Effects of Generics and Contextual Cues on 3- and 4-Year-Olds' Normative Inferences

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Abstract

Generics (e.g., boys play football) are used to link certain properties to the members of a category. One of the conceptual consequences of generics is licensing normative inferences about how category members should behave. Building on pragmatic approaches, we propose that children are especially likely to form normative inferences when they hear generic statements used in mismatching situations (e.g., saying "boys play football" to a boy who is playing volleyball). We investigated whether 3- and 4-year-olds (N = 157) draw normative inferences from generic statements that either matched or mismatched an observed situation. Partially aligning with our predictions, children prescribed generically and specifically stated properties to new category members more often in mismatching than in matching situations. Exploratory analyses suggested that children were more likely to prescribe generically than specifically stated properties in mismatching and matching situations. Overall, findings suggest that generics and situational mismatch promote normative inferences in children.

Keywords: conceptual development; generic language; normativity; social categorization; pragmatics

Introduction

Imagine a boy telling his parent that he has decided to join the volleyball team at school. In turn, the parent says, "Boys play football!" This statement is not directly relevant to the boy's decision to join the volleyball team, yet it does not sound mistaken. Rather, it is naturally interpreted as intended to convey a social expectation or norm, reflecting an attempt to correct behavior based on beliefs about what boys are supposed to do, rather than a purely descriptive claim about what boys in fact do. Statements like this are called *generic statements*, which refer to categories as abstract kinds and attribute properties to the kind as a whole (e.g., *Boys play football*; *Girls wear pink*), rather than to specific individuals (e.g., *This boy plays football; These girls wear pink*). Generic statements are prevalent across cultures and languages (Carlson & Pelletier, 1995; Gelman et al., 2008; Leslie, 2008). Further, they support inferences both about category structure, leading social categories to be construed as coherent and stable kinds (e.g., boys as a distinct type of people; Gelman et al., 2010; Rhodes et al., 2012, 2025), and about the properties they mention, which are often inferred to be inherent (Cimpian & Markman, 2009, 2011; Gelman & Bloom, 2007), prevalent (Gelman et al., 2002; Tessler & Goodman, 2019) and inflexible characteristics of category members (e.g., Benitez et al., 2022; Leshin et al., 2021; Rhodes et al., 2012).

The period between ages 2 and 3 years marks a key point in children's comprehension and use of generic language. Around these ages, children themselves start producing generic statements (Gelman, 2003; Pappas & Gelman, 1998) and they show sensitivity to the generic–nongeneric distinction (Gelman & Raman, 2003; Graham et al., 2011, 2016). By age 3, they can also use pragmatic cues to differentiate generic from nongeneric expressions. For example, they infer generic meaning from plural forms when they are used for singular referents, whereas 2-year-olds do not (Gelman & Raman, 2003). Further, hearing generic statements about novel social groups promotes 2.5-year-olds' social category formation (Rhodes et al., 2018) and 3-year-olds' generalization of properties across novel categories (Graham et al., 2011; Pronovost & Scott, 2022). However, as illustrated by the opening example, generic statements can also invite normative interpretations with the intention of prescribing how members of the category are supposed to behave. Therefore, the present study investigated whether 3- to 4-year-old children draw normative inferences from generics, and whether they use contextual cues to make such inferences.

Prior theoretical work in philosophy of language has addressed how and when generic statements give rise to normative interpretations, with one account locating the source of normativity at the *pragmatic* level, arguing that contextual cues can enable normative readings (Haslanger, 2011, 2014; Hesni, 2021). On this view, whether a generic receives a normative interpretation depends on the communicative context in which it is uttered. For example, Hesni (2021) describes a situation in which a bus driver is delayed, and a passenger says to the driver, "Bus drivers stick to their timelines." The statement is naturally understood as expressing a normative expectation that the driver should follow the schedule.

