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Do Plinkers Live in Trees?

How Generics and Speaker Knowledge Guide Preschoolers' Inductive Inferences

By

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The undersigned certify that they have read, and recommended to the Faculty of Graduate Studies for acceptance, a thesis entitled "Do Plinkers Live in Trees? How Generics and Speaker Knowledge Guide Preschoolers' Inductive Inferences" submitted by Hayli R. Stock in partial fulfillment of the requirements for the degree of Master of Science in School Psychology.

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Abstract

The goal of the present study was to investigate the influence of generics and speaker knowledge on four-year-olds' inductive inferences. Children were presented with a novel creature and novel property of this creature, which was described using either a generic or nongeneric statement. The speaker appeared to be knowledgeable, neutral, or unknowledgeable about the information being relayed. Children were subsequently asked if a second creature shared the same property as the first. Results revealed that children extended properties to additional exemplars only when properties were described in a generic form by a knowledgeable or neutral speaker. If a speaker appeared to be unknowledgeable, or if statements were made in a nongeneric form, properties were not consistently extended beyond the first exemplar. Findings demonstrate that children avoid mapping properties to whole categories if there is reason to believe the association could be incorrect.

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Developing knowledge about categories is an essential part of conceptual maturity (Prasada, 2000). Category-based information helps humans to efficiently interact with the world because it allows for the ability to make inductive inferences. Inductive inferences typically involve the following: First, observing that *X* has the property *Y* (e.g., a robin can fly); second, judging that *X* and *Z* belong to the same category (e.g., a robin and a sparrow are both birds); and third, inferring that *Z* also has the property *Y* (e.g., therefore a sparrow can fly).

In adding to their conceptions about the world, much of what children know is derived from information provided by other people, typically through language (Jaswal & Neely, 2006). A form of language that is particularly valuable in developing category knowledge is referred to as generic language. Generic language refers to communication that suggests information is applicable to a whole category (e.g., "Dogs bark"), as opposed to nongeneric language that suggests information applies only to a specific exemplar of a category (e.g., "That dog barked"). Given that learning about categories is heavily reliant on the language others use, it is important to be attuned to linguistic cues denoting generic interpretations and to whether the information being received is accurate. The goal of the present study was to investigate the influence of generics and speaker knowledge on four-year-olds' inductive inferences about the shared properties of novel kinds.

What is generic language and why is it important?

Stated simply, generic language involves phrases that refer to a kind as a whole, rather than to an individual (Hollander, Gelman, & Star 2002; Krifka, Pelletier, Carlson, ter Muelen, Link & Chierchia, 1995). Generics typically refer to qualities that are essential to a

kind and that are enduring (Cohen, 2001; Gelman 2004b; Pappas & Gelman, 1998; Prasada & Dillingham, 2006). As well, generic statements are not tied to a particular context, but rather are deemed to be timeless, referring to an abstract entity as a whole (e.g., Gelman, 2003; Gelman & Bloom, in press). For example, the generic declaration that "birds fly" indicates that the property of flying applies to the whole category of birds rather than specific exemplars. Further, this statement also holds that birds fly *because* they are birds, and the ability to fly does not simply "come and go."

Features of generics introduce two problems (Gelman, 2003, 2004; Gelman & Raman, 2003; Prasada, 2000). The first problem is an issue of language interpretation, whereby it must be resolved whether or not an utterance is intended to be generic. This is referred to as the *problem of generic language* (Gelman & Raman, 2003). The second problem is an issue of conceptual organization whereby a judgment must be made about whether a property generalizes to other members of a category, and further, to *which* category the information should be extended (Gelman & Raman, 2003). The judgment on how to *apply* information to categories is referred to as the *problem of generic knowledge* (Prasada 2000). Each issue will be described in more detail in the following sections.

The problem of generic language

Determining whether an utterance should be interpreted as generic can be a challenging task for a child. For example, generic noun phrases can be constructed in a variety of ways, but are typically denoted using bare plurals (e.g., "*birds* fly"), definite singulars (e.g., "*the* bird flies"), or indefinite articles (e.g., "*a* bird flies"; Gelman, 2003, 2004; Lyons, 1977; Pappas & Gelman, 1998). However, many cues that mark generic intention in the English language are subtle, and various combinations can alter the interpretation of sentence meanings.

Morphosyntactic cues, contextual cues, and world knowledge are components that interact to contribute to whether a noun phrase should be interpreted as generic. As described by Gelman (2004), morphosyntactic cues, such as determiners and number, interact to dictate a generic or nongeneric interpretation. For example, the statement *"Lions* roar," would be interpreted as generic, however, a slight alteration, "*The* lions roar," would not. Although both statements contain a plural form of lions, the latter includes a definite determiner (*the*) which removes the generic implication. Tense is another morphosyntactic cue that can denote genericity. Typically, past tense utterances are not interpreted as generic, with the exception of the historic past (Gelman, 2003, 2004). For example, "Lions roared" is not generic, whereas "Dinosaurs ate plants" is. Finally, aspect is another cue to be taken into consideration when determining generic meanings, wherein statements in the simple present are denoted as generic (e.g., "Cats meow"), while present progressive statements are not (e.g., "Cats are meowing").

In addition to the above mechanisms, to fully understand generic language, listeners need to be attuned to contextual cues and world knowledge (Gelman, 2003, 2004). For example, listeners typically interpret statements in the context of an entire conversation, or in light of evidence before them, each of which could alter the meaning of an utterance. World knowledge cues are also important in that some types of properties are likely to be interpreted as generic in some contexts, and nongeneric in others. For example, the statement "A muffin is hard" is likely to be interpreted as referencing a *specific exemplar* of the category "muffin." However, the statement "A rock is hard" is likely to be interpreted as meaning the category of "rocks" in general. Both statements are structurally identical, but knowledge and experience with each category guides an interpretation of whether the property is likely to be characteristic of the category as a whole, or specific only to an

individual exemplar. As is evident from the above examples, interpreting generic language can prove to be a daunting task for children, hence what Gelman refers to as the *problem of generic language.*

The problem of generic knowledge

The *problem of generic knowledge* rests in the complex process of organizing information into a coherent mental framework (Gelman, 2003, 2004). As described by Prasada (2000) there are a number of characteristics of generics that contribute to the challenging nature of this undertaking. One specific problem of generic knowledge is that it cannot be reduced to statistical regularities (Gelman, 2003; Prasada, 2000). For example, though one is able to conclude birds fly, it is impossible for one to have had direct experience with *all* birds. In fact, inductions are typically drawn from a limited number of cases, and applied to kinds as a whole. Children need to grasp when enough evidence can accurately entail a generalization.

