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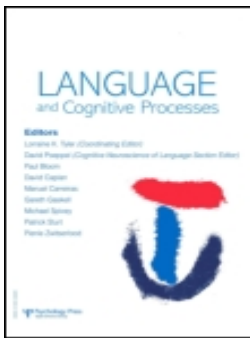
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When hearsay trumps evidence: How generic language guides preschoolers' inferences about unfamiliar things

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Two experiments investigated 4-year-olds' use of descriptive sentences to learn non-obvious properties of unfamiliar kinds. Novel creatures were described using generic or nongeneric sentences (e.g., *These are pagon*s. *Pagon*s/*These pagon*s are friendly). Children's willingness to extend the described property to a new category member was then measured. The results of Experiment 1 demonstrated that children reliably extended the property to new instances after hearing generic but not nongeneric sentences. Further, the influence of generic language was much greater than effects related to the amount of tangible evidence provided (the number of creatures bearing the critical property). Experiment 2 revealed that children continued to extend properties mentioned in generic descriptions even when incompatible evidence was presented (e.g., an example of an unfriendly 'pagon'). The findings underscore preschoolers' keen understanding of the semantics of generic sentences and suggest that inferences based on generics are more robust than those based on observationally grounded evidence.

The ability to associate objects and individuals with characteristic properties is critical for the human ability to categorise, reason, and communicate information to others. However, the process of identifying relevant properties

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and associating them with stable concepts during development is far from trivial. Whereas some properties can be discovered on the basis of direct perceptual experience (e.g., *is orange* for carrots), many cannot (e.g., *contains vitamin A*). Moreover, even once a property has been identified, it is rarely a straightforward task to decide whether it is characteristic of a concept in general, or whether it is idiosyncratic to a particular case (e.g., an *orange* carrot vs. an *orange* cat).

Although sufficient experience with individual cases can narrow down the properties that are characteristic for a given concept, linguistic communication will normally provide a more efficient means for children to acquire reliable knowledge about characteristic attributes. One reason for this is that language can be readily used to describe properties that cannot be identified or otherwise inferred from sensory-perceptual information (e.g., *contains vitamin A, has keen auditory abilities*). Second, natural languages typically provide linguistic distinctions that can signal whether a property should be associated with an individual instance of a kind, or with an abstract kind more generally. For example, whereas the English statement *These hyenas are ferocious* describes the property of specific individuals, its generic counterpart *Hyenas are ferocious* describes a property of the concept 'hyena', as signalled by the bare plural subject noun phrase. In the current study, we explore how generic language is understood and used by 4-year-old children to infer the characteristic properties of unfamiliar things.

An important series of studies by Gelman and associates has demonstrated that young children can distinguish generic and nongeneric sentences in a range of circumstances (e.g., Gelman, Star, & Flukes, 2002; Gelman & Tardif, 1998; Hollander, Gelman, & Star, 2002; Pappas & Gelman, 1998). For example, Gelman et al. (2002) report that 4-year-olds reliably differentiate the meaning of bare plurals and quantified noun phrases in sentences such as *All bears/Bears/Some bears like to eat ants*. In this study, children were most likely to attribute the property to a visually displayed category member following the *All bears* sentence, less likely with the bare plural *Bears* sentence, and least likely following the *Some bears* sentence. Young children also recognise the difference between generics and definite noun phrases marked by the article *the*. Gelman and Raman (2003) presented 4-year-olds with pictures of category instances whose properties were atypical for the kind they belonged to (e.g., penguins). The children were then asked questions containing either definite or bare plural nouns, e.g., *Do the birds fly?* or *Do birds fly?* In the former case, children most often responded 'no', taking into account only the instances shown in the picture. With sentences containing bare plurals, children tended to respond 'yes', taking into account the characteristic properties of the kind as a whole.