Following this pragmatic view, we speculate that normative interpretations may be especially likely to arise when generic statements are used in contexts that conflict with the observed situation. Listeners generally assume that utterances produced by cooperative speakers are informative and appropriate to the context (Grice, 1975), and they seek an interpretation that makes the utterance relevant in that context

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(Sperber & Wilson, 1986). Relevance shapes human communication broadly (Tomasello, 2008), including 3-year-olds' interpretations of indirect statements (Schulze et al., 2013). When a statement conflicts with an observed situation, this mismatch may prompt children to engage in pragmatic reasoning to infer the speaker's communicative intention. When the conflicting statement is generic, this pragmatic reasoning process may bias children toward a normative interpretation, since generics draw attention to category-level representations and categories and their properties are often construed normatively (Foster-Hanson et al., 2021; Haward et al., 2018; Prasada & Dillingham, 2006, 2009).

The Present Study

The present study examined how generics and situational mismatch influence 3- to 4-year-olds' normative inferences about a novel social group. To do this, we investigated children's extension of norms to novel group members. Children heard a "Zarpie teacher" speak to a "Zarpie student" in response to the action the student was performing, using either generic or specific language (e.g., "Zarpies ride skates" or "This Zarpie rides skates"). The teacher's statement either matched or mismatched the student's ongoing action (e.g., the student was riding skates or a bike). Then, children were shown a new Zarpie student and asked to tell the student which action to perform by choosing between the teacher-stated action and an alternative (e.g., to ride skates or a bike). Building on prior work on children's norm enforcement behavior (Rakoczy et al., 2008; Schmidt et al., 2012), here we examined which behaviors children prescribe to others as an indicator of their normative beliefs.

Our preregistered predictions were that, in the generic mismatch condition, children would interpret the teacher's statement normatively and therefore prescribe the action stated by the teacher, rather than the action performed by the Zarpie student, to the new Zarpie student. In contrast, in the specific mismatch condition, we expected children to interpret the teacher's statement as a descriptive mistake (e.g., the teacher says "This Zarpie rides skates" when the Zarpie is riding a bike) and therefore to prescribe the action performed by the Zarpie student, rather than the teacher's stated action, to the new Zarpie student. In both match conditions, we expected children to prescribe the action that was both stated by the teacher and performed by the Zarpie student, rather than the novel action. Because the teacher's statement and the Zarpie student's action referred to the same behavior, and children received no information about the alternative action, children could rely on descriptive reasoning to expect behavioral consistency across Zarpie individuals.

Open and Transparent Science

The research question, the study design, hypotheses and analyses were preregistered and available on OSF (https://osf.io/aewk4/overview?view_only=fe4d6337a8f24d5a80e1d837dcce0ab2).

Method

Participants

Participants included 157 children (ages 3 – 4.97, M_{age} = 4.08, 93 girls, 63 boys, 1 preferred not to say). Participants were tested through an unmoderated research platform that was designed for developmental research (Rhodes et al., 2020). All participants resided in the US. An additional 6 participants were tested but excluded from analysis following the preregistered exclusion criterion of failing to complete at least 75% of the trials. Based on parents' reported racial-ethnic information, 59.87% of the children were white, 20.38% were Multiracial, 11.40% were Asian, 5.10% were Black, and 3.18% were Hispanic.

Procedure

The study had a 2 (language form: generic vs. specific; between-subjects) by 2 (statement–action consistency: match vs. mismatch; within-subjects) mixed factorial design with repeated measures. After two familiarization trials, participants completed 8 test trials. In each trial, participants viewed the same brief animated scene twice in which a student performed an action and a teacher addressed the student using either generic or specific language. The student's action either matched or mismatched the action referred to in the teacher's statement. After each scene, participants told a new student which action to perform.

Familiarization Trials The familiarization trials ensured that participants could track and recall the actions they saw and the statements that they heard, particularly when statements and actions mismatched. Only generic language was used in the familiarization trials. Trials were presented in a fixed order. In each trial, a puppy performed an action. Then, an authority figure (i.e., a mother dog) made a statement directed at the puppy. In the first trial, children saw the puppy wearing a blue sweatshirt. Then, the mother dog appeared facing towards the puppy and said: "Puppies wear red sweatshirts." Thus, the first familiarization trial mirrored the logic of the mismatch trials in the subsequent test trials. In contrast, the second familiarization trial mirrored the match trials: the puppy was playing a piano when the mother dog appeared and said: "Puppies play the piano." Then, participants were asked a memory check question about both the action (e.g., "What color sweatshirt was the puppy wearing?") and the statement (e.g., "What color sweatshirt did the mommy dog say puppies wear?"). Participants were not given any feedback after responding.