An additional complexity of generic knowledge is that concepts continue to reside despite evidence to the contrary (McCawley, 1981). The allowance for exceptions thus gives root to the tendency for evidence to be viewed as an "exception to a rule" rather than to re-evaluate the held generalization (Pappas & Gelman, 1998; Prasada, 2000). For example, if one was to see a dog with only three legs, the statement "dogs have four legs" would not be judged to be false. Rather, it would be assumed that the specific exemplar of the *kind* should be deemed to be an exception. In fact, research demonstrates that in some contexts, a generic statement will be accepted even if all items in an immediate context do not have that property (Gelman & Bloom, in press). As such, children must be aware that generics are flexible in allowing for exceptions.

The final problem of generic knowledge outlined by Gelman (2003, 2004) emerges when one is generalizing properties to a kind, and it is ambiguous as to *which* kind one shall refer the property. For example, the property of flying observed from a cockatiel could be generalized to the category of pets, birds, or animals. Children must become advanced in reasoning about how properties can, and should, be extended. In all, generic knowledge presents a challenging task in knowing when a property is generalizable, and subsequently organizing information into a coherent mental framework. (For additional discussion on the features of generic knowledge, see Prasada, 2000).

Generics as a universal construct

Prior to reviewing of the use of generics in the English language, it should be noted that generic knowledge is evidenced to be a universal conceptual phenomenon that is not solely a creation of the English language. Knowledge of kinds, and communicating information about properties of categories, occurs regardless of the language spoken or linguistic markings. As evidence of this argument, research has demonstrated that generics can be represented in languages other than English (e.g., Gelman & Tardif, 1998), and even in the absence of language altogether (e.g., Goldin-Meadow, Gelman, & Mylander, 2005). For example, Gelman and Tardif (1998) clearly identified generic noun phrases in an analysis of naturally occurring adult-to-child speech in the Mandarin language. Mandarin differs from English in that it does not have the same grammatical distinctions of articles, plurality, and tense. Thus, in contrast to relying on grammatical information to identify a generic meaning, Mandarin listeners rely on pragmatic and contextual cues.

Although it may not be surprising that children learn generic noun phrases when they are exposed to language models, innovative research by Goldin-Meadow et al. (2005) demonstrated that generic representations are present even when language models do not

exist. In this study, they monitored the communication of American and Chinese deaf children who had developed their own gestural systems as a result of having had no exposure to verbal speech or conventional sign language. These children used generic gestures at approximately the same rate as hearing children use generic statements. These findings, thus, clearly demonstrate that generics are a universal conceptual phenomenon, rather than a language specific occurrence.

Children's exposure to and production of generics in English

There is evidence that generics are relatively common in everyday speech (Gelman, Coley, Rosengren, Hartman, & Pappas, 1998; Gelman & Tardif, 1998; Pappas & Gelman, 1998). For example, Gelman et al. (1998) found that mothers often used generics even when their children were as young as twenty months of age in a picture-book reading task, with the majority of mothers producing at least one generic phrase during a session. Similarly, Pappas and Gelman (1998) demonstrated that 92% of mothers produced at least one generic noun phrase during a picture-book reading task, with 65% of the children also producing a generic utterance themselves. Furthermore, generic noun phrases were produced independently of the context of the page (i.e., whether the page depicted multiple or single members of a category). This finding supports the context-independent feature of generics, in that utterances apply to an abstract kind, rather than specific contextual exemplars. Evidence derived from these studies support the fact that at a very young age children are frequently exposed to generics in learning about categories and that they also produce generic utterances.

Research also demonstrates that the use of generics follows a developmental trajectory. For example, Gelman and Raman (2003) reported that children as young as two years produce generics, with a rapid increase observed between two and three years of age

(see also Gelman, 2003). The pattern of a proportional increase in the use of generics in language is further evidenced in the research by Pappas and Gelman (1998) who found a modest increase in the use of generic language by three- and four-year-old children compared to two-year-olds.

Preschoolers' understanding of generics

Although the findings described to this point indicate that children are both *exposed to*, and *produce* generics, it does not reveal first, whether they *understand* these statements, and second, how knowledge derived from these statements is subsequently *used.* Studies have, however, been conducted that illustrate that by four-years-of age children are attuned to the various features of generic statements and are capable of subsequently using the cues to guide their inferences about kinds.

Gelman and Raman (2003) assessed children's ability to attend to specific linguistic features denoting a generic interpretation of an utterance. Specifically, two, three, and four, year-old children were shown a picture of two items with an atypical feature (e.g., pink clouds), and responded to generic or nongeneric questions which were signaled by the inclusion or absence of the definite article *the* (e.g., "What colour are clouds?" versus "What colour are *the* clouds?") Results demonstrated that even two-year-olds appropriately answered generic questions with properties known of the *kind* (e.g., clouds are white) rather than with contextual information (e.g., clouds are pink). This illustrates that children were able to effectively interpret these subtle linguistic cues to identify the generic and nongeneric meanings of sentences. In a second study, these researchers altered nonlinguistic contextual cues to genericity by providing a match or mismatch between the number of items shown on a page and the plurality of a noun phrase. Specifically, children were shown either one or two atypical exemplars of a category, while the items were

always accompanied by a plural noun phrase (e.g., in the match condition, a picture of two pink clouds was presented with the dialogue "Here are two clouds. What colour are *they*?"). In this experiment, two-year-olds, unlike three- and four-year-olds, did not attend to the pragmatic cues in the context before them, but rather, attended only to linguistic cues (i.e., the plural noun phrase). Regardless of match or mismatch, two-year-old children answered with reference to the whole category (e.g., stating that clouds are white). In contrast, older children took context into account, and altered their responses accordingly. If a picture depicted two exemplars, they responded with evidence in the immediate context, rather than in reference to a category in general. Results thus suggested that developmentally, children will first attend to linguistic cues before being able to additionally process contextual information to decipher generic versus nongeneric interpretations.

Chambers et al. (under review) assessed preschoolers' generic interpretations when world knowledge could not be used. Specifically, objects presented in the study were novel creatures made by the experimenters, so that children could not rely on information derived from past experience with items. In this research, children were asked to make inductive inferences, or predictions, about the novel objects that were introduced with properties described in generic (e.g., "*Pagons* are friendly") or nongeneric (e.g., "*These pagons* are friendly") sentences. It was found that an increase in exemplar-based evidence (e.g., if multiple pagons were shown to be friendly) did not change performance in generic conditions, with children consistently extending properties at above chance levels. This illustrates that children did not need additional support to understand that properties stated generically can be applied category-wide. A second experiment exposed children to counterexamples to assess whether the allowance for exceptions in generics held in this scenario. It was revealed that contradictions did not affect inferences based on generic

descriptions. Thus, regardless of the presence of exceptions, four-year-olds continued to display a tendency to extend a property to additional exemplars. Overall, this research illustrates that sensitivity to generic language helps to guide inductive inferences regardless of the amount of supporting evidence for properties, and despite cases of exceptions. Further, these findings are important because they demonstrate that children are able to interpret generic statements independent of world knowledge. As Chambers et al. argued, this scenario is representative of how children realistically approach the world where they are often unfamiliar with concepts being discussed, thus supporting the claim that generics provide an efficient mechanism to learn about the world.

