4-5-year-olds (mean age 60 months, *SD* = 6.49 months) and seventy one 6-7-year-olds (mean age 85 months, *SD* = 7.07 months) participated at public libraries, preschools and city-hosted public events in San Francisco Bay Area and received small age-appropriate gifts. An additional 63 adults completed the study online and received $2.50. Ages for the developmental samples were determined based on prior work documenting important changes in several cognitive development areas in this age range, including pragmatic inference abilities critical for contextual restriction (Baharloo et al., 2022; Huang & Snedeker, 2008; Noveck, 2001; Stiller et al., 2015). Additionally, we have shown that at 4 years of age children already demonstrate some capacity to understand structural explanations that underwrite contextually restricted social generics, but this understanding is incomplete and undergoes active development in subsequent years (Vasilyeva et al., 2018). These factors make the age range from 4 to 7 years an optimal window to look for developmental shifts in deploying the contextual restriction capacity in generic interpretation.

Materials, Design and Procedure

Children were tested individually by trained researchers; adults completed the study online. The study took the form of an illustrated story about a novel social group called Sapers who live all over the world, including on Zolua island. Participants learned about four classes of group characteristics: hairstyle, headwear, trade and sleeping habits; these varied across Sapers living on Zolua island vs. elsewhere in the world. For example, in the learning phase of one trial, participants learned that "in most countries, most Sapers wear headbands. On Zolua island, most Sapers wear straw hats" (conveyed with quantified expressions using "most", rather than generic language; see Figure 1). We will refer to the group properties prevalent in most countries (e.g., wearing headbands) as ***global***, and to the group properties prevalent on Zolua island (e.g., wearing straw hats) as ***local***. This was followed by a comprehension check, where participants matched locations (most countries vs. Zolua island) to corresponding group properties, and received feedback; e.g., "Can you point to what most Sapers wear in most countries?", followed with "That's right, *headbands*" or "Actually, *headbands* is the correct answer. Will you remember that?" (responses reported in the OS).

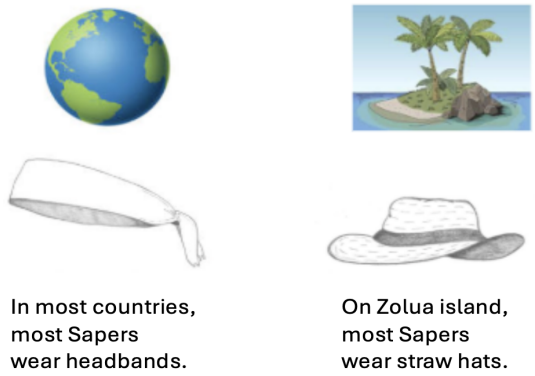

Figure 1: Sample description of property distribution.

The main task was to help a story character, Piggy, make a poster about Sapers. The key experimental manipulation concerned the contextual restriction: half of the participants helped make a poster about Sapers around the world (unrestricted condition), while the other half of the participants helped make a poster about Sapers on Zolua island (restricted condition). To ensure understanding of the poster-making task, all participants completed a practice session at the beginning of the study, helping Piggy make a poster about Mickey Mouse (see OS for performance summary), and selected the right poster board for the main task (see Figure 2 for the options).

On each trial, participants saw one candidate generic to be added to the poster board, e.g. "Piggy put this card on our poster about Sapers *around the world/on Zolua island*", followed by a generic statement (e.g. "Sapers wear headbands") and a corresponding image. On half of the trials, the generic attributed a global property; on half of the trials it attributed a local property; property type was counterbalanced across trials. Participants were asked: "What should we tell Piggy? Is it right or not right?". For children, an initial response ("right" or "not right") was followed up with "Really [right / not right], or a little [right / not right]?", yielding a four-point rating ranging from 1 "Really not right" to 4 "Really right". Such two-step rating procedures are commonly used with young children. Adults proceeded through all the steps at their own pace, and entered their ratings directly on the four-point scale ranging from 1 "Really not right" to 4 "Really right". The order of the trials was randomized for each participant. The study wrapped up with a short additional exploratory task described in the OS.

