Published in final edited form as:
Lang Learn Dev. 2010 July 1; 6(3): 223–240. doi:10.1080/15475441.2010.484413.

Fast-mapping placeholders: Using words to talk about kinds

Susan A. Gelman and **Amanda C. Brandone**
University of Michigan

Abstract

Fast-mapping is the ability to acquire a word rapidly on the basis of minimal information. As proposed by Carey (1978), we assume that children are able to achieve fast-mapping because their initial word meanings are skeletal placeholders that will be extended gradually over time. In this paper we propose that a notion of "kind" is fundamental to children's initial mappings for object labels. We illustrate this point by considering the acquisition of generic noun phrases, which are understood by children as kind-referring from very early on. We argue that the acquisition of generics has implications for mechanisms of word learning. Evidence suggests that generics cannot be acquired solely on the basis of associative learning mechanisms; rather, they are a default interpretation for young children.

Fast-mapping placeholders: Using words to talk about kinds

In a classic paper, Carey (1978) made reference to young children's "word-learning wizardry." The famous statistic that has been cited in journal articles, monographs, and textbooks throughout the past 30 years is that children learn 9 new words a day, every day, from about 18 months of age until about 6 years of age (when estimates suggest they will have amassed a vocabulary of roughly 14,000 words). This astounding feat has captured the imagination of researchers around the world, and countless studies have examined children's amazing ability to learn a large number of words within a relatively brief developmental period.

However, the famous statistic in Carey's paper was accompanied by an often overlooked statistic that is arguably even more significant: namely, that a young child is working out the meanings of roughly 1,600 words at any given point in time. If we assume that it takes about 6 months to map out the full meaning of a word (almost certainly an underestimate, as Carey notes), then in order to get to that magic number of 14,000 words by age 6, children must have over 1,600 words under construction at a time. What this statistic emphasizes is the underspecified status of children's initial word mappings. The full conceptual representation of a word may take months (perhaps years) to develop, because each word is initially mapped onto only a partial understanding – a placeholder, so to speak.

The initial process of establishing some sort of placeholder meaning for a word is termed fast-mapping; the more extended and challenging task of figuring out the rest of that representation is termed extended-mapping. Carey and Bartlett's (1978) classic "chromium" study provides an illustration of how fast-mapping falls short of extended-mapping. In their study, 3-year-olds learned a new word ("chromium") in the context of an object that was olive-green in color. One week after a single experience with the word, the participants displayed some recall of the word, some understanding of the concept (e.g., grasping that olive-green differs from forest green, even if originally they had merged the two into a

Address for correspondence: Susan Gelman, gelman@umich.edu, 530 Church St., Department of Psychology, University of Michigan, Ann Arbor, MI 48109-1043..

single, undifferentiated “green” category), and some knowledge of the word's meaning (e.g., that it refers to a color). Importantly, however, these understandings were all incomplete. Children's recall of the word was partial at best (e.g., “crum” instead of chromium); their understanding of the concept (e.g., how olive-green relates to other colors) was improved relative to baseline (before exposure to the word) but far from perfect; and their knowledge of the word's meaning was imprecise (e.g., knowing that olive-green had a name, but not which name, or knowing that “chromium” referred to a color, but not which color). As these data suggest, fast-mapping is quick– but it is incomplete, and the resulting mapping is best construed as a placeholder. By “placeholder”, we refer to a special kind of partial meaning, one that is fast-mapped and can change or become elaborated with increasing knowledge.

Given the nature of fast-mapping and, in particular, the partial initial meanings that are established through this process, a key question becomes what kinds of placeholder meanings children assign to words while fast-mapping. In this paper, we address one piece of this question by considering what the nature of the placeholder is for object labels. We argue that, for object labels, the notion of *kind* is central to children's initial mappings. After explaining what a placeholder notion of kind implies for children's use of a word, we devote the rest of the paper to providing more extensive evidence for how children think and talk about kinds more directly using generic noun phrases. Throughout, we consider the implications for fast-mapping, although much of the research to date on kind concepts has not yet examined fast-mapping directly, a point to which we return in the Conclusions.

Placeholder meanings for object labels

Imagine that you come across a strange creature and hear it labeled with a novel label: “This is an *aye-aye*.” What initial meaning might you map onto this novel word? Attending to the item's observable features (e.g., its long claws, its straggly fur) is undoubtedly important. These features may guide your use of the word so that you apply it to other creatures with long claws and straggly fur. Particularly if one has the opportunity to view multiple aye-ayes, one can start to build a statistically-informed representation: P (certain shape) = x; P (scraggly fur) = y; P (long toes) = z. However, these featural observations do not sufficiently capture the meaning of the novel word. We suggest that in addition to these featural observations, the placeholder includes two additional, more abstract considerations: that an aye-aye belongs to a KIND, and that that kind is located within an ONTOLOGICAL TYPE (in this case, “animal”; see Keil, 1979, for discussion of ontology). The ontological types available to children are likely to include, at the very least: animals, objects, events, and substances. Ontological types can be identified very rapidly on the basis of subtle perceptual cues (e.g., the animate/inanimate distinction can be gleaned by subtle variations in motion; Bertenthal, Proffitt, & Cutting, 1984; R. Gelman, Durgin, & Kaufman, 1995).

Understanding that a novel word maps onto a placeholder “a kind of animal” is still very skeletal. Such an understanding does not specify whether an aye-aye is a primate, a rodent, or something else altogether. It does not tell you whether an aye-aye is a meat-eater or a vegetarian, prey or predator, pet or wild. It does not tell you what sound an aye-aye makes, where it lives, or how it moves. In other words, it doesn't tell you much of what you could eventually learn about this kind of animal, and how it differs from other kinds of animals.

So what does knowing that an aye-aye is a member of a kind tell you? In what sense does this information provide a meaningful placeholder? A placeholder notion of kind entails at least four implications for children's concepts (though these are not meant to be exhaustive; see also Prasada & Dillingham, 2006, 2009 for further implications): extendibility, inductive potential, deference to experts, and a conceptual distinction between kinds and individuals.

Extendibility is the idea that a word refers not only to named instances, but also to new instances that haven't previously been named (Golinkoff, Mervis, & Hirsh-Pasek, 1994; Waxman, 1990). By fast-mapping a novel count noun presented in the context of a single instance to a kind, children can immediately assume that the word refers to a class of similar instances (though an important unresolved issue is how "similarity" is computed). Thus, upon hearing that one item is "an aye-aye," children and even infants assume that there are other items that are aye-ayes as well.

Inductive potential is the assumption that new information learned about one instance of a kind can often be extended to others of the same kind. For example, upon learning that one aye-aye eats grubs, children are likely to extend that property to other aye-ayes. Children even extend novel inferences to others receiving the same label when those properties are non-obvious (such as internal structure), and when category members are perceptually dissimilar (Gelman & Markman, 1986; Graham, Kilbreath, & Welder, 2004; Jaswal & Markman, 2007; Shipley, 1989). Thus, fast-mapping a novel word onto a kind enables children to acquire new information rapidly and to construct powerful and testable expectations on the basis of rather minimal knowledge.