To investigate how generics are treated differently than other kinds of information, Gelman, Star and Flukes (2002) assessed whether four-year-old children distinguished generic statements (e.g., "*Bears* have claws") from statements using universal quantifiers (e.g., "*All* bears have claws") and indefinite plurals (e.g., "*Some* bears have claws"). When children heard a statement using all, they extended the property to more exemplars than if they had heard "some", whereas the generic form of the statement (e.g., "bears") resulted in an intermediate extension of the property. Similarly, Hollander et al. (2002) found that most four-year-olds consistently treated generics as intermediate between "all" and "some" meanings. In building upon the previous findings, however, Hollander et al. found a sharp contrast between three- and four-year-olds' response patterns. Specifically three-year-olds were statistically as likely to accept the statement "*all* girls have curly hair", as they were to accept that "*girls* have curly hair" and "*some* girls have curly hair," showing they did not distinguish the difference in the falsifiable nature between generic, 'all', and 'some' statements. In contrast, four-year-old children did treat generic statements differently, as their tendency to accept a generic statement was intermediate between "all" and "some"

statements. Therefore, it appears that by four-years of age, but not before, children comprehend the semantics of sentence genericity by their demonstrated understanding that generics imply broad generalizations but also allow for exceptions.

Yet another feature of generics is that the interpretation of the meaning of a statement can be reliant on world knowledge. In this regard, one experiment in a series by Cimpian and Markman (2007) illustrated that preschool age children take world knowledge into consideration when deciding whether information can be generically applied. For example, when asked to tell a stuffed toy information they had learned about pictures of animals, properties which were more conducive to generalizations (e.g., seeing things from far away) were stated generically more often by four-year-old children, than properties that were more likely to be individual specific (e.g., being sick). This research provided evidence that children use their own world knowledge to interpret whether information is generic, when other contextual and linguistic variables are held constant.

Summary of generics literature

In summary, research demonstrates that generic knowledge appears to be a universal conceptual phenomenon that is expressed in various languages (e.g., Gelman & Tardif, 1998), as well as in the absence of any formal language models (Goldin-Meadow et al., 2005). In the English language, children are frequently exposed to generic statements, and in turn, produce generic utterances themselves (Gelman et al. 1998; Gelman et al., 2005; Gelman & Raman 2003; Pappas & Gelman, 1998). By the time they reach four years of age children are capable of successfully interpreting generic phrases and using information contained within the utterance to guide inductive inferences (e.g., Chambers et al., under review; Gelman et al., 2002; Hollander et al., 2002).

Further, it has been demonstrated that there is a developmental trajectory in children's ability to efficiently understand and use the many features of generics. Gelman and Raman (2003) demonstrated that although two-year-olds effectively attend to linguistic cues in interpreting the meaning of generic statements, they appeared unable to take into account pragmatic cues that could alter the meaning of the linguistic content. Alternatively, such cues were found to be effectively interpreted by three-year-olds. Gelman, et al. (2002) and Hollander, et al. (2002) further investigated preschooler's tendency to allow room for exceptions in generic statements and found that by the age of four-years children have a firm grasp of this rule, whereas three-year-olds were observed to struggle (Hollander et al., 2002). In sum, these studies imply that understanding features of generics, and the ability to use generic information to make inductive inferences follows a developmental trajectory, becoming increasingly effective by the age of four years.

The effect of speakers' knowledge on learning new information

As stated earlier, in developing concepts about the world, much of what children know is derived from information communicated by other people (Jaswal & Neely, 2006). As the previously reviewed research has demonstrated, generic language is a key strategy used to communicate knowledge, as it has the capability to disseminate information that can be applied to whole categories. However, given that much of our knowledge is derived from others, it is important to be able to assess if the source of information is reliable. To date, no research has examined children's application of category information when presented with a combination of generic language with cues of speaker knowledge.

Investigating the interaction between generic language cues with speaker knowledge is important because generics are deemed to be statements reporting known facts, or information that is *generally* true. Recall, generics report qualities that can be

applied to an entire category, are essential, and enduring (Lyons, 1977; Gelman, 2003, 2004; Pappas & Gelman, 1998). Thus, as posited by Chambers et al. (under review), the use of a generic statement, in itself, may entail that a speaker believes a property applies to *most* members of a category. That is to say, if a person uses a generic utterance, it can be assumed they must have had access to information to support their claim, thus fostering "blind faith" in the statement. It is unknown, however, whether an indication of lack of speaker knowledge would disrupt this assumption, or if a blind faith in a generic utterance would prevail over other pragmatic cues.

To develop a prediction of how children would fare when faced with a conflict, it is important to review an area of research that investigates the influence of speaker reliability, which is within the context of mapping new words. Here, studies have demonstrated that when a new word is taught by an unreliable source, children will not map the potentially incorrect word to the object. For example, Sabbagh and Baldwin (2001) found that when given an explicit statement about a speaker's knowledge or ignorance, three- and four-year-old children learned words taught by knowledgeable speakers, but did not learn words from ignorant speakers (i.e., speakers who claimed they were unsure whether the referent of a novel word was correct). Further, in an increasingly subtle context, where speakers indicated the source of an object (e.g., whether the object was made by a friend, or if they themselves made it), four-year-olds were shown to block the word-referent link from someone who had less experience with an item. In a similar vein, Sabbagh, Wdowiak and Ottaway (2003) devised a setting in which an object was labeled differently by two speakers, one who was deemed to be knowledgeable, and one who was deemed to be ignorant. Four-year-old children favored the word mapping provided by a reliable speaker's cues. Comparable results were also found by Koenig and Harris (2005) when children were

exposed to a series of scenarios in which two informants demonstrated either consistently accurate or inaccurate information to children (e.g., one informant always labeled familiar objects such as a ball and cup correctly, while another consistently labeled the same objects incorrectly). In this study, four-year-old children reliably identified the accuracy of informants, and subsequently endorsed labels provided by the accurate experimenter.

Together these findings demonstrate that four-year-old children track the reliability of information sources, and subsequently use these pragmatic cues to select correct word mappings. Given that generic language typically implies confidence in the information being presented, the purpose of the present study was to investigate if children will endorse the same selectivity as in word learning research, or whether they will make the blind faith assumption.

Present study

The aim of the present study was to investigate how children use generic language cues and speaker knowledge in combination to guide inductive inferences. The first goal was to confirm past research in assessing whether four-year-old children are sensitive to generic versus nongeneric cues, and if these cues are subsequently used to guide inferences about novel kinds. The second goal of this research was to investigate whether a professed level of speaker knowledge would cause a disruption in the extension of described properties.