GENERICIS AND UNFAMILIAR KINDS

The research by Gelman and colleagues provides compelling evidence that by 4 years of age, children can distinguish the generic and nongeneric use of sentences denoting familiar kinds such as *bird*, *bear*, *shirt*, etc. This ability is impressive in view of the often subtle nature of the linguistic cues that signal generic meanings in English (e.g., the presence or absence of an unstressed function word), as well as the cognitive demands involved in shifting attention away from the features of objects in the immediate environment when evaluating and responding to generic sentences. However, research has only begun to address children's ability to understand genericis referring to *unfamiliar* kinds (see Gelman & Bloom, 2007). We believe a consideration of this issue is relevant because familiarity plays an important role in the recognition of generic language. As a starting point, it is important to note that the generic/nongeneric distinction is not unambiguously signalled by linguistic factors. For example, bare plural noun phrases are often used to denote specific entities rather than kinds, as in the sentence *Look, hyenas are in the garden again!* As a consequence, identifying whether a generic interpretation is intended for a given sentence normally involves nonlinguistic considerations such as whether a described property is likely to be an essential or defining characteristic rather than an incidental attribute of an individual object or individual (see Krifka, Pelletier, Carlson, ter Meulen, Link, & Chierchia 1995). Importantly, evaluations of this type often hinge on possessing certain kinds of knowledge or experience with the things under discussion. An adult would likely judge that *The hyena has spots* is a generic statement yet *The hyena has fleas* is nongeneric by using knowledge of what kinds of attributes are characteristic for hyenas. However, when background knowledge about the kind is minimal, it is correspondingly more difficult to identify whether a statement is generic or nongeneric. For example, the sentence *the pagon has spots* could plausibly describe a characteristic property of a kind, or might simply describe the markings on a specific member of this category. Given additional familiarity with properties of 'pagons', the intended meaning would become less ambiguous. The influence of prior knowledge is also apparent in other ways. For example, whereas the definite singular noun phrase in *The Coke bottle has a narrow neck* can denote a generic kind, the same is not possible with *The green bottle has a narrow neck*. This reflects the ability to understand Coke bottles, but not green bottles, as constituting a 'well-established' kind category (see Krifka et al., 1995).

The importance of background knowledge and experience has implications for children's ability to understand genericis. In particular, young children may often fail to accurately recognise and understand generic statements because many concepts are unfamiliar from the child's perspective. This issue is important because an understanding of generic language

would arguably be most useful during early childhood. In the later years, acquired schema-based knowledge could be used to direct attention to meaningful properties of objects and individuals, thereby increasing the overall efficiency of concept learning (Murphy & Allopenna, 1994). But when this knowledge is minimal or lacking, generic language could potentially play a more pivotal role in enabling children to acquire category-specific knowledge. It is therefore necessary to explore how children interpret and use generic language denoting unfamiliar concepts.

Unfamiliar concepts may also prove valuable for exploring another aspect of children's grasp of generics, namely whether children understand the conceptual abstractions that are a defining feature of generic statements. Here we refer to the fact that generic statements rarely capture fully objective or statistically valid descriptions of the real world (see e.g., Prasada, 2000). For example, although the sentence *birds lay eggs* is a legitimate generic claim, it is in fact true of only a statistical minority of birds (namely, healthy adult females). A more striking feature of generics in this regard is that they often resist falsification by direct negative evidence. For example, if a docile hyena is encountered after having heard *hyenas are ferocious*, this hyena will likely be considered unusual or somehow unimportant rather than as providing evidence against the original claim. This aspect of generic sentences distinguishes them from otherwise similar nongeneric descriptions (e.g., *All hyenas are ferocious*), which can be directly falsified by counterexamples. Unfamiliar kinds are useful for investigating children's grasp of these abstractions because observational experience with instances of the kind (and their properties) can be carefully controlled.

We explore 4-year-olds' understanding of generic language in two experiments in which a property is ascribed to members of a novel category using generic or nongeneric statements. Our measure of interest is whether children infer that the property will also apply to additional category members. Our first goal is to provide a basic test of whether children can distinguish generic and nongeneric statements when they lack experience with the categories under discussion. Our second goal is to benchmark the influence of generic language against the influence of more direct forms of evidence for the learning of characteristic properties. This is achieved by varying the number of category members associated with the property in question (Experiment 1), and by presenting explicit counterexamples (Experiment 2).

EXPERIMENT 1

In Experiment 1 we investigate how children understand and use generic statements to learn the properties of unfamiliar kinds in situations where the

amount of supporting evidence is varied. On a given trial, children were presented with representations of novel creatures (see Figure 1), which were described using either nongeneric or generic sentences (e.g., *These are pagons*. *These pagons are friendly*, or *These are pagons*. *Pagons are friendly*). Following the description, we assessed children's willingness to ascribe the same property to a completely new category member (e.g., *Is this pagon friendly?*). If children reliably identify generic sentences denoting novel kinds and use this information to guide category-based inferences, verification rates should be higher following generic statements compared with nongeneric ones.

We also varied the number of creatures presented during the description to provide either relatively strong or weak evidence regarding the association between the category (e.g., pagons) and the stated property (e.g., being friendly). If children are sensitive to this form of statistical evidence, verification rates should increase when a relatively larger number of category members were present during the description. Further, it is possible that the form of the description (generic/nongeneric) and the size of the observed sample could yield an interaction. For example, genericis might only affect children's inferences about characteristic properties when statistical evidence supporting the link between a property and category members is relatively weak.