Deference to experts is the assumption that one's own representations of a kind are incomplete and corrigible, whereas a knowledgeable adult or expert has a store of information concerning the kind, including how to identify category instances. Because of this assumption, children are willing to accept counter-intuitive labels provided by a knowledgeable adult (Gelman & Markman, 1986; Jaswal, 2004; Jaswal & Markman, 2007). Deference to experts means that fast-mapping is a process in which unexpected information can be initially accepted and only later fully explained (for example, a penguin may be accepted as a "bird" before a child understands how this bird shares features with other, more typical birds). In this way, children benefit from cultural transmission of information that they could not yet generate based on their more limited knowledge base (Gelman, 2009).

Finally, *kinds are contrasted with individuals*. This last implication may be the most important, as it gets to the core of what we mean when we say that a child treats a word as kind-referring, namely: A kind (e.g., "aye-ayes" in general) does not reduce to a set of individuals (e.g., a bunch of aye-ayes)—it is both broader and more abstract. This contrast supports two observations. First, there are certain predicates (such as "extinct" or "numerous") that can be predicated of kinds *only*. For example, we can say that dinosaurs (as a group) are extinct, but not that any particular individual dinosaurs are extinct. Second, there are certain statements for which we predicate a property that is characteristic of the kind, even if that property fails to be true for a majority of individuals. For example, we accept that "birds lay eggs", even though fewer than 50% of birds do so (as neither male nor juvenile birds lay eggs).

In sum, we suggest that the process of fast-mapping object terms involves creating a placeholder meaning "a kind of X." Once the child identifies a label as linked to a kind, this has consequences for extendibility, inductive potential, deference to experts, and a conceptual distinction between kinds and individuals.

It is this last issue (the distinction between kinds and individuals) that is the primary focus of the remainder of the paper. Although a rich body of evidence demonstrates an early appreciation of extendibility, inductive potential, and deference to experts, researchers are only beginning to investigate the question of when and how children make use of a distinction between kinds and individuals in their interpretation of language. In this paper, we will consider this question by examining children's use and understanding of kind-

referring expressions known as generics. Specifically, we will address the following questions: What do children understand about the distinction between individuals and kinds? How/when do these distinctions map onto the available expressions in a conventional language system? And what are the implications of the acquisition of generics for mechanisms of word learning?

Generic noun phrases

One of the clearest ways to investigate the distinction between kinds and individuals is to examine people's understanding and production of generic noun phrases, such as “Dinosaurs are extinct” or “Birds lay eggs”. Generic noun phrases provide the most direct evidence for kind representations in language, as they express kinds (rather than individuals) directly. They also seem to link to core properties, as they express predicates that are relatively enduring (not transient), timeless (not contextually bound), and inherent (not accidental) (Carlson & Pelletier, 1995; Lawler, 1973; Prasada, 2000; Prasada & Dillingham, 2006). Furthermore, generic noun phrases seem to be universal: in all languages that have been studied, linguists note that generics are expressed differently from talk about individuals (Carlson & Pelletier, 1995).

When talking with their young children, English-speaking parents use generics in about 3-5% of their utterances (e.g., Gelman, Coley, Rosengren, Hartman, & Pappas, 1998; Gelman, Goetz, Sarnecka, & Flukes, 2008; Pappas & Gelman, 1998). Children likewise spontaneously produce generic nouns by about 2½ years of age (e.g., Gelman et al., 1998; Gelman et al., 2008; Pappas & Gelman, 1998). The capacity to think about an individual as belonging to a more abstract kind appears to be readily available from an early age, as children produce generics even for items they have viewed only individually. For example, one child named “Adam” at age 2½ countered a suggestion by his mother that he take a nap with the generic statement “Adams don't have to take naps.” This toddler generated a kind that didn't exist, even when to the best of his knowledge there was only an individual Adam.

Generics: The inductive challenge

Generics pose an inductive challenge to learners, both from the standpoint of generic knowledge (e.g., how does one know when to generalize information beyond an individual to the broader kind) and from the standpoint of generic language (Gelman & Raman, 2003; Prasada, 2000). In this section we focus on the problem of generic language and provide an overview of some of the semantic and formal challenges that children face when trying to learn these expressions.

Semantically, generics are puzzling. They are not equivalent to an entire category, as they admit of exceptions (e.g., “Birds fly”, but penguins don't fly). They are also not equivalent to any particular quantifier or proportion of a category. Some generics express predicates that are believed to be true for the majority of category instances, such as “Boys play with cars” (which adult participants in our research attribute to roughly 80% of boys). Other generics, as noted earlier, express predicates that are believed to be true for only about half the category, such as “Birds lay eggs.” And, most surprisingly, generics can even express predicates that are true for a small subset of the category, such as “Ticks carry Lyme disease” (which characterizes less than 20% of ticks). A further consideration is that other regularities that are equivalent in frequency *cannot* be expressed with generics. For example, “Birds are female” and “People are right-handed” are infelicitous, despite the relatively high frequency of female birds and right-handed people (see also Leslie, 2007, 2008).

To resolve these semantic challenges would require coming up with an account for why certain kinds of regularities are expressible as generics and others are not. This difficult

question has received much attention in the linguistic and philosophical literature (e.g., Asher & Morreau, 1995; Cohen, 1999; Krifka et al., 1995; Greenberg, 2003; Leslie, 2007, 2008) and is beyond the scope of the present paper. However, the relevant point for us here is that learning when to produce generics felicitously is a challenge.

Formally, generics are also challenging because there is no one-to-one mapping between form and meaning. In English, generic noun phrases can be expressed with bare plurals (e.g., “Stars twinkle”), indefinite singulars (e.g., “A hammer is used for pounding”), mass nouns (e.g., “Oil paint takes a long time to dry”), and definite singulars (e.g., “The rabbit is a timid creature”). Furthermore, each of these noun phrase forms can be used non-generically (e.g., “Stars are lighting up the night sky”; “A hammer fell on my big toe”; “Oil paint spilled all over the floor”; “The rabbit hopped away from us”).

As these examples suggest, identifying an utterance as generic or non-generic requires a combination of morphosyntactic, semantic, and contextual cues (Carlson & Pelletier, 1995; Cimpian & Markman, 2008; Gelman, 2004). Specifically, the presence of an article can shift the interpretation of an utterance from generic (“Grass is green”) to non-generic (“The grass is green”). Likewise, the aspect of a verb can shift the interpretation of an utterance from generic (“Dogs bark”) to non-generic (“Dogs are barking”), and the semantics of the verb can shift the interpretation of an utterance from generic (“Bob likes rice”) to non-generic (“Bob wants rice”). Finally, contextual cues also exert powerful effects. For example, the sentence “They can't see colors very well” spoken while pointing to a pair of dogs may be interpreted differently depending on whether the sentence is uttered by a veterinarian who has just examined the dogs or a teacher who is pointing the dogs out to her class (Cimpian & Markman, 2008).