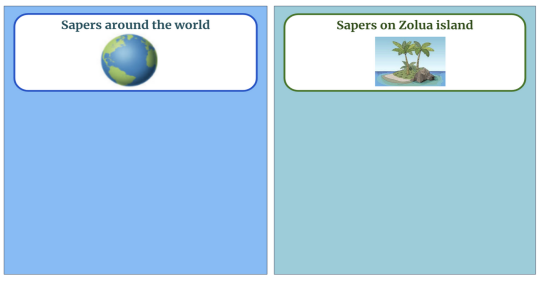

Figure 2: Poster boards used as visual aids for the contextual restriction manipulation.

Results

Responses (generic endorsement ratings) were treated as an ordinal outcome and analyzed using the *clmm* (Cumulative Link Mixed Models) function in R. A mixed ordinal regression, predicting generic endorsement ratings from property distribution (global vs. local), contextual restriction (unrestricted vs. restricted), and participant age group (younger children, older children, adults), applying sum contrasts for the predictor factors and allowing for random participant intercepts, revealed a three-way interaction, model Likelihood Ratio $LR = 49.71$, $p < .001$. The three-way interaction with age group remained significant if either adults ($LR = 17.95$, $p < .001$) or the youngest age group were dropped from the model ($LR = 7.41$, $p = .006$), indicating that detectable developmental changes occurred between each of the three age ranges.

To explore the three-way interaction in more detail, we examined two-way interactions between property and contextual restriction separately for younger children, older children, and adults; these were significant, indicating sensitivity to contextual restriction within each age group: younger children $LR = 9.30$, $p = .002$; older children $LR = 71.36$, $p < .001$; adults $LR = 195.27$, $p < .001$.

We next queried the full model for specific comparisons, applying treatment contrasts. We first focus on generics attributing globally-prevalent properties, i.e. those displayed by Sapers living in most countries. As shown in Figure 3, all age groups were significantly more willing to endorse such generics in the unrestricted context (describing Sapers around the world) than in the restricted context (describing Sapers on Zolua island); younger children $b = 1.23$, $z = 2.93$, $p = .003$; older children $b = 2.53$, $z = 5.91$, $p < .001$; adults $b = 3.25$, $z = 7.32$, $p < .001$. The generic endorsement gap between the restricted and unrestricted contexts grew wider with age, younger vs. older children $b = 1.31$, $z = 2.21$, $p = .027$, but the comparison between older children and adults did not reach significance, $b = .71$, $z = 1.20$, $p = .231$.

When we examined generics attributing locally-prevalent properties, i.e., those displayed by Sapers on the island, a different developmental picture emerged. In contrast to the globally-prevalent properties, and in contrast to all other age groups, the younger children in our sample endorsed these generics on par in the restricted and unrestricted contexts, $b = .36$, $z = .83$, $p = .407$ (as shown in Figure 3). Both older children and adults, however, rated these generics significantly higher when they were placed on a poster about Sapers on the island (restricted context) than on a poster about Sapers around the world (unrestricted context); older $b = 2.31$, $z = 5.36$, $p < .001$; adults, $b = 3.67$, $z = 7.70$, $p < .001$. Comparing the size of the generic endorsement gap for local generics across ages, the two contexts diverged significantly more in the older children than younger children ($b = 1.95$, $z = 3.21$, $p = .001$), and more in adults than in older ($b = 1.34$, $z = 2.17$, $p = .030$) or younger children ($b = 3.30$, $z = 5.19$, $p < .001$).

Finally, within each age group and each conversational context (e.g., a restricted context poster about the island or an unrestricted context poster about the world), generics attributing global vs. local properties received significantly different ratings, all pairwise ps $< .001$, with the exception of the younger group who endorsed both local and global property generics to equal extent in the global context, $b = .13$, $z = .34$, $p = .732$.