Method

Participants. Participants were ninety-six 4-year-olds (48 male, 48 female) within 4.0 and 4.96 years of age, from families using English as

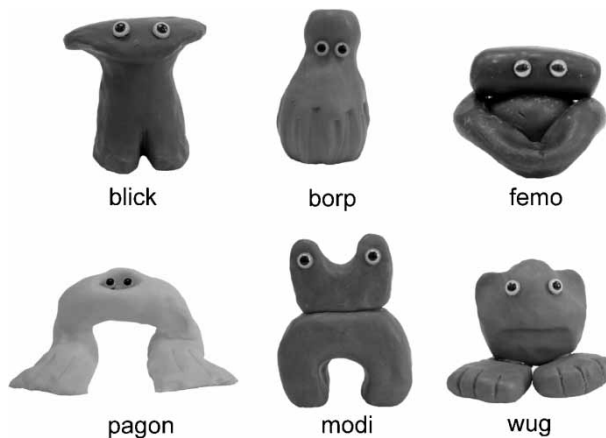


Figure 1. Examples of six novel kinds used in the experiments. Clockwise from top left: blick, borp, femo, wug, modi, pagon.

their dominant language. Participants were randomly assigned to one of four conditions: Nongeneric-Weak Evidence ($n = 24$, $M = 4.44$ years, $SD = 0.27$); Generic-Weak Evidence ($n = 24$, $M = 4.47$; $SD = 0.30$); Nongeneric-Strong Evidence ($n = 24$, $M = 4.34$; $SD = 0.21$); and Generic-Strong Evidence ($n = 24$, $M = 4.40$; $SD = 0.23$).

Stimuli. Six kinds of novel creatures were created using modelling clay, and six instances were created for each kind. The individual instances differed only in colour, and different colour combinations were chosen for each creature category in a way that prevented the possibility of making generalisations on the basis of colour similarity. Each category was paired with one of six novel nouns (*wug*, *blick*, *femo*, *borp*, *pagon*, and *modi*) and one of six adjectives familiar to 4-year-olds (*shy*, *gentle*, *mean*, *strong*, *fast*, and *friendly*; see Ridgeway, Waters, & Kuczaj, 1985). The adjective-creature pairing was varied across participants such that each adjective occurred with each creature type with approximately the same frequency.

Procedure. Participants were tested individually in their daycare or in the lab. A puppet was used to present stimuli and ask questions. A pretest using familiar objects was conducted to ensure each child could accurately respond to questions about category membership (e.g., whether different objects presented in sequence could be called a ‘spoon’). If necessary, feedback was provided on the training task to model correct responses to the puppet’s questions. No feedback was provided during the main task.

On each trial, creatures from a given category were introduced, and a property was described using a generic or nongeneric description (e.g., *These are pagons. These pagons/Pagons are friendly*). This was crossed with a second manipulation varying the number of category members shown during the description. In the ‘strong evidence’ condition, five exemplars were presented to provide a fairly robust cue that the property would apply to category members encountered later on. In the ‘weak evidence’ condition, our goal was to minimise the number of instances presented. When nongeneric descriptions were presented in this condition, only one category member was shown (e.g., *This pagon is friendly*). However, in the corresponding generic condition, the minimum number of instances that could be shown was two. This is because the presentation of only a single instance would result in a number mismatch between the bare plural and the previous noun phrase (e.g., *See this pagon? Pagons are friendly*.) Studies of language processing have shown that number mismatches of this type provide an explicit signal that a distinct semantic interpretation is required for the second noun phrase (e.g., Gernsbacher, 1991). The property description was repeated two times. A new category member was then presented along with a property

verification question (e.g., *Is this pagon friendly?*). The child's response was recorded, and the next trial began.

Results and Discussion

The mean percentage of property verifications across conditions is shown in Table 1. A 2 × 2 analysis of variance with sentence type (nongeneric/generic) and evidence (strong/weak) as between-participant variables revealed a main effect of sentence type, $F(1, 92) = 17.33$, $\eta_p^2 = 0.16$, $p < .001$, reflecting a 32% increase in positive verifications following generic compared with nongeneric descriptions. Neither the main effect of evidence nor the evidence × sentence type interaction were significant. Additional analyses revealed that the percentage of property extensions was significantly greater than chance following generic descriptions, $t(47) = 4.63$, $p < .0001$, but not following nongeneric descriptions, $t(47) = 1.42$, $p = .16$.