Test Trials Test trials were integrated in a narrated storybook titled *Zarpie School*, which introduced a novel social group called the *Zarpies* and showed events from their school life. Participants completed eight test trials, each of which corresponded to one of the teacher statements (e.g., riding skates). On each trial, a Zarpie student either performed the same action mentioned by the teacher (e.g., student was

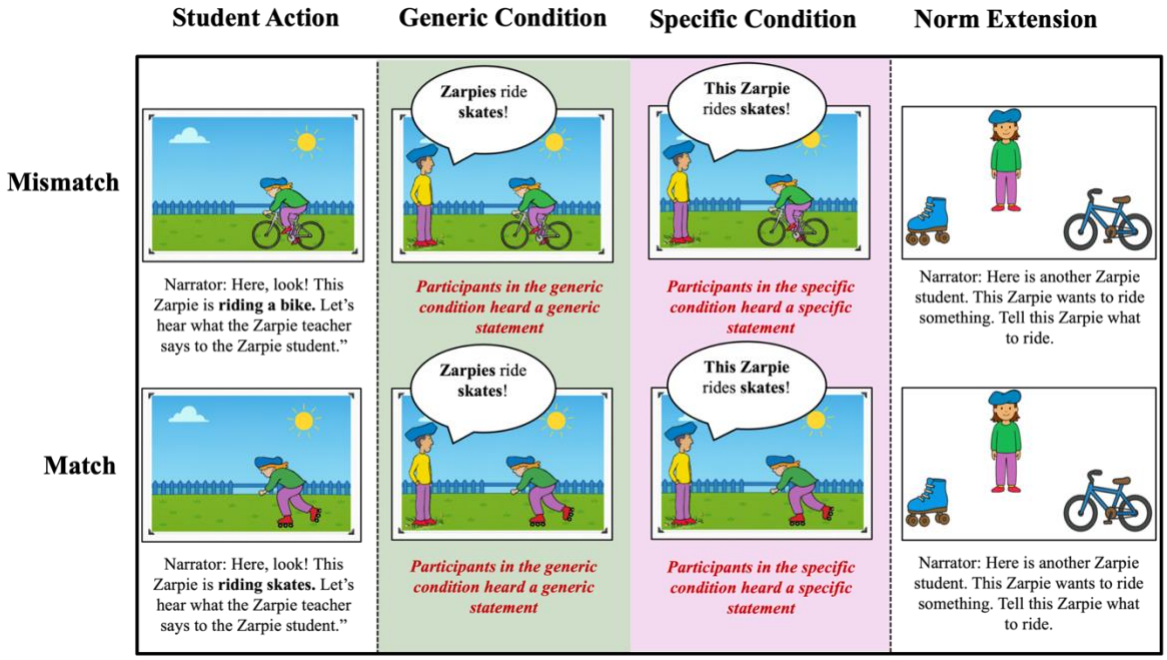

Figure 1. Experimental design illustrating match and mismatch conditions under generic and specific language

riding skates in the *match* trials) or a different action (e.g., student was riding a bike in the *mismatch* trials; see Table 1 for a complete list of teacher statements and student actions). Each test trial followed the same sequence. First, a Zarpie student appeared on the screen and performed an action. The narrator then indicated that the Zarpie teacher would speak to the student, after which the teacher appeared and addressed the student and said one of the fixed statements.