To assess these tendencies, four-year-old children were shown novel creatures, while a speaker described properties of the items, and children were subsequently asked whether another similar looking creature would share the property. Objects were presented to children in one of six conditions, each representing a different combination of genericity and speaker reliability: *Generic Knowledgeable, Generic Neutral, Generic*

Unknowledgeable, Nongeneric Knowledgeable, Nongeneric Neutral, Nongeneric Unknowledgeable. In the generic conditions, the property of the object was introduced using a bare plural statement (e.g., "*Plinkers* live in trees") while in the nongeneric condition, properties were described using a demonstrative singular (e.g., "*This* plinker lives in trees). In knowledgeable conditions, the speaker declared they were confident about the information they were providing, in contrast to unknowledgeable conditions, where the speaker professed they were uncertain about the properties being relayed. Finally, in the neutral conditions, the speaker made no reference to the reliability of the information they were describing.

It was predicted that children would be more likely to extend a property to additional members of a category when it is described generically (e.g., "*Plinkers* live in trees"), as opposed nongenerically (e.g., "*This* plinker lives in trees"). It was also predicted that if the experimenter indicated that she was knowledgeable about the objects, the child would extend the property more often than when the experimenter expressed uncertainty. The third prediction was that an interaction of these cues would be observed. In particular, it was predicted that if statements were made generically, properties would be extended in both knowledgeable and neutral conditions, but would not be extended if a speaker professed to be unknowledgeable. In contrast, it was expected that speaker knowledge would have little effect when properties were described in a nongeneric way, because children would be unlikely to extend properties regardless of knowledge state, due to nongeneric structure of the utterance.

Method

Participants

The final sample consisted of 156 preschool aged children ($M = 4.62$ years, SD = 0.29, range = 4.00 – 5.37). Eight additional children were tested but excluded from the final sample for the following reasons: experimenter error ($n = 4$), failing warm-up trials ($n = 3$), and English as a second language ($n = 1$). Children were randomly assigned to one of the following six conditions: *Generic Knowledgeable, Generic Neutral, Generic Unknowledgeable, Nongeneric Knowledgeable, Nongeneric Neutral,* and *Nongeneric Unknowledgeable* (see Table 1 for a description of participant details for each condition). Children were recruited for the study from a participant database at the University of Calgary, as well as from local preschools. Participants were largely from middle-class families, in which English was the primary language spoken in the home.

Materials

Children engaged in a warm-up activity prior to beginning the testing phase of the study. In this warm up phase, familiar items were used to elicit 'yes' and 'no' responses. These items included three plastic forks of different colours, two combs of different colours, one small doll hat, a small drinking glass, a toy car, and a miniature book.

Using modeling clay, novel creatures were created for use in the induction task. A total of six sets of creatures were produced, with each set comprised of two objects of equal size and shape, differing only in colour (See Appendix A). Each set of creatures was assigned a novel count noun which was used to consistently refer to those objects in all conditions (*borp, fep, wug, lif, blicket,* and *plinker).* Creatures were also given unique and unobservable properties including: *sees things in the dark, eats plants, has two stomachs,*

Table 1

Participant descriptives by condition

Condition	*n*	Gender	*M* Age [a]	SD	Range
Generic Knowledgeable	26	Males = 13 Females = 13	4.48	0.26	4.00 - 5.07
Generic Neutral	26	Males = 13 Females = 13	4.76	0.25	4.27 – 5.14
Generic Unknowledgeable	26	Males = 12 Females = 14	4.58	0.29	4.07 – 5.18
Nongeneric Knowledgeable	26	Males = 11 Females = 15	4.60	0.26	4.22 – 5.22
Nongeneric Neutral	26	Males = 11 Females = 15	4.69	0.27	4.21 – 5.23
Nongeneric Unknowledgeable	26	Males = 13 Females = 13	4.61	0.33	4.01 – 5.37

[a] = Age presented in years

sleeps during the day, has a sticky tongue, and *lives in trees.* All novel creatures were kept in an opaque box decorated with patterned material, ribbon, and colourful star stickers.

Design

Children were randomly assigned to one of six conditions with generic sentence structure and speaker knowledge crossed as between participant variables. Every participant engaged in the same warm-up phase, but depending upon condition, received different descriptions of novel creatures. Each of the six creature sets was introduced in a counterbalanced order such that no sets were consistently presented at the same point in the procedure across children. Properties assigned to the novel creatures were also counterbalanced such that each creature was described with the same property an equal number of times within each condition. The counterbalanced order of presentation of object sets and the counterbalanced assignment of properties to objects sets were then yoked across the six conditions.

Procedure

Children were tested on an individual basis either in the research lab setting, or in a quiet area of their preschool. Children were seated at a table directly across from the examiner. At the start of the testing session, children were told they were about to play a game with the experimenter, and were then presented with three warm-up trials. The purpose of these trials was to elicit both 'yes' and 'no' responses from children to ensure they understood they were welcome to give both types of answers, and thus reduce response bias.

During the warm-up trials, the experimenter first presented children with an object, and stated what it was (e.g., "This is a fork"). The experimenter then presented two additional items and asked children if each of the items were the same kind of thing as the

first (e.g., "Is this a fork?") All three warm up trials required children to give a 'yes' or 'no' response to two items. One trial required a 'yes' response to both items (i.e., three forks were presented), one required a 'no' response to both objects (i.e., a glass, a book, and a car were presented), and a third elicited both a 'yes' and 'no' response (i.e., two combs and a hat were presented). Those children who did not answer all of the warm-up trials correctly were excluded from the study (n = 3).

Once warm-up trials were completed, the experimenter cleared items from the table, and presented a storage box containing the novel creatures. This box was introduced differently, depending on condition. Children in *neutral* conditions heard a statement where neither knowledge, nor lack of knowledge about the objects was emphasized (i.e., "See this box? This box is filled with a whole bunch of things. There's lots of things in here that I'm going to show you"). In contrast, children in *knowledgeable* conditions heard instructions that emphasized the experimenter's familiarity with the objects (i.e., "See this box? This box is filled with things I brought from home. I've had these things for a long time, so I have seen them all before, and I know a lot about them.") Finally, in the *unknowledgeable* conditions, children heard instructions that emphasized the experimenter's lack of familiarity with the objects (i.e., "See this box? This box is filled with things I borrowed from my friend. My friend just gave them to me today, so I have not seen them before, and I don't know very much about them.")

Following introduction of the box, the examiner proceeded to present novel creatures to children. There were a total of six trials, with each trial involving the presentation of two members of a novel creature set. Across all conditions for each of the six trials, the experimenter took one creature of a set from the box, labeled it with a novel count noun, and described a property of the creature. This item was then placed on the table

in front of the child while the examiner retrieved the second creature from that set. The second creature was placed in front of the child, and the examiner asked if this creature shared the previously described property. Two variations existed between the conditions; whether the examiner used generic or nongeneric statements to describe properties (i.e., *generic* or *nongeneric conditions*), and the amount of knowledge the examiner expressed to have about the items (i.e., *knowledgeable, neutral,* or *unknowledgeable conditions*).