Although the lack of a main effect of evidence or an interaction between evidence and sentence type indicates that the number of objects presented did not differentially affect children's performance, we conducted a follow-up analysis controlling for effect of the number of instances on interpretation of generic versus non-generic sentences. That is, we compared responses to generic vs. non-generic descriptions in the strong evidence condition only, as the same number of instances were presented in both groups. This analysis indicated that children extended the properties significantly more often in the generic group than in the nongeneric group, $t(46) = 2.20$, $d = .64$, $p < .05$.

We also explored individual children's consistency in extending the property across trials in each condition. We classified any child who extended the property on 50% or more of the trials as an Extender. We then compared the number of participants who were and were not classified as extenders collapsed across evidence group, using a 2 (Generic/Non-generic) × 2 (Extender Type) chi-square contingency table analysis. This

TABLE 1
Mean percentage of property verifications across conditions

	<i>Description</i>	
	<i>Generic</i>	<i>Nongeneric</i>
Experiment 1		
Strong evidence	65.9% (8.5%)	39.6% (8.4%)
Weak evidence	81.2% (5.4%)	44.4% (7.6%)
<i>Mean</i>	73.6% (5.1%)	42.0% (5.6%)
Experiment 2	65.3% (6.0%)	26.4% (9.7%)

Note: Values in parentheses indicate standard error.

analysis indicated that the number of extenders varied significantly across conditions, $\chi^2(1, n = 96) = 12.99, p < .0001$. Consistent with the analyses reported above, the majority of participants in the generic condition (81%; 39/48) consistently extended the property, whereas only 46% (22/48) of the participants in the nongeneric group consistently extended property to a new exemplar.

The results indicate that young children can identify generic statements referring to novel things and use them to guide category-based inferences. This outcome is impressive given that the identification of generic language (from the perspective of the semantic competence of adults) often draws on background knowledge for the category in question. Similarly, categories that are not well-established in the mind of the listener can bias interpretation towards a nongeneric interpretation in some cases. These facts, combined with the subtlety of linguistic cues to genericity (e.g., the presence/absence of function words) suggest that preschoolers might otherwise be unsuccessful at identifying generic descriptions in the task we used. On this note, it is worthwhile noting that children's sensitivity to the generic/nongeneric distinction is observed across all properties tested in the experiment (see Figure 2). Thus, the effect is not driven by the perception that only specific properties should be understood as characteristic to a kind when mentioned in a generic sentence frame, at least within the set of traits we considered. It is also relevant to acknowledge that answering questions about our (inanimate) clay 'creatures' required a certain degree of play-acting

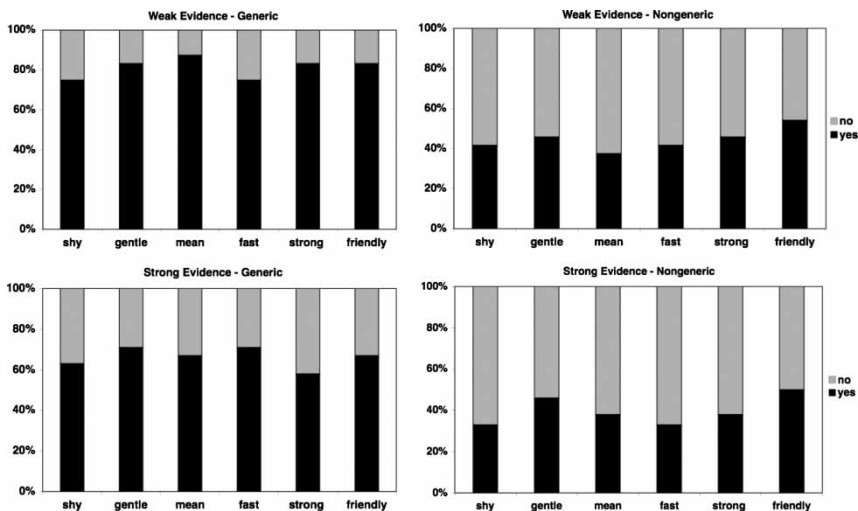


Figure 2. Proportion of 'yes' and 'no' responses to the verification question across property types, Experiment 1.

on the part of the child. However, there are clear parallels between our results and studies using materials depicting familiar real-world categories (e.g., Gelman et al., 2002). In addition, it is arguably difficult to find a neutral way to present truly unfamiliar kinds in experimental studies of genericis. Although more realistic-looking novel creatures could be presented via detailed drawings or perhaps morphed photographs, prior research suggests that the mere depiction of objects in two-dimensional representations independently encourages a generic rather than exemplar-specific interpretation of the object in question (Gelman, Chesnick, & Waxman, 2005).