Teacher statements differed across language form conditions and varied between subjects. In the generic condition, statements referred to the group as a whole (e.g., "Zarpies play frisbee"). In the specific condition, the same statements referred to the individual student (e.g., "This Zarpie plays frisbee"). Aside from this difference in language form, the content of the statements was identical across conditions. Statement–action consistency (match vs. mismatch) varied within subjects and each participant completed four match trials and four mismatch trials. Participants were randomly assigned to one of two predetermined stimulus blocks, each containing all eight teacher statements. Across blocks, the match status of statements was alternated such that a statement that appeared as a match trial in one block appeared as a mismatch trial in the other. Thus, each teacher statement appeared equally often in match and mismatch trials across participants but appeared in only one form per participant. Within each block, trial order was randomized.

Table 1. Teacher statements and corresponding mismatching actions. Only mismatching actions are included in the table because matching actions were identical to the statements.

Statements	Mismatching Actions
1.[…] draw/s hearts on its/their knees	drawing stars
2.[…] eat/s tree leaves	eating flowers
3.[…] ride/s skates	riding a bicycle
4.[…] bounce/s beach balls on its/their heads	bouncing a tennis ball
5.[…] play/s frisbee	playing volleyball
6.[…] play/s with worms	playing with bugs
7.[…] walk/s in the sand	walking in the mud
8.[…] climb/s walls	climbing a tree

Norm Extension In each trial, after the student's action and the teacher's statement were presented and narrated twice, participants answered a *norm extension* question assessing whether they would prescribe the new group member to do the teacher-stated action property. The narrator introduced a new Zarpie student and stated that this student wanted to perform the same type of action as the previous student (e.g., "This Zarpie wants to ride something") but left the specific action unspecified. Two response options then appeared on the screen, each depicting a different action option (e.g., skates vs. a bicycle). Participants were asked to tell the new Zarpie what to do (e.g., "Tell this Zarpie what to ride"; see Figure 1).

The choice screen was visually identical across match and mismatch trials. However, in mismatch trials, one option corresponded to the action property mentioned in the teacher's statement, whereas the other corresponded to the action property previously performed by the student. In contrast, in match trials, the teacher's statement and the student's action referred to the same action property, and the alternative option depicted a novel action property that had not been shown or mentioned earlier in the trial.

Analytic Strategy Participants' trial-level binary responses (coded as 1 if they selected the property featured in the teacher's statement and 0 otherwise) were analyzed in R (R Core Team, 2023). Selecting the teacher-stated action property was interpreted as evidence of extending the stated feature as a norm to the new student, with higher values showing greater normative extension. We fit a Bernoulli generalized linear mixed-effects model with a logit link to predict the participants' tendency to prescribe the stated feature. Fixed effects included language form (generic = 1, specific = 0), statement–action consistency (mismatch = 1, match = 0), age (mean-centered), and their interactions. Random intercepts were included for participant and item. We ran an ANOVA on the fitted GLMM model to test the 2-way interactions and followed up on it by using the emmeans package (Lenth et al., 2018). Also, to evaluate our preregistered prediction that participants would more often choose the teacher's action in the generic-mismatch condition, we examined whether model estimates in each language form and statement–action consistency condition differed from chance in the predicted direction using estimated marginal means implemented with the emmeans package (Lenth et al., 2018).

Results

Familiarization Results Performance on the familiarization questions showed that children were able to successfully keep track of the relevant information prior to the test trials. Children reliably remembered both observed actions and properties, and the statements across ages. Children's responses to all familiarization questions were above chance levels for both feature memory and statement memory, for both 3- and 4-year-olds (all *p*s < .001).

Main Results Children extended the teacher-stated action property by telling the new Zarpie to perform that property more when the teacher used generic rather than specific language (main effect of language form: OR = 2.13, 95% CI [1.56, 2.89], $p < .001$). Children also extended the teacher-stated action property more in the mismatch condition, in which the student's observed action property differed from the property stated by the teacher (main effect of statement–action consistency: OR = 3.66, 95% CI [2.79, 4.81], $p < .001$). The 2-way interaction between statement–action consistency and age was significant (OR = 1.66, 95% CI [1.02, 2.70], $p = .04$). Simple slope analyses revealed that extension increased with age in the mismatch condition (OR = 1.67, 95% CI [1.12, 2.48], $p = .01$), but not in the match condition (OR = 1.01, 95% CI [0.71, 1.42], $p = .97$, see Figure 2). Simple slope analyses indicated that the mismatch–match contrast was significant across the observed age range (*p*s < .001).