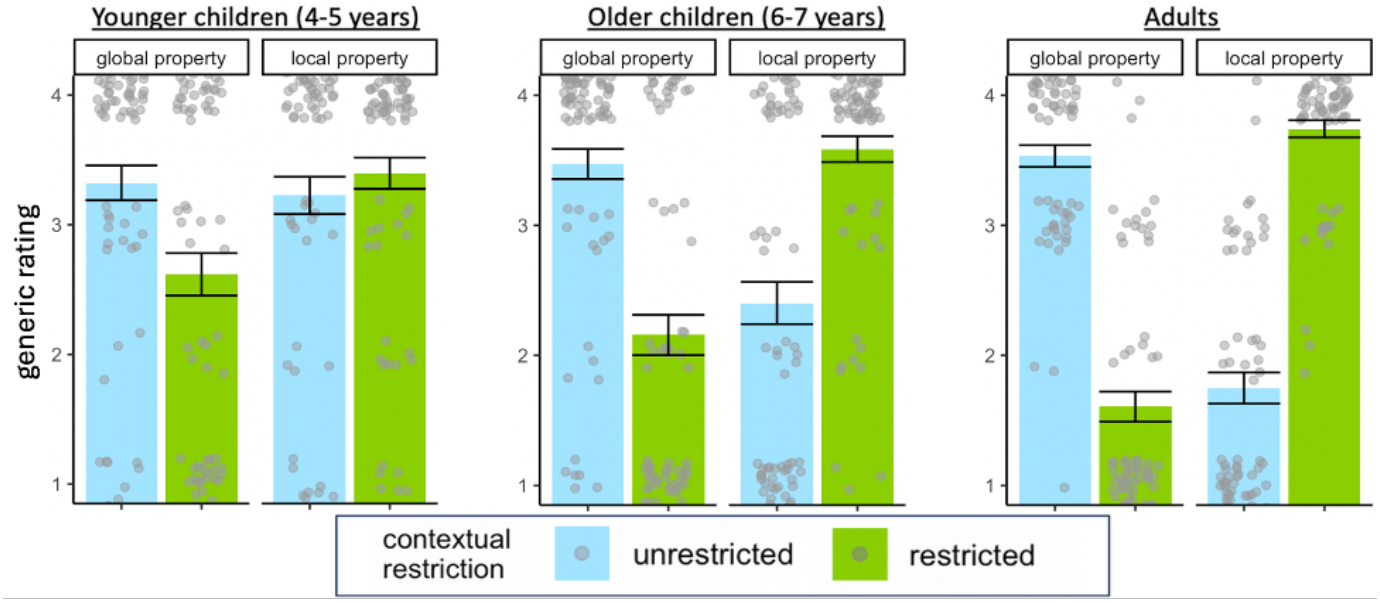

Figure 3: Mean generic endorsement ratings as a function of contextual restriction, property attributed to the social group in a generic claim, and participant age. Error bars represent ± 1 SEM. Gray dots represent individual data points. Statistical analyses (ordinal regressions with random participant intercepts) treated the outcome as an ordinal variable, but for visualization purposes, we display means here, and report means in the text.

Discussion

We examined whether adults and children use generics in a contextually-restricted way, to describe regularities that are limited to narrow contexts. First, we found that adults use generics flexibly: to describe broad patterns that hold across contexts, and to describe narrow, socially contingent patterns holding within "sociocultural bubbles". This suggests that a unified account of essentialist and structural generics is psychologically plausible, at least for adults. Both can convey robust non-accidental regularities, but such regularities can vary flexibly in scope (from relatively broad and global to narrowly restricted to a particular place).