The current experiment also provided a means to compare the influence of generic language with the influence of increasing the number of category members presented during the description phase. We reasoned that a larger sample should provide correspondingly stronger statistical evidence for extending the described property to a new category member. However, the results show that generic descriptions were overall much more effective at boosting property extensions than increasing the sample size. In fact, the latter manipulation had no overall effect on property extensions ($p = .19$), nor did it modulate the effect of genericity (interaction $p = .50$). Thus, the mere form of a description can impose strong constraints on understanding in contextual situations where more empirically-grounded forms of evidence apparently have no effect.

The finding that varying the sample size had little effect on children's responses prompts us to consider how *inconsistent* evidence might affect inferences about characteristic properties. Specifically, learning that some observed cases do *not* possess the property that others were said to possess may be more likely to reduce the expectation that the property is characteristic of the category. This is because contradictory evidence is directly encountered within the observed sample, thereby bypassing the need to consider whether inconsistent examples might be found beyond the sample. However, children's sensitivity to counterevidence may differ according to whether property information was stated using a generic versus a nongeneric description. As mentioned earlier, a hallmark of adults' understanding of genericis is the fact that contradictory evidence usually fails to falsify generic statements. Thus, the assertion *Kids like ice cream* is perceived to be true in a way that the nongeneric statement *All kids like ice cream* is not. Because the latter sentence pertains to actual category members rather than an abstract kind, the observation that some children do not in fact like ice cream requires the truth of this utterance to be rejected. If children understand this aspect of generic meaning, counterevidence may have little effect on the inferences children draw from generic descriptions.

As with the issue of how generic sentences are identified, genericis' resilience to exceptions raises questions related to the role of background

knowledge and experience. One question concerns how much concrete experience (if any) is necessary before generic concepts become resilient to contradictory evidence. For example, a certain amount of statistically-grounded knowledge might be necessary before sentences like *Kids like ice cream* would be accepted as ‘true’ despite apparent counterevidence. A related question is raised by the fact that generics’ tolerance of exceptions appears to be a matter of degree, depending on one’s understanding of the specific domain and the properties under consideration. For instance, generic descriptions in formal, abstract domains such as mathematics and geometry do not always permit exceptions (e.g., *Triangles have three sides*). Further, even when consideration is limited in scope to properties that are quite similar, the allowability of exceptions seems to vary in degree across specific properties (e.g., *Hyenas have spots* vs. *Hyenas have a tail*). This appears to depend on the kind of variation that is expected across subgroups of category members, and where an exception case falls within these subgroups (see Cohen, 2004, for discussion). In the case of unfamiliar categories, it is therefore highly plausible that children’s ability to understand the significance of observed exceptions would be compromised. As a result, the inferences children draw from generic descriptions might be highly variable in situations where counterevidence is encountered. To investigate these issues directly, we test how generic and nongeneric descriptions influence children’s inferences about novel creatures when these descriptions are followed by the presentation of explicit exceptions.

EXPERIMENT 2

Method

Participants. Participants were 24 4-year-olds (13 females and 11 males) within 4.1 and 4.83 years of age, from families using English as their dominant language. Participants were randomly assigned to either the Nongeneric ($M = 4.47$ years, $SD = 0.22$) or Generic condition ($M = 4.48$, $SD = 0.14$). None had participated in Experiment 1.

Procedure. The procedure from Experiment 1 was used with the following modifications: Two instances were presented during the generic or nongeneric description (*These are pagns. These pagns are friendly*, or *These are pagns. Pagns are friendly*). A third instance was then shown and identified as an exception to the previous assertion (e.g., *Except this pagon, this pagon isn’t friendly*). This was followed by the presentation of the test creature and verification question (e.g., *Is this pagon friendly?*).

Results and discussion

As in Experiment 1, mean verification rates were higher when the property was expressed in generic sentences compared with nongeneric sentences, $t(22) = 3.41, d = 1.34, p < .005$ (see Table 1). This result demonstrates that the distinction between generic and nongeneric interpretations is maintained even when explicit counterexamples are provided. Further, as shown in Figure 3, this distinction was relatively consistent across all the properties that were tested. (The slight variations across properties within each condition are likely due to the smaller number of children tested in this experiment compared with Experiment 1.) Additional statistical tests revealed that, as in Experiment 1, property verifications following generic descriptions were reliably higher than chance: $t(11) = 2.56, p < .05$. However, in contrast to Experiment 1, verifications following nongenerics were significantly below chance performance: $t(11) = 2.42, p < .05$. Thus, contradictory information apparently leads preschoolers to believe that the property is *not* characteristic of all category members following nongeneric descriptions. However, when the same contradictory information follows a generic description, there is little impact on preschoolers' inferences about characteristic properties.