In the three generic conditions, novel properties were introduced using a bare plural phrase (e.g., wugs) which signals a generic interpretation. In the *Generic Neutral* condition, no emphasis on knowledge or experience with the objects was provided (e.g., "Look at this, this is a wug. *Wugs* can see things in the dark. Yes. *Wugs* can see things in the dark. Yes. *Wugs* can see things in the dark") In the *Generic Knowledgeable* condition, the speaker's knowledge about the objects was emphasized (e.g., "Look at this, this is a Wug. *Wugs* can see things in the dark. Yes. *I know wugs* can see things in the dark. Yes. *I know, wugs* can see things in the dark."). In the *Generic Unknowledgeable* condition, the experimenter's lack of experience with creatures was emphasized (e.g., "What's this? Oh! It *says* it's a wug. I *think wugs* can see things in the dark. I *don't really know* if *wugs* can see things in the dark. No, *I don't really know.* But I *think wugs* can see things in the dark".)

In the nongeneric conditions, properties of creatures were introduced using a demonstrative singular phrase (e.g., *this* wug), signifying a nongeneric interpretation. The same knowledge manipulations as described above were used. Thus, introductions in *nongeneric* conditions were as follows: *Nongeneric Neutral*: "Look at this, this is a wug. *This* wug can see things in the dark. Yes *this* wug can see things in the dark. Yes. This wug can see things in the dark"; *Nongeneric Knowledgeable*: "Look at this, this is a wug. *This* wug can see things in the dark. *I know this* wug can see things in the dark Yes, I *know this*

wug can see things in the dark"; *Nongeneric Unknowledgeable*: "What's this? Oh! It *says* it's a wug. I *think this* wug can see things in the dark. I *don't really know* if *this* wug can see things in the dark. No, I *don't really know.* But I *think this* wug can see things in the dark."

Children's yes-no responses on each trial were recorded. No feedback was given on any of the test trials. If children answered "I don't know" the experimenter reminded children that it was "okay to take a guess." After all test trials were completed, children were given a prize as a token of appreciation for their participation.

Results

Children's answers on test trials were converted to a proportion score (the number of property extensions, or yes responses, divided by six). A graph representation of proportion scores by condition are presented in Figure 1. A one way analysis of variance (ANOVA) indicated that the difference in children's mean age across conditions was statistically significant, F (5, 150) = 3.08, $\eta_p^2 = .09$, $p < .05$. As such, in the following analyses, age was used as a covariate to partial out variance accounted for by discrepant ages. All reported means following ANCOVA analyses are corrected for the effect of age.

In the first set of analyses, the influence of sentence type and knowledge on children's property extensions were examined using a 2 (Sentence type: Generic / Nongeneric) X 3 (Knowledge state: Knowledgeable / Neutral / Unknowledgeable) ANCOVA, with sentence type and knowledge state as between-participant variables, and age used as a covariate. The ANCOVA revealed that age was a significant covariate, F (1,149) = 5.38, $\eta_p^2 = .03$, $p < .05$. There was also a main effect of sentence type, F (1,149) = 5.69, $\eta_p^2 = .03$, $p < .05$, indicating that children were significantly more likely to extend

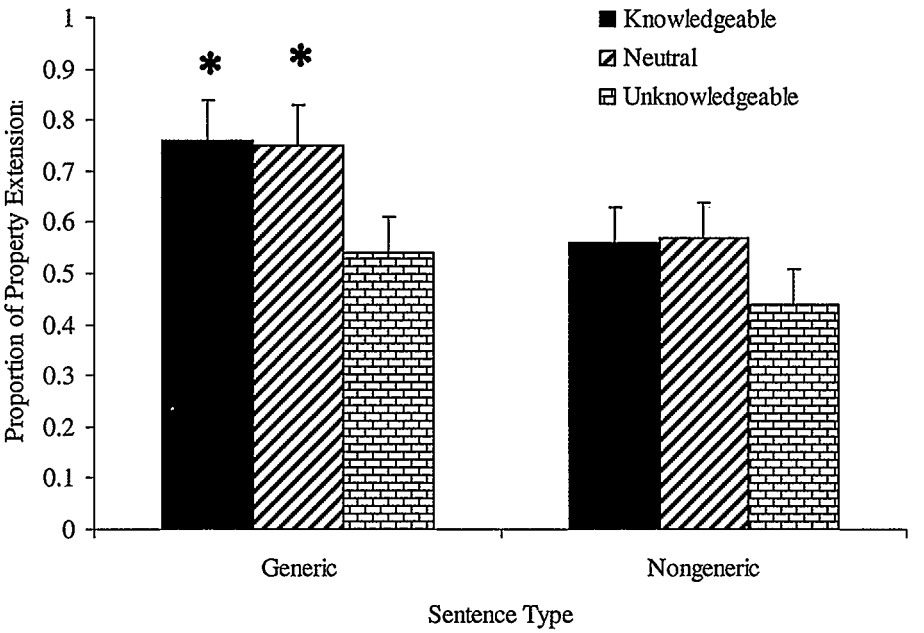

Figure 1. Proportion of property extensions (+*SE*) by condition. Bars with * signify the proportion of property extensions are statistically greater than chance.

novel properties to a second exemplar when properties were presented *generically* (M = .68, SD = .39) versus when they were presented *nongenerically* (M = .52, SD = .42). The ANCOVA also yielded a significant main effect of knowledge state, F (2, 149) = 3.70, η_p^2 = .04, $p < .05$. To follow up on this effect, ANCOVAs were used to compare each condition to one another using age as a covariate. These analyses indicated that significantly more children extended properties when a speaker appeared to be *knowledgeable* (M = .66, SD = .44) compared to *unknowledgeable* (M = .49, SD = .34; F (1, 101) = 4.40, $\eta_p^2 = .04$, $p < .05$). Similarly, children hearing descriptions of novel creatures from a *neutral* speaker were significantly more likely to extend properties beyond a specific exemplar versus when hearing descriptions from an *unknowledgeable* speaker (M = .65, SD = .43 and .49, SD = .34 respectively; F (1, 101) = 6.81, $\eta_p^2 = .06$, $p < .05$). In contrast, children hearing descriptions from a *knowledgeable* speaker were not significantly more likely to extend properties to additional exemplars compared to hearing descriptions from a speaker using *neutral* statements (M = .66, SD = .44 versus M = .65, SD = .43 respectively; F (1, 101) = 0.67, $\eta_p^2 = .00$, $p = .41$). This indicates that overall, children were less likely to apply newly learned information to other members of the same category when that information comes from an individual who has expressed uncertainty about information.