Second, we found that the capacity for contextually restricting generics emerges gradually. Young children (4-5-year-olds) showed a striking asymmetry in their abilities to process contextual cues and selectively accept generics. They demonstrated emerging mastery of the selective use of generics attributing global properties in unrestricted contexts. This is important because it rules out the possibility that younger children are simply confused by our task and/or context manipulation; 4-5-year-olds clearly understand that generics attributing global properties work better in the context of a poster about the world (unrestricted) than on a poster about the island (restricted context). Strong performance in the practice session making a poster about Mickey Mouse and on the comprehension checks (reported in the OS) further confirm this. And yet, the youngest group showed undifferentiated use of generics attributing local properties across contexts – thus failing to demonstrate adult-like understanding of contextually-restricted generics. For them, local properties (common on the island) appeared to "leak" into the broader description of the group around the world. In fact, in unrestricted contexts (the poster about the entire world), they treated generics attributing global and local properties on par. Older children (6-7-year-olds) were starting to look more like adults.

Such undifferentiated use of generics in younger age suggests an alarming discrepancy between children and adults' default assumptions about generic meanings and their respective capacities for contextual restriction, opening the door for miscommunication between adults (teachers, parents) and children (learners). Adults could unwittingly instill problematic, essentialist beliefs in a child, even while attempting to convey the opposite. For instance, saying "immigrants hold lower paying jobs" aims to highlight a local pattern and suggest the potential for change. However, our findings suggest that younger children might misinterpret this as a universal attribute of immigrants, fostering harmful beliefs about the immutability of group attributes and life outcomes, thereby stifling the possibility of change. That is, highlighting problematic patterns with the hope of promoting social change may be perceived by children as claims about a group's unalterable attributes.

More broadly, conveying both global and restricted generalizations to children, and avoiding miscommunication, is vital for early science learning. For instance, a teacher might say "Squirrels are grey" in a lesson about North American squirrels; but a child insensitive to the contextual restriction might come to believe this applies to squirrels across a broad range of regions. We consider three strategies to avoid cross-generational miscommunication caused by generics and highlight how these might be tested in future research.

Strategy 1: Avoid generics and use quantified statements Some authors have proposed avoiding generics, at least to describe social regularities, and using quantified statements– like "Some immigrants hold low paying jobs"–instead in order to reduce essentialism (Haslanger, 2010; Langton, Haslanger, & Anderson, 2012; Leslie, 2017; Wodak & Leslie, 2017; Wodak, Leslie, & Rhodes, 2015). While in relation to our findings too avoidance would guarantee fewer opportunities for miscommunication, we have theoretical and practical concerns with this strategy.

First, avoiding generics would prevent us from harnessing their benefits. While some authors emphasize the negative impacts of generics (Diesendruck, 2021; Gelman, 2003; Hammond & Cimpian, 2017; Haslam et al., 2000; Hetey & Eberhardt, 2014; Roberts et al., 2017), others argue they can be powerful linguistic tools to combat injustice (Hesni, 2021; Ritchie, 2019; Saul, 2017). Generic claims, like "Women of color have trouble getting tenure in STEM," communicate social regularities while being resilient to falsification by counterexamples. In contrast, an explicitly quantified statement like "All women of color have trouble getting tenure in STEM" cannot withstand the same scrutiny, and "Some women of color have trouble getting tenure in STEM" fails to highlight the structural causes of the inequity.

Moreover, if we aim to propose practical strategies for improving communication, an elimination strategy would be difficult to implement. Some authors have suggested that we may cognitively default to generalizing to understand and navigate the world and that we express this default feature of our cognition via generics (Khoo & Sterken, 2021; Leshin, Leslie & Rhodes, 2021; Leslie, 2007). Avoiding the use of such a ubiquitous and fundamental aspect of our language practice might be impossible. Prohibiting the use of generics would also impede the communication of scientific findings, including conclusions drawn from the present study. Overall this strategy appears difficult to implement, even if it were to have positive effects (see discussions of the implementation problem: Deutsche, 2020; Jorem, 2021; Koslow, 2022).

Strategy 2: Explicitly, rather than implicitly, restrict generics Another strategy involves explicitly restricting generics when they are meant to have restricted scope to a particular "bubble". For instance, we could say, "On Zolua Island, Sapers wear straw hats" rather than "Sapers wear straw hats." This could reduce the chance that children would interpret a contextually-restricted generic as an unrestricted one. While this might be an effective strategy, it requires future research to investigate how children understand explicitly restricted generics. Do they still overgeneralize? This research should connect to studies on how children

understand other cases of implicit domain restriction, such as explicitly restricted uses of "every kid."