In a second analysis, we again explored individual children's consistency in extending the property across trials in each condition using the same criteria outlined in Experiment 1. Results of the 2 (Generic/Nongeneric) \times 2 (Extender Type) chi-square analysis indicated that the number of extenders varied significantly across conditions, $\chi^2(1, n = 24) = 10.97, p < .001$. As in Experiment 1, the majority of participants in the generic condition (92%) consistently extended the property to a new exemplar, whereas only 25% of the participants in the nongeneric group consistently extended the property.

The current findings serve to clarify the knowledge that children draw upon to make distinctions between generic and nongeneric statements in past studies using familiar kinds. As described earlier, Hollander et al. (2002) found that children agreed with the statement *Some girls have curly hair* more

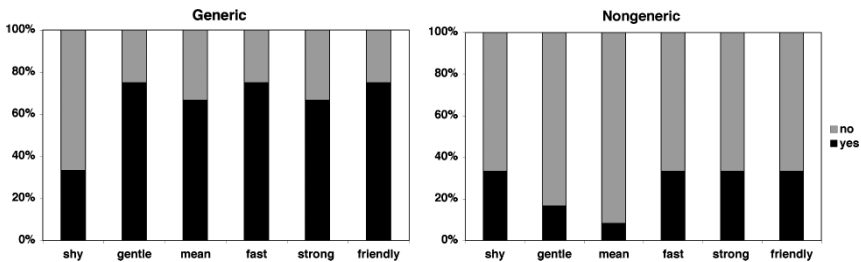


Figure 3. Proportion of 'yes' and 'no' responses to the verification question across property types, Experiment 2.

often than the statement *Girls have curly hair*, which in turn was agreed to less often than *All girls have curly hair*. Although this outcome indicates that children can differentiate generics from expressions containing quantifiers such as *some* or *all*, this pattern of results is compatible with the interpretation that children understand bare plurals in a quantificational nature, denoting a quantity of observed instances that lies between *all* and *some* (i.e., synonymous with *many* or *most*). However, our current findings suggest that the reason why children are more conservative in their verification of the *all* sentences compared to the generic bare plural sentences is because they understand generic statements to pertain to abstract kinds, thereby making exceptions less consequential for the acceptability of the claim.

GENERAL DISCUSSION

One starting point for the current study was to evaluate whether young children are successful at identifying and understanding generic sentences that refer to unfamiliar kinds. As discussed earlier, the process of identifying generic language is often noted to involve familiarity or background information regarding the kind being referenced. In keeping with the results of Gelman and Bloom (2007), we consistently found that 4-year-olds can distinguish generic and nongeneric descriptions referring to novel kinds, which by definition possess few of the knowledge structures that support the process of making generic/nongeneric distinctions. This outcome is impressive in view of the fact that even the basic information-processing demands involved in interpreting newly learned nouns along with complex semantics of generic sentences could reduce children's performance in comprehension.

A second and more central goal of the current study was to measure the influence of generic language against arguably more objective forms of evidence, namely the extent to which category members presented alongside the property description provided consistent evidence for the claim. The results of Experiment 1 showed that increasing the amount of evidence that was consistent with the description (i.e., presenting a larger sample of category exemplars) had no effect on children's tendency to extend the described property to a new exemplar later on. This outcome is somewhat surprising in view of research showing that the sample size can modulate inferences about kinds in other types of experimental tasks. For example, Xu and Tenenbaum (2007) report that, when shown a single exemplar, children and adults will extend a novel category label to new instances at both the subordinate and basic levels. In contrast, when the sample consists of three similar exemplars, the term is assumed to only apply to other instances at the subordinate level. This appears to reflect the learner's assumption that a