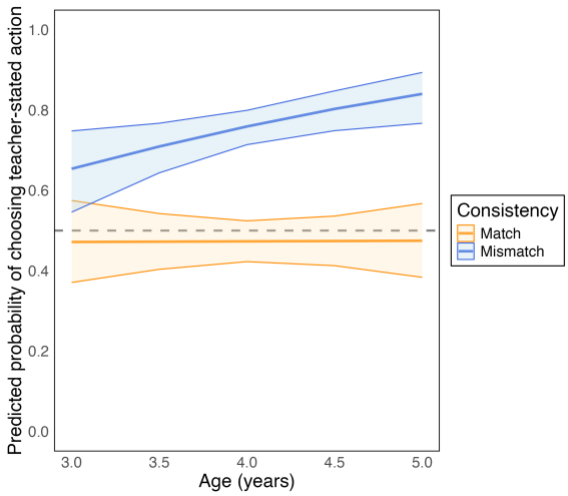

Figure 2. Lines depict model-predicted probabilities of choosing the teacher-stated action as a function of statement–action consistency and age. Ribbons represent 95% confidence intervals. The dashed line indicates chance level (0.5). Higher values on y-axis indicate a higher probability of extending the teacher's statement to a new student as a norm.

To evaluate our preregistered predictions about teacher-stated action extension, we examined whether children's responses differed from chance within each language form × statement–action consistency condition. Consistent with our predictions (Figure 3), in the generic-mismatch trials, children chose the teacher-stated action at an above chance rate when the teacher used generic language ($M = .84$, 95% CI [.79, .88], $p < .001$). Contrary to our predictions, children also extended the teacher-stated action at an above chance rate in specific-mismatch trials ($M = .67$, 95% CI [.60, .73], $p < .001$). In other words, children reliably extended the teacher's stated action to a new Zarpie when it conflicted with the student's action, regardless of whether the teacher used generic or specific language.

In the match conditions, in which the teacher's stated action matched the student's action, children were predicted to extend the action. However, the rate of extending the matching action did not differ from chance in the generic language condition ($M = .54$, 95% CI [.47, .61], $p = .26$) and, in fact, was below chance in the specific language condition ($M = .41$, 95% CI [.34, .48], $p = .01$). This result was counter to our predictions. Instead of participants reliably extending the matching action to a novel Zarpie, they either showed no preference between the matching and novel actions (generic trials) or favored the novel over the matching action (specific trials).

Exploratory Analyses Even though the interaction between language form and statement–action consistency was not statistically significant (OR = 1.55, 95% CI [0.91, 2.64], p = .10) we conducted exploratory analyses to see how language form related to children's responses within each consistency condition. Exploratory pairwise contrasts revealed that, in the mismatch condition, children were more likely to extend the teacher-stated action property when the teacher used generic rather than specific language (OR = 2.63, 95% CI [1.48, 4.68], p < .001). In the match condition, generic language was also associated with higher odds of property extension compared to specific language (OR = 1.71, 95% CI [1.05, 2.78], p = .03). The estimated odds ratio was numerically larger in the mismatch condition than in the match condition, although the confidence intervals overlapped.

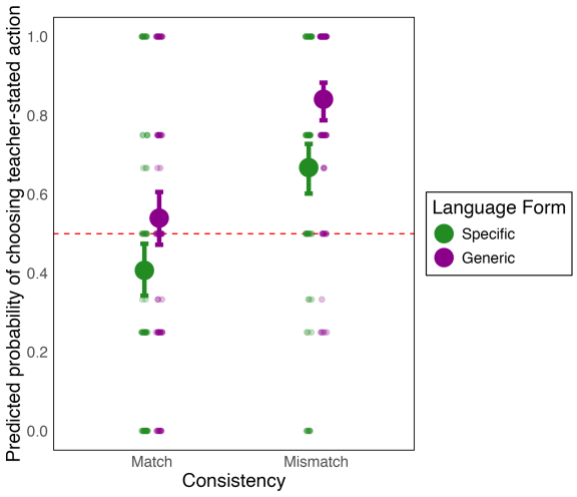

Figure 3. Points depict model-predicted probabilities of choosing the teacher-stated action as a function of language form and statement–action consistency. Error bars represent 95% confidence intervals. Smaller semi-transparent points represent each participant's mean probability of choosing the teacher-stated action across trials within each condition. The dashed line indicates chance level (0.5). Higher values on y-axis indicate a higher probability of extending the teacher's statement to a new student as a norm.