Thus, generics illustrate the indeterminacy of meaning (Quine, 1960). Whereas Quine focused on the indeterminacy of ostensive definition—when the referent is an individual (e.g., “This is an aye-aye”)—the problem is even greater when the referent is a kind. Despite these inductive challenges, however, generics are commonly expressed in languages the world over (Carlson & Pelletier, 1995). Thus, children must have some strategies for acquiring them. How children acquire generics may have implications for how children learn words more broadly.

The acquisition of generics: two theoretical accounts

Research on infants’ conceptual development provides powerful evidence that the ontological distinction between kinds and individuals is present by at least 10 to 12 months of age (e.g., Bélanger & Hall, 2006; Prasada, 2000; Waxman & Braun, 2005; Wilcox & Baillargeon, 1998; Xu, 2005). Furthermore, infants and toddlers attend to many of the linguistic features that distinguish generic from non-generic noun phrases in English, including determiners (Waxman, 2004) and plurality (Wood, Kouider, & Carey, 2009). The question here is how this conceptual distinction and these linguistic sensitivities interact in acquisition. How do children make links between (a) the concepts of kinds and individuals and (b) the expression of kinds and individuals in language? We contrast two distinct learning models: an associative learning model and what we call a generics-as-default model.

Associative learning accounts provide a very powerful, though controversial, model for how children acquire words. To convey the gist of this approach, we start with a quote from Smith, Jones, and Landau (1996, pp. 145-146): “... children repeatedly experience specific linguistic contexts (e.g., “This is a ____” or “This is some _____”) with attention to specific object properties and clusters of properties (e.g., shape or color plus texture). Thus, by this view, these linguistic contexts come to serve as cues that automatically control

attention. ... [D]umb forces on selective attention—that is, associative connections and direct stimulus pulls—underlie the seeming smartness of children's novel word interpretations."

What these researchers have proposed is that children track and correlate repeated linguistic experiences and repeated environmental experiences, and learn to associate particular environmental regularities with particular linguistic regularities. Thus, children learn that a sentence frame containing a count noun ("This is an X") is more likely to co-occur with entities that share a particular shape, whereas a sentence frame containing a mass noun ("This is some X") is more likely to co-occur with entities that share a particular substance. This theoretical model has been highly productive, and leads to clear predictions, many of which have been supported in experimental tests (e.g., Smith, Jones, Landau, Gershkoff-Stowe, & Samuelson, 2002; see Smith & Samuelson, 2006 for a review). Nonetheless, the associative learning model has been criticized as not sufficiently accounting for the conceptual nature of word-learning, the referential nature of word learning, and word-learning expectations that are in place even preverbally (Bloom, 2000; Booth, Waxman, & Huang, 2005; Cimpian & Markman, 2005; Diesendruck & Bloom, 2003; Fulkerson & Waxman, 2007).

The acquisition of generic nouns provides another set of challenges for the associative learning model. For generics, there are no direct associative links between linguistic contexts and object properties. From a conceptual standpoint, generic referents are abstract, and consequently are not instantiated directly in the environment. Thus, there is no direct environmental cue for generics. One cannot point to or display a generic kind. From a linguistic standpoint, generics have no unique set of linguistic markers in English, as the noun phrases used to express generics include bare plural nouns, mass nouns, indefinite singular nouns, and definite singular nouns – all of which can be used to make non-generic reference. Indeed, in some languages (e.g., Mandarin, Quechua), generics are wholly unmarked. Thus, associative links fail to obtain at either level required for associative learning: environmental or linguistic.

To preserve associative learning accounts in some fashion, one would have to find *indirect* associative links that children could use to identify generics. For example, perhaps there are features of the parental input that provide a "signature" that indexes generics (e.g., less ostensive pointing during generic production; Meyer & Baldwin, 2009). We see this as an open empirical question that is important to examine further in future research. But for present purposes, the main idea is that generic meaning is not available in the input in any unambiguous way, and that low-level associative feature-tracking seems to be an insufficient model for the acquisition of generics.

In contrast to the associative learning view, the *generics-as-default* view posits that generics are learned *not* by means of direct associative links between linguistic contexts and object properties. Instead, on this view, utterances are deemed generic if there is no evidence that they are specific. This view rests on the observation that, although there aren't clear ways to mark an utterance as generic, there are numerous, relatively unambiguous ways to mark an utterance as specific. Such indications include number (e.g., "two balloons"), possession (e.g., "my children"), tense (e.g., "ducks waddled"), aspect (e.g., "rice is cooking"), temporal indicators (e.g., "yesterday"), deictics (e.g., "this boy"), and gestures (e.g., declarative pointing). In the absence of such indications, children may judge an utterance to be generic. Another way of saying this is that generics are unmarked linguistically—that they are a default. Note that this view requires a prior conceptual distinction between individuals and kinds (which, as noted previously, infants seem to honor at least by 12 months of age), as well as an assumption that any newly encountered individual must belong to some kind. Thus, the generics-as-default view has both an innate or early-emerging

component (the conceptual distinction between kinds and individuals) and a learning component (learning the various ways that specificity is marked in one's particular language).

These two theoretical accounts (associative learning and generics-as-default) lead to several alternative predictions for the acquisition of generics. First, on the associative learning account, the acquisition of generics should be slow, because it will take time for the child to acquire sufficient evidence regarding the relevant associations from the language input. In contrast, on the generics-as-default account, generics should be acquired rapidly because their conceptual underpinnings are already in place, and because they are unmarked (hence the default). Second, on the associative learning account, children should acquire one form of generics (e.g., bare plural, indefinite singular) at a time, because the proposed associations are between specific linguistic forms and specific features in the world. So, the most common form should be learned first, eventually followed by rarer forms. In contrast, the generics-as-default account suggests that children should acquire multiple forms at once, because generics are assumed for *any* non-specific reference situation. Third, on the associative learning account, generics should be more difficult to learn than quantifiers (such as “all” or “some”), because quantifiers have a clear, unchanging form, thereby making it easy to see the link between form and meaning. In contrast, on the generics-as-default account, generics should be easier than quantifiers, because they have an a priori conceptual basis.

The remainder of this paper examines the evidence for these two positions. We examine evidence from generics in natural conversations, generic use across contexts, generics as marking non-present properties, generics for novel categories, and generics compared to quantifiers and statistical information. As we review this evidence, we consider its implications for the associative learning and generics-as-default accounts. Finally, we return to the issue of fast-mapping, and what the study of generics can tell us about fast-mapping in children.

Generics in natural conversations

An initial examination of generic understanding can be gleaned by investigating children's productive use of generics in natural conversation. Prior research has taken this approach by studying longitudinal data from the CHILDES database (MacWhinney & Snow, 1990; see Gelman et al., 2008, for a full report). Gelman et al. focused on 8 monolingual, English-speaking children with data from 2 to 4 years of age (data were courtesy of Bloom, 1970; Brown, 1973; Kuczaj, 1976; MacWhinney, 2000; Sachs, 1983). In all, nearly one-third of a million utterances were examined (roughly half produced by a child and half by an adult). The utterances were limited to those with plural nouns, mass nouns, or nouns preceded by “a” or “an” (as these are all plausibly generic, and could be identified by computer search).