sample consisting of three highly similar exemplars would be quite unexpected to occur by chance unless the label defined a relatively narrow category in which all instances were highly uniform to begin with. However, it is important to note that our experiments tested how children associate imperceptible properties with kinds, and not whether a particular category is judged to include certain exemplars. It is possible that statistical evidence is generally less valuable for learning about non-obvious properties in the former case. In fact, statistical evidence might interfere with the inferences drawn from language in some situations, judging from the finding that strong evidence accompanying generic descriptions leads to numerically fewer property extensions than weak evidence (see Deak, Ray, & Pick, 2004, for a similar result in another domain). It is clear, however, that the task we used in our experiments does not exhaustively address all ways in which the amount of evidence could plausibly affect inferences about characteristic properties. For instance, effects of sample size may become apparent when a property is attributed to varying number of exemplars on an individual basis and on different occasions. Among other things, this would entail a corresponding increase in how often the property statement is uttered, which may in itself increase the perception that the property is characteristic of the kind (see e.g., Hasher, Goldstein, & Toppino, 1977). Nonetheless, at least at the moment of initial exposure, the influence of genericity on children's inferences about characteristic properties is markedly more robust than the effect of sample size.

In addition to measuring the effect of consistent evidence on inferencing behaviour, we also investigated the influence of contradictory evidence. This allowed us to explore whether children grasp the important conceptual abstractions that are characteristic of generic statements, namely that the 'facts' they convey withstand apparent counterevidence. The results show that children indeed understand this aspect of genericity and make inferences accordingly. When exception cases are presented following a generic description (e.g., *Pagons are fast*), children still reliably ascribe the property to a subsequently presented category exemplar. In contrast, when exception cases are presented after nongeneric descriptions (*These pagons are fast*), children tend to assume the property is not characteristic of the kind, as reflected in the judgement that the property should not extend to a novel exemplar. This contrast is significant in view of the fact that a more conservative learning strategy would seem appropriate when encountering an unfamiliar category for the first time. But despite the lack of familiarity, children appear to disregard forms of statistical evidence that would otherwise be helpful for learning about non-obvious properties when generic language is used. However, this 'blind faith' in generic statements may change as familiarity with the kind concept grows over time. For example, Gelman et al. (2002) found that, when given descriptions of familiar kinds

such as *Bears like to eat ants*, 4-year-olds are more likely to verify the property in a depicted category member when it is a typical rather than a moderately atypical member of the category. This would suggest that increasing knowledge about the nature of a category eventually moderates the effect of generic language when drawing inferences about individual cases.

Our findings that 4-year-olds reliably distinguished between generic and nongeneric utterances raise the question of how this occurred. That is, how do children identify generic assertions? As mentioned in the introduction, linguistic cues do not unambiguously signal when sentences have a generic meaning. Comprehenders often rely on background knowledge to decide when a generic or nongeneric meaning is intended. Given their general knowledge limitations and the complete lack of familiarity with novel kind categories used in our experiments, how did the 4-year-olds distinguish generic and nongeneric statements? One possibility is that children apply a simple heuristic that roughly approximates adult comprehension, namely that ‘bare plural’ noun phrases require a generic interpretation. (We refer to this strategy as a heuristic because it would clearly lead to misinterpretations in sentences where bare plurals denote sets of individuals rather than abstract kinds, e.g., *Lions can be found in the southeast quadrant of the zoo*). A form-to-meaning mapping of this sort could plausibly be learned in part on the basis of linguistic input during language development. For example, mismatches in number between a noun phrase and the potential referents in the contextual domain could function as a cue to infer that a specialised meaning should be associated with bare plurals (e.g., *Don't touch, Freddy. Stoves are hot!*, spoken in a situation with a single stove.)

However, we suspect a more adequate hypothesis is that even young children are combining multiple cues in a probabilistic manner to identify generic language (see also Gelman, 2004). For one thing, bare plural noun phrases are not used to signal generic concepts in all languages, nor are they the only linguistic form used for this purpose in English (e.g., *A lion is a dangerous beast*; *The telephone is important in modern society*). Further, a number of studies have shown that young children understand and use many other features of sentences that reinforce generic interpretations (see Gelman, 2004, and Krifka et al., 1995, for detailed discussions of these cues). For example, children are sensitive to whether adjectives or verbs typically convey relatively stable or transient traits (e.g., the distinction between *to be happy or gentle* and *to feel happy or gentle*: Graham, Welder, & McCrimmon, 2003; Graham, Cameron, & Welder, 2005). Similarly, Gelman and Heyman (1999) found that children judge a property to be less stable when it is referred to in a verbal predicate (e.g., *Rose eats carrots whenever she can*) compared with when it is incorporated into a noun (e.g., *Rose is a carrot-eater*.) These factors clearly influence adults' intuitions for whether a