Planned contrasts were used to examine whether the professed knowledge state of a speaker would affect property extensions differently in the *generic* versus *nongeneric* conditions. As described previously, it was predicted that in generic conditions properties would be extended in both knowledgeable and neutral sentence frames, but would not be extended if a speaker professed to be unknowledgeable. In contrast, it was expected that in

nongeneric conditions, speaker knowledge would have little effect, because children would be unlikely to extend properties regardless of knowledge state. Thus, planned pair-wise comparisons of the proportion of property extensions across groups were conducted. The alpha level remained at .05 for all pair-wise tests, as the comparisons were each separate planned t-tests that did not follow from an omnibus analysis (see Maxwell & Delaney, 1990). As predicted, when properties were presented using a generic sentence frame, children extended properties significantly more often if the speaker was *knowledgeable* versus *unknowledgeable* (*Generic Knowledgeable M* = .76, SD = .41, *Generic Unknowledgeable M* = .54, SD = .34; $t(50) = 2.10$, $d = 0.58$, $p < .05$). Similarly, children exposed to the generic sentence frame were also more likely to extend properties when spoken by a *neutral* speaker than children who heard a speaker who professed to be *unknowledgeable* (*Generic Neutral M* = 0.74, SD = .39, *Generic Unknowledgeable M* = 0.54, SD = .34; [1]$t(50) = 2.03$, $d = 0.56$, $p < .05$). In contrast, children's extensions of properties did not differ when the sentence was presented in a generic frame and described by either a knowledgeable or neutral speaker (*Generic Knowledgeable M* = .76, SD = .41, *Generic Neutral M* = .74, SD = .39; [1]$p > .05$, *ns*). Thus, it appears that an emphasis on lack of knowledge is influential on property extensions when described in a generic sentence. In contrast, an investigation of children's responses in *nongeneric* conditions revealed that extensions were made at an approximately equal rate across all conditions (*ps* > .05), regardless of the emphasized knowledge state of the speaker.

In a further analysis, children's extensions were compared to chance levels to ascertain whether they were responding differently than would be expected by chance.

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[1] These analyses were also conducted as ANCOVAs using age as a covariate to ensure effects were not attributable to age differences. Results were found to be similar, regardless of statistical procedure.

These analyses revealed that children in both the *Generic Knowledgeable* and *Generic Neutral* conditions extended novel properties at above chance levels (t (25) = 3.23, d = *1.29, ps* < .05, for both). In contrast, children in the *Generic Unknowledgeable* condition responded at levels that would be expected by chance ($p > .05$). Similarly, chance comparisons across *all nongeneric* conditions demonstrated response patterns at chance level (*ps* > .05).

To gain a more detailed understanding of children's individual response patterns, a chi-squared analysis was conducted to examine the consistency of children's property extensions to additional exemplars. Children who extended the property on four or more of the six trials were classified as extenders, whereas participants who extended properties on only three or fewer trials were classified as non-extenders (See Table 2). An overall chi-square test indicated that the number of extenders versus non-extenders varied significantly by condition (χ^2 (5, N = 156) = 14.20, $p < .05$). As can be seen, the majority of children in the *Generic Knowledgeable* (n = 20) and *Generic Neutral* (n = 20) conditions consistently extended properties to a second exemplar. In contrast, relatively equal numbers of children in *Generic Unknowledgeable*, *Nongeneric Knowledgeable,* and *Nongeneric Neutral* conditions were or were not consistent extenders. Finally, the majority of children in the *Nongeneric Unknowledgeable* condition consistently restricted their extensions and thus followed the non-extender pattern (n = 17).

Discussion

The purpose of the present study was to assess the influence of generic language cues and speaker knowledge on four-year-olds' inductive inferences about novel kinds. Children were shown a novel creature while the experimenter described a property about it

Table 2

Number of children adapting response patterns by condition.

Condition	*n*	Non-Extenders (yes on < 4 trials)	Extenders (yes on ≥ 4 trials)
Generic Knowledgeable	26	6	20
Generic Neutral	26	6	20
Generic Unknowledgeable	26	13	13
Nongeneric Knowledgeable	26	11	15
Nongeneric Neutral	26	11	15
Nongeneric Unknowledgeable	26	17	9

using either a generic or nongeneric statement. As well, the speaker appeared to be knowledgeable, neutral, or unknowledgeable about the information they were relaying. Children were subsequently asked if a second creature shared the same property as the first. Results yielded a number of insights into the interaction of speaker knowledge state with children's appreciation of generic language.

First, results indicated that four-year-old children were sensitive to linguistic cues signaling generic interpretations. Specifically, children were significantly more likely to extend properties to additional exemplars when that property was described in a generic form (e.g., "*Plinkers* live in trees") as compared to when it was described in a nongeneric form (e.g., "*This* plinker lives in trees"). This indicates that at four-years of age, children were sensitive to the presence of the bare plural cue, and understood that it denoted that the property described could be applied category-wide. This result is consistent with previous studies which have also demonstrated that preschool-age children are sensitive to generic linguistic cues (e.g., Gelman & Raman, 2003). In particular, the current findings replicate those of Chambers et al. (under review) who first documented that four-year-olds use generics to learn about unfamiliar kinds. In the present study, as in Chambers et al., children were asked to predict whether a novel object would share an imperceptible property with another, demanding that children quickly base judgment on cues embedded in an utterance without being able to access world knowledge. Thus, understanding generic language provides children with an efficient means to learn and infer about new entities. Together, our research adds to the growing evidence base that preschoolers are keenly attuned to many generic linguistic markers, including definite articles and bare plurals, and that they subsequently make use of these cues to guide their inferences.

Second, the results of the current study demonstrated that children were also attuned to the reliability of the source when making inductive inferences. That is, children were significantly less likely to extend properties beyond an initial exemplar if a speaker explained they were unknowledgeable about the object they were describing. These findings are consistent with word learning literature that has found that preschool-aged children are reluctant to make object-word pairings if information is given by an unreliable source (e.g., Sabbagh & Baldwin, 2001). The current study extends findings beyond word learning to a different type of task, demonstrating that children are also reluctant to apply learned *properties* to additional members of a kind. Taken together, results illustrate that children are reluctant to learn, and apply, many forms of information if there is reason to believe it may be incorrect. The observation of this tendency in multiple realms leads to speculation that a filtering mechanism could be working to help children hold accurate mental frameworks about the world, a claim that will be visited in more detail later in this discussion.

Third, the current results reveal that linguistic and pragmatic cues worked together to affect inductions. When descriptions were phrased *generically* (e.g., "*Plinkers* live in trees"), children were likely to extend the novel property to another exemplar *only* when professed by a *knowledgeable* or *neutral* speaker, and *not* when described by an *unknowledgeable* one. In the *Generic Knowledgeable* condition, because the speaker professed they knew a lot about the objects while making a generic statement, children were given added assurance properties were generalizable to a whole category. Children's tendency to extend properties in the *Generic Neutral* condition, however, reflects the overriding assumption that generic statements typically imply information is true of a category, as children extended properties without having the added assurance of speaker

reliability. Moreover, other research has shown that preschool aged children, as a default, assume adults are good sources of information (Jaswal & Neely, 2006). Thus, as was evidenced in the *Generic Neutral* condition, children based judgment on the generic sentence frame, and did not need further emphasis on knowledge state to presume the statement was accurate. In contrast to these tendencies, children responded at chance level when a speaker professed to be *unknowledgeable* while making a *generic* statement (e.g., "I'm *not sure* but I *think plinkers* live in trees"). This demonstrates that children did not necessarily take blind faith in the generic structure of the utterance, but also took speaker reliability into account. Given that the speaker in this condition directly professed ignorance about objects, children had strong reason to doubt the information they heard. This evidence illustrates children do not have blind faith in the generic statements, but will also take pragmatic cues into account if they are made available.