Each noun phrase was coded as generic or non-generic, taking into account immediate context. 8,462 of the coded utterances were generic, either child- or adult-produced. Sample utterances coded as generic include the following (with ages in years; months. days):

Abe (age 2;6.6): It's for firemans.

Nathaniel (3;0.22): Why airplanes don't, doesn't go on floors?

Adam (2;4.3): I like grapefruit.

Mark (3;9.26): I hate babies that cry, and you're a baby that cries.

An initial tally of generic use at three ages (2 years, 3 years, 4 years) indicated three notable points. First, all of the children produced generics, even at the youngest age. Second, there

was a sharp increase in generic production from ages 2 to 4 (even controlling for amount of overall talk). Third, by age 4, children produce generics as frequently as adults (again, controlling for amount of overall talk).

Gelman et al. then examined whether children's generics were child- or adult-initiated. Because children were in conversation with adults (typically a parent), it is possible that children weren't actually spontaneously producing generics but were merely following the adults' lead – carrying on conversations concerning topics that adults had introduced in generic form. To examine this question, conversations were divided into *sequences* on a given topic. For example, one sequence was about the topic "baby", with several specific references to a baby (e.g., "Why Paul [child's baby brother] keeps going over here?") and then two generic references to babies (e.g., "Why babies can't play with children?"). We then coded whether the *first* generic utterance in a sequence was child- or adult-initiated. This analysis revealed that, for sequences including a child-produced generic, the majority of such sequences were classified as child-initiated. Although children were more likely to initiate generics at age 4 years than at age 2 years, even the 2-year-olds initiated such sequences more than adults. These data suggest that children acquire generics relatively early (producing them at about the same point that they acquire the requisite syntactic skills of plurality and determiners; Brown, 1973), thus arguing in favor of the generics-as-default position.

A further question that Gelman et al. (2008) addressed was whether children initially produce only the most common generic form (i.e., bare plural in English) or if instead they produce a variety of different generic forms (i.e., bare plural, indefinite singular, mass noun). On an associative learning account, children should at first produce the most common form (thereby overproducing bare plural generics, because adults produced these most frequently in their conversations with children). In contrast, on the generics-as-default account, children should produce all three forms from the start. The data support the latter position: each of the eight children produced generics in all three distinct forms. Overall, then, children appear to have no difficulty acquiring generics for relatively rarely used forms.

Generic use across contexts

Evidence of generic production in naturalistic contexts, though revealing, cannot tell us what children *understand* about generics. Indeed, generics pose a difficult challenge for testing. For example, a classic word-learning study (with a focus on non-generic nouns) might teach a child that X is a blicket, and then ask the child to "show me the blicket", whereupon the child simply has to point to a picture or select an object that they feel best corresponds to "the blicket." In contrast, there is no picture or object choice that could analogously correspond to a generic kind. Furthermore, there is no way to complete the prompt "show me..." to trigger a generic interpretation. "Show me the blicket" is a definite reference (a specific blicket); "show me a blicket" is an indefinite reference (any blicket); and "show me blickets" is also an indefinite reference (any blickets). None are generic. Furthermore, although adults can readily answer metalinguistic questions concerning the generic/non-generic distinction (e.g., "'Cats sleep on mats'—is that cats in general or just a few cats?"; Gelman & Tardif, 1998), metalinguistic judgments are notoriously difficult for preschoolers.

Instead, one strategy that we used to test children's understanding of generics was to examine contexts of generic use. Different contexts can affect the tendency to think about items as kinds versus individuals. On the assumption that generics refer to kinds, we reasoned that a context that fosters a focus on kinds should elicit more generic use than a context that fosters a focus on individuals. Domain offers such a difference in focus. Previous research has shown that animal categories are more richly structured and

"kindlike" than artifact categories (e.g., Keil, 1989; Gelman, 1988). Therefore, we predicted that animal categories should be more likely than artifact categories to elicit a focus on kinds and, hence, generic use.

To test this hypothesis, we presented both preschoolers and adults with a series of pictures of novel animals and artifacts (Brandone & Gelman, 2009). Each item was labeled and participants were simply asked to talk about it. We scored whether each utterance children and adults produced was generic (e.g., "Bongos take really slow steps"; "What do you do with a scobbit?") or specific (e.g., "He climbs up trees"; "I don't have that at my house"). Results showed that adults and children had no trouble generating generics after seeing only a single exemplar of an item (e.g., a single "scobbit") and participants readily construed the novel animals and artifacts as both individuals and members of kinds. Nevertheless, adults and children produced relatively more generics for animals than for artifacts. These results support the hypothesis that both preschoolers and adults understand generics as kind-referring and, because the animal domain more readily lends itself to the consideration of kinds, preschoolers and adults produce more generics for animals than for artifacts (Brandone & Gelman, 2009).

Gelman and colleagues (Gelman, Chesnick, & Waxman, 2005; Gelman, Waxman, & Kleinberg, 2008) also predicted that children would produce more generics in talk about pictures than in talk about objects. One important way that children think about pictures and objects differently, is that pictures are easily understood as representations (a photo of a house can represent that house), whereas objects are more difficult to construe as representations (although a model of a house can represent that house, it is also an object in its own right; DeLoache, 1991). Accordingly, it should be easier to construe an instance as standing in for the kind when the instance is a picture than when it is an object: a picture of a cat should elicit more kind-referring statements (generics) than a three-dimensional cat. To test this prediction, Gelman and colleagues videotaped mother-child pairs as they played with pictures and objects (Gelman et al., 2005; Gelman, Waxman, & Kleinberg, 2008). Each dyad saw a set of items, half presented as objects and half presented as drawings in a picture book. Mothers were instructed to look at each item sequentially and to talk about it as they would normally do at home. Analyses examined the proportion of utterances that referred to kinds (e.g., "What do froggies say?" "Ice cream's for eating"), and the proportion of utterances that singled out individuals (e.g., to horse: "Oh, hi, Annabelle"; to frog: "Bye, Mr. Frog").

Results revealed that both mothers and children were more likely to treat objects as individuals (and hence use individuating, specific language) and to treat pictures as representatives of kinds (and hence use kind-referring generics).

Generics express non-present properties

From the evidence presented so far, it appears that both children and adults use generics to express kinds, as they are produced more frequently when the context encourages a focus on kinds (i.e., more often for animals than artifacts; more often for pictures than objects). However, these measures are indirect. A more direct test would be to pose questions that capitalize on the *conflict* between present context and generic knowledge. To illustrate, generic knowledge can be called to mind even when it is not supported by a specific instance in the current context. For example, you can say "squirrels eat nuts" even when you are looking at a single squirrel that is not eating. Interestingly, deaf children of hearing parents who receive virtually no conventional language input, make such reference in their spontaneous communicative gestures (also known as "home sign"; Goldin-Meadow, Gelman, & Mylander, 2005). Thus, the ability to call to mind generic knowledge, even when it is unsupported by the current context, must require minimal language input.