Discussion

Here we examined whether young children draw normative inferences from generic statements, particularly when those statements conflict with the observed behavior. Consistent with one of our predictions, children were especially likely to tell new group members to perform the teacher-stated action when the statements were in generic form and used in mismatching situations (e.g., the teacher saying "Zarpies ride skates" to a Zarpie who was riding a bicycle). This pattern suggests that children interpreted the teacher's statement as expressing a normative expectation and used it to enforce the stated behavior for new group members as a norm. This finding supports the proposal that situational mismatch can function as a pragmatic cue that influences the interpretation of generic statements and leads them to be understood as expressing normative expectations about how group members should behave rather than as merely descriptive claims.

Contrary to our predictions, norm extension in mismatching situations was also robust when the statement was in specific language form. One explanation for this unexpected finding might be the habitual aspect of the specific language trials (e.g., "This Zarpie rides skates" indicates a habitual pattern of behavior). Habitual constructions in English are commonly understood as describing stable patterns of behavior associated with an individual across situations, rather than a single observed action (Cheng, 2011; Leslie & Lerner, 2016; Wasserman, 2011). The habitual aspect of specific statements may have encouraged interpretations that share features with generics, which also often rely on habitual aspect (e.g., "Zarpies ride skates"). As a result, the specific statements may have functioned as a comparatively weaker version of generics, especially when paired with situational mismatch. When a teacher's statement conflicts with the student's ongoing behavior, this contextual conflict may encourage children to treat the statement as expressing how the individual member of the group typically (or ideally) behaves, which in turn supports normative expectations about other members' ideal behaviors even in the absence of generics.

Another possibility for observing norm enforcement in mismatching situations, under both generic and specific language, is that children might have engaged in pragmatic reasoning about the speaker's communicative intentions. According to classic pragmatic accounts, listeners infer meaning by reasoning about why a cooperative speaker would choose a particular utterance in a given context (Grice, 1975; Sperber & Wilson, 1986). Developmental work shows that even 3- to 4-year-olds engage in such intention-based reasoning when utterances seem irrelevant given the context (Schulze et al., 2013). In the present study, the speaker's decision to produce a statement that conflicted with the student's ongoing behavior may therefore have led children to seek an intention behind the speaker's utterance. Once this pragmatic reasoning is engaged, children may draw on available category-level information to resolve the speaker's intended meaning. In the present task, even the specific statements included a category label (e.g., "This Zarpie…"), and the storybook context introduced a social category (a Zarpie school with Zarpie students and Zarpie teachers). These cues may become particularly salient when pragmatic reasoning is engaged and sufficient to activate a category representation. Given that categories and their properties are often construed in normative terms (Foster-Hanson et al., 2021; Haward et al., 2018; Prasada & Dillingham, 2006, 2009), children may have inferred an intention to guide or correct behavior, thereby supporting normative interpretation via pragmatic reasoning even for specific statements.