In contrast to the differences among *generic* conditions, when statements were made in a *nongeneric* form (e.g., "*This* plinker lives in trees"), children responded at chance levels regardless of the professed knowledge state of a speaker. Therefore, even if the experimenter expressed that they were familiar with a particular creature (e.g., "I *know this* plinker lives in trees"), children were reluctant to extend properties to additional exemplars of the category. This indicates that regardless of available pragmatic cues, children attended to the linguistic structure of the sentences, and deemed information to be relevant to *one* object only, and subsequently were uncertain as to whether it could be generalized to *other* objects. This reluctance demonstrates a conservative learning strategy in which children will not extend information if given reason to believe it may not hold true for a whole category. This is an extremely adaptive mechanism, as for example, if one were to hear the utterance "*I'm not sure, but I think this* horse is friendly" it would be illogical, and even

dangerous, to hold faith that this statement is true, and even further to assume another horse will also be friendly. In this vein, being conservative in applying information communicated in a nongeneric frame, and further strengthening this conservative tendency if statements are believed to be unreliable, is a useful mechanism in learning about the world, by avoiding the development of false assumptions.

The finding that children only consistently extended properties to whole categories when they were described with *generic* cues by a *knowledgeable* or *neutral* speaker yields interesting speculation when considered in conjunction with word learning research. Similar to the current finding that children were reluctant to extend information given by an unknowledgeable speaker, word learning studies have demonstrated that children also disregard labels provided by an ignorant speaker (e.g., Sabbagh & Baldwin, 2001; Sabbagh et al., 2003). Explanations for this phenomenon suggest that disregarding labels provided by someone perceived as unknowledgeable could be a result of an efficiency mechanism whereby children essentially "filter" information they hear, in order to avoid having to "unlearn" incorrect labels at a later date (Jaswal, 2004; Sabbagh et al., 2003; Sabbagh & Baldwin, 2001). This filtering of information could be an adaptive strategy for maintaining accurate knowledge about the world (Jaswal, 2004). Findings from the current study could be evidence of such a strategy at work in the realm of generic knowledge as well. Specifically, children may be demonstrating a conservative strategy in which they will not apply information to entire categories until they are able to attain information from a more reliable source. Such a strategy would be adaptive when one considers the *problem of generic knowledge*. Recall, generic knowledge allows for exceptions to categories (Prasada, 2000). Therefore, if a child applies information to their mental framework of a category as a whole (e.g., Plinkers live in trees), this framework would subsequently require a

significant amount of falsification evidence to "unlearn" if it is, in reality, false. That is, the child would need to experience a lot of evidence that plinkers do *not* live in trees before this information is corrected, since generic knowledge, by nature, is resistant to falsification. To illustrate this point further, Gelman (2004) gives an example of the lack of statistical evidence supporting the generic concept that birds lay eggs. Specifically, she explains that very few birds *actually* lay eggs when one considers that only *females* lay eggs, and further, only the *mature* females have the capability to do so. Thus, despite the fact that statistically less than half of the bird population possesses this characteristic, it is still taken as a generic fact. The resistance to solidify information as generic fact, if given any reason to doubt its certainty, helps to avoid this potential confusion.

Overall, findings of the current study add to generics literature in several ways. First, the results provide additional evidence that children attend to linguistic cues when interpreting generic utterances. Next, the results extend previous research by adding documented instances in which children are able to efficiently use this knowledge to make inferences about the properties of novel categories. Thirdly, and most importantly, the present findings provide evidence that children do not have a blind faith in generic statements, but will also take into consideration additional pragmatic information, such as speaker's knowledge. Evidence gathered here illustrates that children are reluctant to extend generic information if it is given by an unreliable speaker. Together with word learning research, these tendencies provide support for the existence of an efficiency mechanism in learning about the world, by which children are reluctant to learn and apply information if it may not be accurate.

Limitations

The current research is not without limitations. First, it was noted that some conditions within the study were found to have an older average age than others. Ordinarily, this would cause concern because, as is demonstrated in research, production and understanding of generics appears to follow a developmental trajectory (e.g., Gelman, et al., 2002; Gelman & Raman, 2003; Hollander, et al., 2002). Nonetheless, results reported within the current study are not believed to be due in any way to age differences, because effects of age were carefully controlled in the analyses. For example, main effects of knowledge and generics were both derived through analysis of covariance. Analysis of covariance is useful, in this case, as it serves to adjust the means of the dependant variable (i.e., proportion of property extensions) to what they would be if all of the participants scored equally on the covariate (i.e., if all children were the same age; Tabachnick & Fidell, 2001). Thus, analyzing data in this way removed the variance due to age differences between children, lending a more "pure" view of condition effects. Further, planned comparisons between particular conditions also took these age differences into account. For groups that displayed significant gaps in age, ANCOVAs were also conducted to ensure results of reported t-tests held true even when the impact of age was removed.

Second, an argument could be made that it was not simply the bare plural linguistic cue that signaled children to attend to the generic interpretation, but rather a combination of linguistic differences between generic and nongeneric utterances. Specifically, although some properties lead to a nearly identical format between a generic and nongeneric sentence structure, signaled only by the presence of a bare plural or definite singular (e.g., "*This fep* can see things in the dark" versus "*Feps* can see things in the dark"), other properties resulted in slightly different grammatical variations (e.g., "*This fep has a* sticky

tongue" versus "*Feps have* sticky *tongues*"). Overall, the grammatical variations are not believed to be influential over the main findings of the current research. As has been demonstrated extensively through the literature review, generic noun phrases vary significantly in terms of the grammatical structures that can be used, and the variety of additional cues that interact to affect the interpretation of the meaning of utterances. The fact that not all of the property statements were delivered with identical grammatical cues lends only to the increasing real-world applicability of this study. Children are continually exposed to generic utterances in the real world in a variety of ways, as they have been in the current research.

Future Directions

The current study presents some interesting avenues for additional research. The first, and easiest to implement, would be to run the same procedure with younger children to ascertain how the interaction between generics and speaker knowledge would be resolved. Recall that Gelman and Raman (2003) posited that linguistic cues may have a more salient presence over other pragmatic cues at younger ages. Specifically, in their research, they discovered that two-year-old children attended only to the linguistic cues in statements, such as "are *they* big or small" to form their responses, while overlooking other contextual information, such as multiple exemplars placed in front of them. Given that their research investigated contextual cues, it would be interesting to also assess whether the same aged children would take the current pragmatic cue, speaker knowledge, into consideration; or alternatively, whether linguistic cues would again reign as the more salient indicator towards statement interpretation.