We now turn to the question of when children appreciate that generics make reference to properties representative of the larger category even when the properties are not found in the present context. Gelman and Raman (2003) presented 2-, 3-, and 4-year-olds with pictures of two entities (e.g., two penguins). The entities were chosen to be atypical or unusual in at least one salient respect (e.g., penguins are atypical birds because they cannot fly). Participants then heard a question about this atypical dimension (e.g., flying). In the non-generic condition, the question was posed in non-generic form (e.g., "Here are two birds. Now I'm going to ask you a question about *the birds*. Do *the birds* fly?"); in the generic condition, the question was presented in generic form (e.g., "Here are two birds. Now I'm going to ask you a question about *birds*. Do *birds* fly?"). If children understand that generics are not limited in reference to the entities available in the immediate context, they should provide kind-level responses to generic questions (e.g., "yes" concerning whether "birds fly"). In contrast, for the non-generic questions, children should provide specific responses that refer to the individuals shown in the picture (e.g., "no" concerning whether "the birds fly"). Results supported these hypotheses. Children between 2½ and 4 years of age provided more kind-level than specific responses to generic questions and more specific than kind-level responses to non-generic questions. Thus, as early as 2½ years children understand that "Do birds fly?" refers not to the picture of two birds that is sitting in front of them, but rather to the abstract kind, "birds" in general.

Next Gelman and Raman asked whether children can make use of the convergence of linguistic and nonlinguistic contextual information to reach a generic interpretation. Children were presented with situations in which linguistic and contextual information either matched or mismatched. In the match situations, children saw pictures of a single idiosyncratically atypical entity (e.g., a giraffe with a short neck) and heard questions with a singular pronoun (e.g., "Here is a giraffe. Does *it* have a long neck or a short neck?"). Here the pronoun in the question ("it") should be interpreted as referring to the single entity pictured (e.g., the giraffe with the short neck). In the mismatch situations, children saw pictures of a single idiosyncratically atypical entity (e.g., a giraffe with a short neck) and heard questions with a plural pronoun (e.g., "Here is a giraffe. Do *they* have long necks or short necks?"). Here the pronoun in the question ("they") can be interpreted as referring to the kind (e.g., giraffes in general). Although the kind is not directly named, it is implied through the use of a plural pronoun with no plural referent. Results showed that children between 2½ and 4½ years provided more kind-level responses to the mismatch situations and more specific responses to the match situations. These results confirmed the hypothesis that children can use the convergence of linguistic and contextual information to yield a generic or non-generic interpretation.

To verify that it was the mismatch between wording and context that children were using to yield a generic interpretation, and not simply the presence of a plural question, a follow-up study presented wording that was kept constant and context that varied. In the match situations, children saw pictures of two idiosyncratically atypical entities (e.g., two giraffes with short necks) and heard questions with a plural pronoun (e.g., "Here are two giraffes. Do *they* have long necks or short necks?"). Here the pronoun in the questions ("they") should be interpreted as referring to the two entities pictured (e.g., the giraffes with the short necks). In the mismatch situations, children saw pictures of a single idiosyncratically atypical entity (e.g., a giraffe with a short neck) and heard questions with a plural pronoun (e.g., "Here is a giraffe. Do *they* have long necks or short necks?"). Here the pronoun in the questions ("they") should again be interpreted as referring to the kind (e.g., giraffes in general). Results showed that children between 3½ and 4½ years again provided more kind-level responses to the mismatch situations and more specific responses to the match situations, suggesting that they use the mismatch between language and contextual cues to yield a

generic interpretation. This was not the case, however, for the youngest age group: 2½-year-olds performed at chance.

Thus, by 2½ years of age, children appreciate that generics express kind-relevant properties, even when such properties are not available in the present context. The evidence that young children understand that generics refer to abstract kinds and are not strictly associated with features in the immediate context lends further support to the generics-as-default account of generic acquisition.

Generics for novel categories

Because the aforementioned work used highly familiar categories, labels, and properties, it is unclear from these data alone whether children also comprehend the conceptual implications of novel generics for novel categories. This question is particularly relevant to the larger question with which we started this paper, concerning whether a notion of "kind" is fast-mapped to children's object labels. Recent work has begun to explore children's understanding of generic language in the context of novel categories (e.g., Brandone & Gelman, 2009). For example, Chambers, Graham, and Turner (2008) introduced 4-year-olds to novel creatures (e.g., "These are pagons") and then described a non-obvious property of those creatures using either generic (e.g., "*Pagons* are friendly") or specific (e.g., "*These pagons* are friendly") language. They also varied the number of category members shown during the description: either one or five exemplars were introduced. Then a new category member was shown and children's willingness to extend the property to that new category member was assessed (e.g., "Is this pagon friendly?"). Results showed that whether the sentence was generic or not influenced children's willingness to extend the property: Children were significantly more likely to extend properties expressed with generic language than those expressed with specific language. Results also showed that generic descriptions were more effective at boosting property extensions than was increasing the amount of available evidence: whether there were one or five exemplars did not appear to influence property extensions.

In a second experiment, Chambers and colleagues explored whether counterevidence (e.g., one unfriendly pagon) would influence the likelihood of extending a property expressed in generic or specific form. Recall that a hallmark of the adult understanding of generics is that they are robust against counterevidence. For example, it is true that "Birds fly" despite the fact that penguins and ostriches do not fly. To explore this component of generic understanding in children, Chambers et al. introduced children to instances of a novel category (e.g., "These are pagons") and described a non-obvious property using generic (e.g., "*Pagons* are friendly") or specific language (e.g., "*These pagons* are friendly"). They then identified a third category member as an exception to the previous assertion (e.g., "Except this pagon, this pagon isn't friendly"). Children were again tested on their willingness to extend the property to a new category member. Results showed that, when properties were introduced with specific descriptions, after receiving counterevidence children did not extend the property to a new category member. However, when properties were introduced with generic descriptions, despite counterevidence children continued to extend those properties to new category members. Together, results from Chambers et al. suggest that young children's understanding of generics is not limited to familiar categories: children understand that when a property of a novel kind is expressed generically, it generalizes broadly to members of that kind. In short, young children readily map a new count noun onto a kind, even when presented with only a single category instance. Furthermore, the form in which a novel noun is introduced (generic vs. specific) influences which properties are linked to that noun.

Hollander, Gelman, and Raman (in press) explored an additional consequence of understanding generics within the context of novel properties and novel kinds. Namely, they asked whether generic language would lead children to consult a property predicated of a kind when identifying new instances of that kind. For example, if children had never encountered the category "bants" before, but heard a new property expressed generically (e.g., "Bants have stripes"), would they later consult the generic property (e.g., stripes) to determine whether or not a new animal was a member of the category "bants"? To test this, Hollander et al. presented adults and preschoolers with a novel animal, labeled it (e.g., "This is a bant"), and described one of its properties with either a generic (e.g., "*Bants* have stripes") or a specific (e.g., "*This bant* has stripes") sentence. Then they asked which of two new animals could also be labeled with the new label: one that matched the target item on the predicated property (e.g., stripes) or one that matched the target item in overall perceptual appearance (Study 1) or shape (Study 2). Hollander and colleagues predicted that hearing a property expressed with generic language (as opposed to specific language) should increase the likelihood of linking that property to a kind and thus choosing the property-match, as compared to a baseline control condition in which no property information was provided.