generic meaning is intended, as shown by the contrast between *The lion is fierce* versus *The lion feels fierce*. In this regard, the kinds of sentences used in our experiments likely represent a case in which factors such as syntactic structure, tense, and aspect and the properties being mentioned were 'neutral' to the extent that the form of the noun phrase could play a particularly strong role in cueing the intended interpretation of the sentence. For example, the trait terms (*friendly, shy*) and physical characteristics (*strong, fast*) used in our materials were selected to be plausible in descriptions of either general kinds or specific individuals. One question for future research is to contrast adults' and children's understanding when these linguistic cues are varied independently. Similarly, the other linguistic forms used to express generic concepts may not be managed as well as bare plural noun phrases. For example, the generic use of definite singular noun phrases (as in *The hyena is a dangerous animal*) may be more difficult for children to recognise because these noun phrases more typically denote individuals and because background knowledge is thought to play a larger role in signalling their generic usage compared with bare plurals (Carlson, 1980). These observations suggest that children's limited background knowledge would limit their success at identifying and using generic language when these cues are less neutral and provide conflicting evidence about the intended meaning (see also Gelman & Raman, 2003).

Another issue that bears further empirical investigation surrounds the types of information that children believe are conveyed by generics. Our findings indicate that when learning about non-obvious properties, young children appear to privilege information conveyed in a generic description to a greater extent than (in)consistency in the evidence that is presented to them. What is the basis for this strong valuation of generic language when learning about unfamiliar kinds? One possibility may be that children interpret at least some generics as reflecting a type of connection between kinds and properties that Prasada has described as a principled connection (Prasada, in press; Prasada & Dillingham, 2006). A principled connection refers to the linkage between an exemplar of a particular kind and those properties that are determined by that kind (e.g., *Dogs have four legs because they are dogs*) as opposed to properties that are not determined by the kind membership of the exemplar. Thus, principled connections lead to the normative expectation that members of a particular kind will generally possess particular properties. Principled connections can be distinguished from other types of connections between properties and kinds including those that are statistically linked to the kind but do not support the explanation of the property in terms of the kind (e.g., *Dogs chase cars*) or more spurious connections used in a prescriptive manner (e.g., *Boys don't cry*). Although all of these relations are conveyed using generics, Prasada and Dillingham (2006) demonstrated that adults clearly distinguish between

principled and statistical connections in generic statements. It is unclear, however, whether young children also honour this distinction. In fact, a recent study by Gelman and Bloom (2007) suggests that there are developmental differences in the understanding of the types of properties conveyed by generics. These researchers found that adults considered whether a property was innate versus acquired when judging whether a generic statement was true. In contrast, 4- and 5-year-olds did not consider property origins in their interpretations of generic statements. Gelman and Bloom speculate that it may be that adults consider that some generics express more essential-type properties, while young children may view generics as expressing any type of regularity between a property and a kind.

Another possible explanation for why children privilege information conveyed in generic form prioritises the notion that children understand generics to express something about what the *speaker* knows or believes, rather than some disembodied facts about the world. In this regard, generics might be taken to reflect a speaker's belief that a certain statement has some generalisable quality. The value the child attributes to this belief could be assessed by measuring whether the child assumes the same information is known to or believed by other members of society. Previous work has found a dissociation between children's assumptions about newly learned names and newly learned facts in this regard. For example, 3-year-olds assume other adults will know a word corresponding to an object (*This is a koba*), but do not assume other adults will know a communicated fact about an object (e.g., *This is the one my uncle gave me*, see Diesendruck & Markson, 2001; Markson & Bloom, 1997). However, if children's faith in generic statements reflects general knowledge attribution, it is possible that different results would be obtained if a fact conveyed generic information, rather than a report of a particular episode (e.g., *This is the one cats like*.) If so, the distinction reported by Markson and Bloom may not rest only on the contrast between words and facts per se, but also on the strength of the cues that indicate when information can be reliably attributed to other individuals. Evaluations of this sort are likely to also include additional pragmatic factors such as the reliability of the speaker. Studies of word learning have shown that children's receptivity to novel names for objects depends to some degree on their assessment of whether a speaker is knowledgeable about a given topic (e.g., Sabbagh & Baldwin, 2001; Sabbagh, Wdowiak, & Ottaway, 2003). Children's understanding of characteristic properties may be similarly affected, even when based on generic sentences (Dahl, 1975).

Although there are outstanding questions about the basis for young children's apparent faith in generic statements, it is clear this receptivity can provide important advantages when learning about novel concepts. Observational learning requires multiple encounters to identify central characteristics of kinds, and rarely provides an effective means to learn about imperceptible

properties. The ability to identify and understand generic language provides young children with a rapid and efficient means to learn about non-obvious aspects of the world around them.

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