However, suggesting that parents and teachers always explicitly restrict generics when that is their intended meaning would also be difficult to implement. Implicit domain restriction is ubiquitous in adult language use. For example, we say, "Every kid wants to play soccer" to mean every kid at the playdate, not that all kids in the entire world do. The suggestion that parents, teachers, and others explicitly restrict all claims would be exceedingly difficult to follow. Moreover, for complex cases, it may be hard to determine the most accurate or useful scope of restriction. For instance, should we modify "Immigrants hold lower paying jobs" to specify immigrants in the United States in 2025, in the last century or in all nations with particular immigration policies? While there are better and worse specifications, pinpointing the best ones in everyday conversation could be challenging (see, e.g., Buchanan & Ostertag, 2005 and Wilson & Sperber, 2012 on this problem within philosophy of language).

Strategy 3: Narratively contextualize the limits and fungibility of local generics As a third strategy for mitigating miscommunication, we suggest adults be encouraged to provide more context and highlight the limits of local generalizations. This could involve emphasizing the relationship between current social realities and history, differences in other places, and highlighting that regularities can be altered (see Saul, 2017; 2018). We believe this is the most promising strategy to reduce miscommunication between adults and children regarding restricted generics.

Although it requires more effort from parents and teachers, we take it to be the most practical strategy. It might be implemented via curricula with units that situate regularities within time, place, and historical narratives, and explore ways to change them. These methods are more achievable than asking parents and teachers to avoid certain common linguistic forms or to always use language that precisely delineates what they intend to communicate, and may contribute to a more dynamic learning environment that helps children hone their interpretation of generics. The best way to implement this strategy and its effects warrant future research.

Future Directions and Ongoing Work

The present work documented contextual restriction in generics describing neutral behavioral and appearance-based social regularities about novel groups. Future research should explore whether these findings generalize to familiar groups, across different types of attributes, including those positively or negatively charged, and whether the findings hold for different modalities of exposure to contextual variability in group properties (e.g., witnessing it firsthand vs. learning through testimony), as well as within real conversations children participate in. Naturalistic interactions likely contain additional conversational cues that might help children keep track of speaker-specific prior knowledge, communicative intentions, and contextual restrictions (e.g., Chen et al., 2024).

The current work also leaves open whether generics about biological kinds (e.g., lions) would allow for implicit restriction, and whether this changes across development. It might be that social regularities are taken to be context-sensitive, given the ways that norms, laws, and practices vary across communities and time periods, but biological kinds are not. Alternatively, people might understand that animal and plant species differ across environments and take generics about these kinds to be restricted as well. Our ongoing work suggests that generics about natural kinds are just as amenable to contextual restrictions as generics in the social domain.

Future research will need to further establish generalizability of our findings across generic subtypes: can striking property generics (such as "sharks attack people") be contextually restricted? Does contextual restriction apply in the same way to descriptive and normative generics (like "boys don't cry")? Prior work has revealed a notable early understanding and tolerance for context-restricted norms (e.g. Hindu children not only understand that Muslims can have different religious norms, but they also think that Muslims should abide by Muslim, not Hindu, norms; Srinivasan et. al., 2019; see also Turiel, 1983, 2008). But does this translate into appreciation of contextually-restricted generics, or are these cases treated as distinct and not as rules that can be encoded in generic language? These are all important questions that we hope to tackle in future work.

Summary

This study yielded the first evidence of contextually restricted generics in adults, documented partial appreciation in 4-5-year-old children, and identified a novel discrepancy between young children and adult's use of generics that opens a door for cross-generational miscommunication. When using generics to talk to young children about societal patterns, additional clarifications and explanations might be called for to avoid problematic misunderstandings.

Online supplement

https://osf.io/mbnvr/?view_only=13b10dae4300463193857bc68a77e49f

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