Results showed that adults and children indeed were more likely to select the item that matched the target item on the predicated property when the property was expressed generically (e.g., "*Bants* have stripes") than when it was expressed specifically (e.g., "*This bant* has stripes"). Children and adults were also more likely to choose the predicated property in the generic condition than in the baseline control condition. Thus, although they had a baseline preference to extend the label to an item that matched in shape or overall perceptual appearance, participants were able to use generic property information to extend the label to the predicated property-match. These studies show that children can make use of generics in the service of word learning by exploiting generic language in decisions about the extension of a novel word.

Generics, statistical frequency, and quantifiers

As mentioned earlier in our discussion of the challenge of generic language, there is considerable debate as to how to characterize the semantics of generics (e.g., Asher & Morreau, 1995; Cohen, 1999; Greenberg, 2003; Krifka et al., 1995; Leslie, 2007, 2008). One question concerns whether generics differ (semantically) from quantifiers. Intuition suggests that generics do not reduce to any particular quantifier: they cannot mean "all" (because it is permissible to say "Birds fly"); they cannot mean "most" (because it is permissible to say "Birds lay eggs"); and they cannot mean "some" (because it is not permissible to say "Birds are female"). Moreover, it would appear that generics are, in principle, distinct from quantifiers. As Carlson (1977) points out, a question such as "How many tigers are striped?" can be answered with a quantifier ("Most tigers are striped"; "Some tigers are striped"; "95% of tigers are striped"), but not with a generic (* "Tigers are striped") (see also Leslie, 2007).

Data also suggest that statistical frequency -- though important for some generics (e.g., "Barns are red"; see Prasada & Dillingham, 2006, 2009) -- is insufficient to capture the full range of generic usage. Consider generics expressing properties that are particularly dangerous or striking (e.g., "Sharks attack swimmers"; "Ticks carry Lyme Disease"; see Leslie, 2007 for further discussion). These sentences are intuitively true, even though very few members of the kind in question possess the predicated property. Cimpian, Brandone, and Gelman (2008) found that, when asked to estimate the percentage of sharks that attack swimmers, for example, adults produced generally low numbers (M = 17.68%), and when asked to estimate the percentage of sharks that do *not* attack swimmers, adults produced generally high numbers (M = 71.75%). Nevertheless, when asked to judge the truth or falsity

of these statements, 87.5% of participants reported that “Sharks attack swimmers” is true whereas only 12.5% reported that “Sharks do *not* attack swimmers” is true. Thus, despite the fact that most sharks do not attack swimmers, “Sharks attack swimmers” seems like a better, truer statement than “Sharks do not attack swimmers.” Cimpian et al. also found that adding the quantifier “most” reversed these judgments. For example, only 12.5% of participants agreed that “Most sharks attack swimmers” is true, whereas 100% of participants agreed that “Most sharks do not attack swimmers” is true. One might wonder whether the reverse conditional probability accounts for generic usage (e.g., do we say “Ticks carry Lyme disease” because the probability of carrying Lyme disease is higher for ticks than for other animals?). However, a problem with this account is that many generics are not distinctive in this way (e.g., “Dogs are 4-legged”, but so are cats, horses, pigs, etc.). Furthermore, some properties that are highly distinctive are not felicitously expressed as generics (e.g., we would not say “People receive Ph.D.s”, even though we are the only species to do so). Thus, statistical frequency seems insufficient to capture the full range of generic uses.

An alternative to this statistical frequency view is the possibility that theory-based considerations explain generic use. To explore this possibility, a recent set of studies tested the relative importance of statistical cues versus one theory-laden feature, property origins (Gelman & Bloom, 2007). The primary question motivating this work was whether statistical frequency would be the determinative factor in choosing to use (or endorse) a generic statement, or whether frequency can be overridden by other, theory-based information.

This study included college students as well as 4- and 5-year-olds, who heard a series of vignettes. Across the vignettes, two factors were varied: the origins of a property (intrinsic vs. extrinsic) and the statistical cues (property present in 100% of sample vs. property present in 0% of sample). Generics were predicted to be used to describe properties with intrinsic origins -- regardless of statistical frequency. For example, in one story, children saw a sample of four novel animals and heard, “These are my dobles.” Then they heard how a key property (e.g., having claws) was obtained: either the dobles were born with the claws or they acquired them later (e.g., they put them on). Then participants were told that following some event (e.g., drinking a yummy drink), either all four animals in the sample still have the property, or all four animals in the sample lost the property. Finally, participants heard two key questions: “Do *dobles* have claws?” (generic), and “Do *my dobles* have claws?” (specific).

Undergraduates consistently reported that “my dobles” (specific question) have claws if and only if the sample of four animals currently has the property (thereby privileging statistical information over property origins when hearing the non-generic question). In contrast, they reported that “dobles” (generic question) have claws if and only if the sample of four animals was born with the property (thereby privileging property origins over statistical information when hearing the generic question).

Preschool children showed a different pattern of results. As with the adults, they also consistently reported that “my dobles” (specific question) have claws if and only if the sample currently has the property (again, privileging statistical information over property origins for the non-generic question). In contrast to this question and distinct from the adults, preschoolers reported that “dobles” (generic question) have claws in all four conditions—even when none of the sample currently has the property. Thus, although children do not seem to privilege inborn properties (as do adults), for both adults and children, generics are not simply a description of a commonly held property. Generics refer to kinds; they do not refer to statistics alone (see also Cimpian, Gelman, & Brandone, in press).

Given that generics are distinct from quantifiers, we can then ask which type of expression is easier to learn. On the associative-learning account, quantifiers should be easier to learn because they are explicitly and consistently marked and generics are not. In contrast, on the generics-as-default account, generics should be easier to learn because the generic interpretation serves as a default.

Consistent with the generics-as-default view, studies that have examined children's understanding of generics and quantifiers (in the same study) find that: (a) generics are used in an adult-like fashion at an earlier age than are quantifiers, and (b) quantifiers are at first misinterpreted as if they were generics (Hollander, Gelman, & Star, 2002). For example, Hollander et al. (2002) found that there are no developmental changes in how often children endorse generic questions (e.g., “Do girls have curly hair?”): 3-year-olds’ responses are indistinguishable from those of 4-year-olds and adults. In contrast, there are sharp developmental changes in how often children endorse quantified questions (e.g., “Do *all* girls have curly hair?” “Do *some* girls have curly hair?”). The pattern of results suggests that 3-year-olds appear to ignore the quantifiers “all” and “some” and respond to quantified sentences as though they were generics. Leslie, Khemlani, and Glucksberg (2009) suggest that generics are easier to interpret than quantifiers even for adults, because interpreting generics involves a generalization that requires fewer cognitive resources than interpreting explicit quantifiers. Thus, data on the comparison between generics and quantifiers suggest that quantifiers are harder to learn and interpret than generics, lending support to the hypothesis that the generic interpretation is a default.