In the matching conditions (e.g., the teacher saying "Zarpies ride skates" to a Zarpie who was riding skates), our

preregistered prediction was that children would extend the teacher-stated action, as it both aligned with the teacher's statement and matched the observed behavior. Contrary to this prediction, children did not reliably extend the matching action: responses were at chance in the generic condition and below chance in the specific condition with children instead favoring the novel alternative (e.g., they told the new Zarpie to ride a bike). Although unexpected, this pattern is not problematic for our account and may, in fact, provide stronger support for it. When the teacher's statement aligned with the observed behavior, there may have been little pragmatic pressure to interpret the utterance as normatively informative. For specific statements, this alignment might have encouraged a descriptive interpretation and led children to show a novelty bias. However, novelty bias is unlikely to explain all of the results since children were at chance in the generic match condition. For the generic match condition, one possibility is that, although generic statements highlight category-level information, the matching context did not provide strong evidence that the stated property was a defining or exclusive feature of the category. Children observed only a single instance of a Zarpie performing the action, which may have left open the possibility that other Zarpies could perform different actions. In the absence of a mismatch that would prompt a pragmatic (normative) interpretation, children may therefore have treated both options as plausible, rather than extending the observed action as a norm. Overall, norm enforcement was attenuated in matching contexts. Taken together with the mismatch findings, this pattern is consistent with the idea that situational conflict facilitates normative interpretations of both generic and specific statements, with generics showing a stronger tendency toward norm enforcement, whereas such interpretations are less likely to arise in the absence of mismatch.

Broader Implications

These findings may have broader implications for how children represent different relations between kinds and properties. Prasada and Dillingham (2006, 2009) propose that people can represent two types of relations between kinds and properties: principled connections and statistical connections. A principled connection holds when a member of a kind has a property *in virtue of being that kind*. For example, having four legs bears a principled connection to the kind *dog*, because this property captures what it means to be a dog. In contrast, a statistical connection holds when a property is common among members of a kind but is not what it means to be that kind. For instance, wearing collars is statistically associated with dogs, but dogs do not wear collars in virtue of being dogs (Prasada & Dillingham, 2006, 2009).

Although both types of connections license inferences about how prevalent a property is among category members, they differ in other types of conceptual consequences. Principled connections support formal explanations, such that a property can be explained by reference to the kind itself (e.g., the question of why dogs have four legs can be answered as "Dogs have four legs because they are dogs"), whereas statistical connections do not support such explanations (e.g., the question of why dogs wear collars cannot be answered as "Dogs wear collars because they are dogs", Haward et al., 2018; Prasada & Dillingham, 2006, 2009). Crucially, principled connections also license normative inferences, such that if members of a kind don't have a principled property, they are judged as having something wrong with them (e.g., a dog with three legs), whereas violations of statistical connections do not invite such judgments (e.g., a dog without a collar). Sensitivity to this distinction between principled and statistical connections has been documented not only in adults (Prasada & Dillingham, 2006, 2009) but also in children aged 4 to 7 years (Haward et al., 2018), indicating early emerging understanding of principled versus statistical connections.

However, it remains unclear how children come to identify which properties of a kind have principled connections, rather than merely statistical ones. The present findings may help clarify how children come to make such identifications. In our study, children were more likely to prescribe the stated property to new group members when generic language conflicted with observed behavior. This pattern suggests that children interpreted the property as normatively relevant to the category. From this perspective, pragmatic context might be serving as an important cue in the identification of principled connections. Specifically, when generic language conflicts with observed behavior, children may interpret the stated property as expressing what members of the kind are supposed to do or be. Such interpretations may support the identification of properties that are treated as normatively and principledly tied to the kind.

Future Directions

Future work will further test the robustness and scope of these findings. First, we plan to replicate the present results using the same norm-extension measure alongside an additional dependent measure that assesses prescriptive judgments with a different question (e.g., whether an action is okay or not okay), which is commonly used in the literature (e.g., Dahl & Schmidt, 2018; Rhodes & Chalik, 2013; Roberts et al., 2017). Second, we aim to more thoroughly distinguish specific from generic language by removing habitual aspect from the specific language (e.g., using present progressive constructions such as "This Zarpie is riding skates" instead of "This Zarpie rides skates"). If norm enforcement in mismatching contexts is reduced under the new specific condition, this would suggest that habitual interpretations, when combined with mismatch, play a key role in licensing normative inferences. Alternatively, if mismatching cues continue to support norm enforcement even with non-habitual specific statements, this will indicate that situational conflict itself may serve as a particularly strong cue for normative interpretation across different linguistic forms.

Acknowledgments

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