Another direction for future research is to present novel creatures as pictures in a book format. Other research has demonstrated that pictures have a propensity to elicit more

category based language (generics), whereas objects alternatively initiate talk of individuals (Gelman, Chesnick, & Waxman, 2005). This signifies that the application of generic information may have been more readily applied in a pictorial situation than in a real life context. Because children were able to touch and feel objects in the current study, they may be predisposed to think of them in individualistic terms, which may have weakened our observed effects. In addition, because children were able to see that objects were not "real", properties, such as "living in trees" may have been carelessly applied because it was deemed to be "make believe". Slightly different results may be attained when objects are presented pictorially. Such a change in procedure may allow for more thought in generic terms, and also move the playful nature of the task towards a more realistic context. It is predicted that this type of alteration may strengthen the results attained.

Finally, as was discussed earlier, the present findings lend to speculation about effective organizational strategies of generic knowledge. In word learning studies, it is proposed that children may endorse a "filtering" strategy for information learned from ignorant speakers (e.g., Sabbagh et al., 2003; Sabbagh & Baldwin, 2001). Support for this theory rests in the finding that children who were taught words by an unreliable speaker, later showed chance level responding when asked to give the experimenter the object for which they had previously provided a label (Sabbagh & Baldwin, 2001). This implies that children may not have encoded any trace of the word-referent link. It would be interesting to see if such a trend also occurs in the context of generic factual information. Endorsing a comprehension task at the end of a testing session, in which children were asked which object "lives in trees" for example, could shed some light on whether children were attempting to learn information relayed by reliable versus unreliable speakers.

In all, the present research sheds some unique and interesting light on how children use generics to guide inductive inferences. Four-year-olds do not simply take generic statements as fact, and apply information haphazardly to categories as a whole. Rather, additional sources of information, such as a speaker's knowledge are taken into account before information will be confidently applied. These results yield interesting implications as to how children are able to so efficiently learn about the world.

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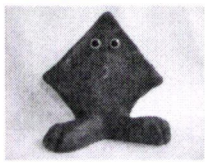
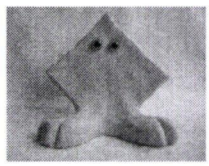
Appendix A:

Novel Creatures

Plinkers

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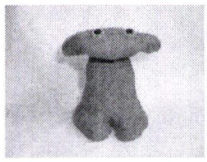


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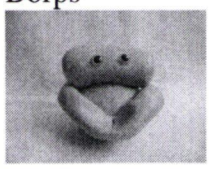
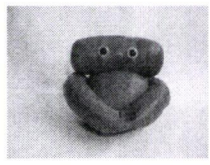
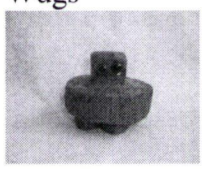
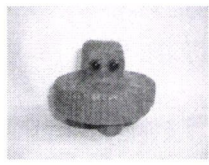



Wugs

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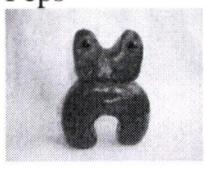
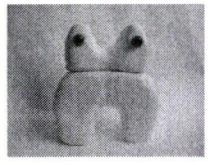
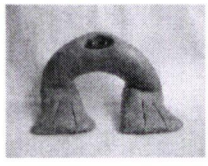
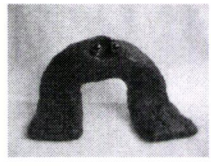



Blickets

Appendix B

Testing Script

Generic – Knowledgeable

Introduction of Box:
See this box? This box is filled with things I brought from home. I've had these things for a long time, so I have seen them before, and I know a lot about them.
Let's look at these things together.

Description of creatures:
Look at this. This is an X. X's ___. Yes I know X's ___. Yes, I know X's ___.

Response Elicitation:
Here's another one. Does this X___?

Generic - Neutral

Introduction of Box:
See this box? This box is filled with a whole bunch of things.
There's lots of things in here that I'm going to show you.
Let's look at these things together!

Description of creatures:
Look at this. This is an X. Xs___.Yes. Xs ___.Yes. Xs___.

Response Elicitation:
Here's another one. Does this X ___?

Generic – Unknowledgeable

Introduction of Box:
See this box? This box is filled with things I borrowed from my friend. My friend just gave them to me, so I have not seen them before, and I don't know much about them.
Let's look at these things together.

Description of creatures:
What's this? Oh! It says its an X. I think X's ___. I don't really know if X's ___. No, I don't really know. But I think X's___.

Response Elicitation:
Here's another one. Does this X ___?

Nongeneric – Knowledgeable

Introduction of Box:
See this box? This box is filled with things I brought from home. I've had these things for a long time, so I have seen them before, and I know a lot about them.
Let's look at these things together.

Description of creatures:
Look at this. This is an X. This X ___. Yes. I know this X ___.Yes. I know this X ___.

Response Elicitation:
Here's another one. Does this X ___?

Nongeneric - Neutral

Introduction of Box:
See this box? This box is filled with a whole bunch of things.
There's lots of things in here that I'm going to show you.
Let's look at these things together!

Description of creatures:
Look at this. This is an X. This X___.Yes. This X ___.. Yes. This X ___.

Response Elicitation:
Here's another one. Does this X ___.

Nongeneric - Unknowledgeable

Introduction of Box:
See this box? This box is filled with things I borrowed from my friend. My friend just gave them to me, so I have not seen them before, and I don't know much about them.
Let's look at these things together.

Description of creatures:
What's this? Oh! It says its an X. I think this X ___. I don't really know if this X___. No, I don't really know. But I think this X ___.

Response Elicitation:
Here's another one. Does this X___?

Appendix C

Certification of Institutional Ethics Review

UNIVERSITY OF CALGARY
Celebrate 40 years 2006

CERTIFICATION OF INSTITUTIONAL ETHICS REVIEW

This is to certify that the Conjoint Faculties Research Ethics Board at the University of Calgary has examined the following research proposal and found the proposed research involving human subjects to be in accordance with University of Calgary Guidelines and the Tri-Council Policy Statement on *"Ethical Conduct in Research Using Human Subjects"*. This form and accompanying letter constitute the Certification of Institutional Ethics Review.

File no:	**4874**
Applicant(s):	**Susan A. Graham**
Department:	**Psychology**
Project Title:	**Inductive Reasoning During Infancy and Early Childhood**
Sponsor (if applicable):	**NSERC**

Restrictions:

This Certification is subject to the following conditions:

1. Approval is granted only for the project and purposes described in the application.
2. Any modifications to the authorized protocol must be submitted to the Chair, Conjoint Faculties Research Ethics Board for approval.
3. A progress report must be submitted 12 months from the date of this Certification, and should provide the expected completion date for the project.
4. Written notification must be sent to the Board when the project is complete or terminated.

Janice Dickin

23 August 2006

Janice Dickin, Ph.D, LL.B, **Date:**
Chair
Conjoint Faculties Research Ethics Board

Distribution: (1) Applicant, (2) Supervisor (if applicable), (3) Chair, Department/Faculty Research Ethics Committee, (4) Sponsor, (5) Conjoint Faculties Research Ethics Board (6) Research Services.