Conclusions

We return to our starting point, fast-mapping. We have argued that fast-mapping involves establishing placeholders as initial meanings. Indeed, the partial nature of early meanings is what permits the rapid early learning of words. This position then raises the question of how to characterize children's placeholder meanings. We proposed that semantic placeholders for object labels include a central notion of “kind” (see also Prasada & Dillingham, 2006, 2009, for more extensive discussion of kind representations). We explored this notion by a close examination of children's use and understanding of generic noun phrases, which by their very nature refer to kinds (vs. individuals). Based on a review of recent research, we draw four primary conclusions regarding the acquisition of generics: (1) Kind-referring expressions (generics) are acquired early in language learning. (2) Generics do not reduce to quantifiers, and in fact are learned by children before quantifiers. (3) Generics seem not to be acquired by associative learning mechanisms. (4) Rather, generics are unmarked linguistically and appear to be a linguistic default.

What are the implications of these findings for fast-mapping? The research on generics provides evidence that, at least by 2½ years of age, kinds are salient to children (Gelman et al., 1998; Gelman et al., 2008; Pappas & Gelman, 1998). Moreover, kinds are readily evoked by young children based on even a single novel exemplar (Brandone & Gelman, 2009; Chambers et al., 2008; Hollander et al., in press). This ready availability of kinds is consistent with the idea that the process of fast-mapping an object label includes forming a skeletal link to a kind (see also Putnam, 1975). The research on generic acquisition also suggests that, although the foundational distinction between kinds and individuals emerges early in development (e.g., Xu, 2005), knowledge about individual kinds develops gradually over years (Carey, 2009). Thus, kind placeholders are sufficiently open-ended to allow for the addition of content. Mapping novel words to an initial, placeholder notion of kind enables learners to construct over time a more accurate and complete understanding. Even for adults, words may retain this openness.

Although this paper concerns fast-mapping, and in particular the nature of the placeholder that children establish during the fast-mapping of object labels, the studies we have reviewed are not fast-mapping studies. Indeed, most of the research we have discussed examines children's interpretation of familiar words. An important direction for future research will be to determine whether children indeed fast-map novel words onto kinds. For example, we would predict that notions of kind and of ontology would be retained by young children even after brief presentations and lengthy delays (e.g., children would recall that a novel noun had been mapped onto an animal versus an inanimate object versus a substance). Similarly, we would predict that children would produce generics after a single experience with a novel count noun (as suggested by Brandone & Gelman, 2009). Finally, it will also be important to examine when other properties of kind representations that are present in adults (Prasada & Dillingham, 2006, 2009) emerge in children's initial word representations.

Acknowledgments

This research was supported by NICHD grant HD-36043 and NSF grant BCS-0817128 to Gelman and a NSF Graduate Research Fellowship to Brandone. We thank Dan Swingley, Sandy Waxman, and an anonymous reviewer for helpful comments on an earlier draft.

References

Asher, N.; Morreau, M. What some generic sentences mean.. In: Carlson, G.; Pelletier, FJ., editors. The generic book. Chicago University Press; Chicago: 1995. p. 300-339.

Bélanger J, Hall DG. Learning proper names and count nouns: Evidence from 16-and 20-month-olds. Journal of Cognition and Development. 2006; 7:45–72.

Bertenthal BI, Proffitt DR, Cutting JE. Infant sensitivity to figural coherence in biomechanical motions. Journal of Experimental Child Psychology. 1984; 37:213–230. [PubMed: 6726112]

Bloom, L. Language development; form and function in emerging grammars. MIT Press; Cambridge, MA: 1970.

Bloom, P. How children learn the meaning of words. MIT Press; Cambridge, MA: 2000.

Booth AE, Waxman SR, Huang YT. Conceptual information permeates word learning in infancy. Developmental Psychology. 2005; 41:491–505. [PubMed: 15910157]

Brandone AC, Gelman SA. Differences in preschoolers' and adults' use of generics about animals and artifacts: A window onto a conceptual divide. Cognition. 2009; 110:1–22. [PubMed: 19046742]

Brown, R. A first language: The early stages. Harvard; Cambridge, MA: 1973.

Carey, S. The child as word learner.. In: Bresnan, J.; Miller, G.; Halle, M., editors. Linguistic theory and psychological reality. MIT Press; Cambridge, MA: 1978. p. 264-293.

Carey, S. The origin of concepts. Oxford University Press; New York: 2009.

Carey S, Bartlett E. Acquiring a single new word. Proceedings of the Stanford Child Language Conference. 1978; 15:17–29.

Carlson GM. A unified analysis of the English bare plural. Linguistics and Philosophy. 1977; 1:412–456.

Carlson, GM.; Pelletier, FJ. The generic book. University of Chicago Press; Chicago, IL: 1995.

Chambers CG, Graham SA, Turner JN. When hearsay trumps evidence: How generic language guides preschoolers' inferences about unfamiliar things. Language and Cognitive Processes. 2008:1–18.

Cimpian, A.; Brandone, AC.; Gelman, SA. [Adults' judgments of generic acceptability and property frequency]. 2008. Unpublished raw data

Cimpian A, Gelman SA, Brandone AC. Theory-based considerations influence the interpretation of generic sentences. Language and Cognitive Processes. in press.

Cimpian A, Markman EM. Preschool children's use of cues to generic meaning. Cognition. 2008; 107:19–53. [PubMed: 17765216]

Cimpian A, Markman EM. The absence of a shape bias in children's word learning. Developmental Psychology. 2005; 41:1003–1019. [PubMed: 16351346]

Cohen, A. Think generic: The meaning and use of generic sentences. CSLI Publications; Stanford, CA: 1999.

DeLoache JS. Symbolic functioning in very young children: Understanding of pictures and models. Child Development. 1991; 62:736–752. [PubMed: 1718666]

Diesendruck G, Bloom P. How specific is the shape bias? Child Development. 2003; 74:168–178. [PubMed: 12625443]

Fulkerson AL, Waxman SR. Words (but not tones) facilitate object categorization: Evidence from 6- and 12-month-olds. Cognition. 2007; 105:218–228. [PubMed: 17064677]

Gelman, R.; Durgin, F.; Kaufman, L. Distinguishing between animates and inanimates: Not by motion alone.. In: Sperber, D.; Premack, D.; Premack, AJ., editors. Causal cognition: A multidisciplinary debate. Oxford University Press; New York: 1995. p. 150-184.

Gelman SA. The development of induction within natural kinds and artifact categories. Cognitive Psychology. 1988; 20:65–96. [PubMed: 3338268]

Gelman, SA. Learning words for kinds: Generic noun phrases in acquisition.. In: Hall, DG.; Waxman, SR., editors. Weaving a lexicon. MIT Press; Cambridge, MA: 2004. p. 445-484.

Gelman SA. Learning from others: Children's construction of concepts. Annual Review of Psychology. 2009; 60:115–140.

Gelman SA, Bloom P. Developmental changes in the understanding of generics. Cognition. 2007; 105:166–183. [PubMed: 17094957]

Gelman SA, Chesnick RJ, Waxman SR. Mother-child conversations about pictures and objects: Referring to categories and individuals. Child Development. 2005; 76:1129–1143. [PubMed: 16274430]

Gelman SA, Coley JD, Rosengren K, Hartman E, Pappas T. Beyond labeling: The role of parental input in the acquisition of richly structured categories. Monographs of Society for Research in Child Development. 1998; 63(1) Serial No. 253.

Gelman SA, Goetz PJ, Sarnecka BS, Flukes J. Generic language in parent-child conversations. Language Learning and Development. 2008; 4:1–31. [PubMed: 21765807]

Gelman SA, Markman EM. Categories and induction in young children. Cognition. 1986; 23:183–209. [PubMed: 3791915]

Gelman SA, Raman L. Preschool children use linguistic form class and pragmatic cues to interpret generics. Child Development. 2003; 74:308–325. [PubMed: 12625452]

Gelman SA, Tardif TZ. Generic noun phrases in English and Mandarin: An examination of child-directed speech. Cognition. 1998; 66:215–248. [PubMed: 9689770]

Gelman SA, Waxman S, Kleinberg F. The role of representational status and item complexity in parent-child conversations about pictures and objects. Cognitive Development. 2008; 23:313–323. [PubMed: 19122853]

Goldin-Meadow S, Gelman SA, Mylander C. Expressing generic concepts with and without a language model. Cognition. 2005; 96:109–126. [PubMed: 15925572]

Golinkoff RM, Mervis C, Hirsh-Pasek K. Early object labels: The case for a developmental lexical principles framework. Journal of Child Language. 1994; 21:125–155. [PubMed: 8006089]

Graham SA, Kilbreath CS, Welder AN. 13-month-olds rely on shared labels and shape similarity for inductive inferences. Child Development. 2004; 75:409–427. [PubMed: 15056196]

Greenberg, Y. Manifestations of genericity. Routledge; New York: 2003.

Hollander MA, Gelman SA, Raman L. Generic language and judgments about category membership: Can generics highlight properties as central? Language and Cognitive Processes. in press.

Hollander MA, Gelman SA, Star J. Children's interpretations of generic noun phrases. Developmental Psychology. 2002; 38:883–894. [PubMed: 12428701]

Jaswal VK. Don't believe everything you hear: Preschoolers' sensitivity to speaker intent in category induction. Child Development. 2004; 75:1871–1885. [PubMed: 15566385]

Jaswal VK, Markman EM. Looks aren't everything: 24-month-olds' willingness to accept unexpected labels. Journal of Cognition and Development. 2007; 8:93–111.

Keil, F. Semantic and conceptual development: An ontological perspective. Harvard University Press; Cambridge, MA: 1979.

Keil, F. Concepts, kinds, and cognitive development. Bradford Book/MIT Press; Cambridge, MA: 1989.

Krifka, M.; Pelletier, F.; Carlson, G.; ter Meulen, A.; Chierchia, G.; Link, G. Genericity: An introduction.. In: Carlson, G.; Pelletier, FJ., editors. The generic book. Chicago University Press; Chicago, IL: 1995. p. 1-125.

Kuczaj, S. Ph.D. dissertation. University of Minnesota; 1976. –Ing, -s, and –ed: A study of the acquisition of certain verb inflections..

Lawler, JM. Tracking the generic toad.. Papers from the ninth regional meeting of the Chicago Linguistics Society; Chicago, IL: Chicago Linguistic Society. 1973. p. 320-331.

Leslie SJ. Generics and the structure of the mind. Philosophical Perspectives. 2007; 21:375–405.

Leslie SJ. Generics: cognition and acquisition. The Philosophical Review. 2008; 117:1–49.

Leslie, SJ.; Khemlani, S.; Glucksberg, S. All ducks lay eggs: The generic overgeneralization effect. 2009. Manuscript submitted for publication

MacWhinney, B. The CHILDES project: Tools for analyzing talk. 3rd Edition. Vol. 2: The database. Erlbaum; Mahwah, NJ: 2000.

MacWhinney B, Snow C. The child language data exchange system. Journal of Child Language. 1990; 17:271–296.

Meyer, M.; Baldwin, D. Gesture as a cue to generic vs. particular reference; Presentation at the Biennial Meetings of the Society for Research in Child Development; 2009.

Pappas A, Gelman SA. Generic noun phrases in mother-child conversations. Journal of Child Language. 1998; 25:19–33. [PubMed: 9604567]

Prasada S. Acquiring generic knowledge. Trends in Cognitive Sciences. 2000; 4:66–72. [PubMed: 10652524]

Prasada S, Dillingham EM. Principled and statistical connections in common sense conception. Cognition. 2006; 99:73–112. [PubMed: 16443448]

Prasada S, Dillingham EM. Representation of principled connections: A window onto the formal aspect of common sense conception. Cognitive Science. 2009; 33:401–448. [PubMed: 21585476]

Putnam, H. The meaning of ‘meaning’.. In: Gunderson, K., editor. Language, mind, and knowledge: Minnesota studies in the philosophy of science, VII. University of Minnesota Press; Minneapolis, MN: 1975.

Quine, WVO. Word and object. MIT Press; Cambridge, MA: 1960.

Sachs, J. Talking about the there and then: The emergence of displaced reference in parent-child discourse.. In: Nelson, KE., editor. Children's language. Vol. 4. Erlbaum; Hillsdale, NJ: 1983. p. 1-28.

Shipley EF. Two kinds of hierarchies: Class inclusion hierarchies and kind hierarchies. Genetic Epistemologist. 1989; 17:31–39.

Smith LB, Jones SS, Landau B. Naming in young children: A dumb attentional mechanism? Cognition. 1996; 60:143–171. [PubMed: 8811743]

Smith LB, Jones SS, Landau B, Gershkoff-Stowe L, Samuelson L. Object name learning provides on-the-job training for attention. Psychological Science. 2002; 13:13–19. [PubMed: 11892773]

Smith LB, Samuelson L. An attentional learning account of the shape bias: Reply to Cimpian & Markman (2005) and Booth, Waxman & Huang (2005). Developmental Psychology. 2006; 42:1339–1343. [PubMed: 17087565]

Waxman SR. Linguistic biases and the establishment of conceptual hierarchies: Evidence from preschool children. Cognitive Development. 1990; 5:123–150.

Waxman, SR. Everything had a name, and each name gave birth to a new thought: Links between early word learning and conceptual organization.. In: Hall, DG.; Waxman, SR., editors. Weaving a lexicon. MIT Press; Cambridge, MA: 2004. p. 295-335.

Waxman SR, Braun I. Consistent (but not variable) names as invitations to form categories: New evidence from 12-month-old infants. Cognition. 2005; 95:B59–B68. [PubMed: 15788158]

Wilcox T, Baillargeon R. Object individuation in infancy: The use of featural information in reasoning about occlusion events. Cognitive Psychology. 1998; 37:97–155. [PubMed: 9878104]

Wood JN, Kouider S, Carey S. Acquisition of singular-plural morphology. Developmental Psychology. 2009; 45:202–206. [PubMed: 19210002]

Xu, F. Categories, kinds, and object individuation in infancy.. In: Gershkoff-Stowe, L.; Rakison, D., editors. Building object categories in developmental time: Papers from the 32nd Carnegie Symposium on Cognition. Erlbaum; Mahwah, NJ: 2005. p. 63-89.