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Learning Proper and Common Names in Inferential versus Ostensive Contexts

Vikram K. Jaswal and Ellen M. Markman

A single, indirect exposure to a novel word provides information that could be used to make a fast mapping between the word and its referent, but it is not known how well this initial mapping specifies the function of the new word. The four studies reported here compare preschoolers' ($N = 64$) fast mapping of new proper and common names following an indirect exposure requiring inference with their learning of new names following ostension. In Study 1, 3-year-olds were shown an animate–inanimate pair of objects and asked to select, for example, *Dax*, *a dax*, or *one.* Children spontaneously selected an animate over an inanimate object as the referent for a novel proper name, but had no animacy preference in common name or baseline conditions. Next, the children were asked to perform actions on, for example, *Dax* or *a dax*, when presented with an array of three objects: the one they had just selected, another member of like kind, and a distracter. An indirectly learned proper name was treated as a marker for the originally selected object only, whereas a new common name was generalized to include the other category member. Study 2 showed that mappings made by inference were as robust as those made by ostension. Studies 3 and 4 demonstrated that even 2-year-olds can learn as much about the function of a new word from an indirect exposure as from ostension.

INTRODUCTION

At first sight, ostensive situations seem to provide a relatively straightforward route to word learning. For example, when reading a picture book with a young child, a mother may label an object by using a deictic statement ("That's a crocodile"), accompanied by ostensive cues making the referent salient, such as eye gaze, voice direction, and pointing. A number of important studies have demonstrated that young children are sensitive to just these types of cues (e.g., Baldwin, 1991, 1993), and may be sensitive to even more subtle pragmatic information about the speaker's communicative intent (e.g., Akhtar, Carpenter, & Tomasello, 1996; Tomasello & Barton, 1994). In ostensive situations, both overt cues and more subtle social-pragmatic cues converge to establish joint reference, which facilitates the uptake of a new word (Tomasello & Farrar, 1986).

Because the object of reference is established immediately in ostension, experimental work on word learning has often focused on how children treat labels provided in ostensive situations (e.g., Hall, Waxman, & Hurwitz, 1993; Imai, Gentner, & Uchida, 1994; Landau, Smith, & Jones, 1988; Markman & Wachtel, 1988; Soja, Carey, & Spelke, 1991). In these studies, the research question has generally concerned what interpretation children give to a label applied to a clearly identified referent. Although the ostensive situation has sometimes been treated as the prototypical word-learning situation, it is known that children learn much of their vocabulary indirectly, without direct instruction or feedback (L. Bloom, 1993). Even in Western cultures, where ostension is considered ubiquitous, single-word labels (e.g., "doggie") and deictic statements (e.g., "This is a doggie") actually account for fewer than 20% of maternal utterances to children under 3 years of age (Cross, 1977; Goddard, Durkin, & Rutter, 1985; Newport, Gleitman, & Gleitman, 1977; Snow, 1977). Furthermore, it has been claimed that in some cultures, like Kaluli, children are not necessarily exposed to ostensive labeling, and yet they readily acquire vocabulary (Schieffelin, 1985). Given that naming games are neither particularly frequent nor universal, vocabulary acquisition clearly occurs in other, nonostensive, contexts that lack overt cues as to a label's referent. In these situations, the inductive problem is even more difficult than in ostensive situations, because children first have to identify a potentially ambiguous referent, and then figure out how to interpret the label (see Hall, Quantz, & Persoage, 2000).

A number of experimental studies have focused on how, in the absence of ostension, children use a variety of linguistic and nonlinguistic cues both to identify a referent and then to infer aspects of a word's meaning—a process called *fast mapping* (Carey, 1978; Carey & Bartlett, 1978; Dockrell & Campbell, 1986; Golinkoff, Hirsh-Pasek, Bailey, & Wenger, 1992; Heibeck & Markman, 1987; for a review, see Woodward & Markman, 1998; for an argument that fast mapping is not limited to words, see Markson & Bloom, 1997). Surprisingly, however, explicit consideration has not

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been given to how thorough and robust inferential learning is relative to learning following ostension. Even if a referent can be inferred from linguistic or social-pragmatic cues in nonostensive situations, ostension and its accompanying overt cues may result in a stronger mapping. This research begins to investigate this issue by building on previous work on how young children acquire proper and common names. The experimental goals were twofold: first, to explore and characterize the sources of information children can use to learn proper and common names inferentially; and second, to compare learning of names following inference with learning following ostension.

Before addresssing the issue of how names can be learned inferentially, it will be helpful to first review the literature on how children distinguish between proper and common names in ostensive learning situations (for an extensive review, see Hall, 1999). Proper names occur in all languages and all societies (Alford, 1987; D. E. Brown, 1991). According to Alford (1987), this is because proper names symbolize individual identities. Indeed, whereas common names (and indeed, most words) are extended to other members of like kind, proper names are not. On the contrary, their function is to individuate linguistically, and so their use is restricted to one particular individual. Although even 18-month-olds will generalize new common names on the basis of taxonomic relations (Markman, 1994), children of approximately the same age restrict proper names to single referents (Katz, Baker, & Macnamara, 1974; Macnamara, 1982). In a diary study of his son's language acquisition, Macnamara (1982, pp. 28–29) wrote that it was "uncanny how accurately he used proper names for particular individuals. . . . He did not become more accurate in his use of proper names; he seemed to start out with as much accuracy as his elders." L. Bloom (1973) has also noted that person names are distinguished from object words from the beginning of word learning: They are less fragile, more persistent after first use, and less ambiguous in meaning. The speed and accuracy with which children learn proper names requires explanation and may offer insight into how children integrate multiple sources of information in early word learning.

Several potential sources of linguistic and nonlinguistic information could facilitate the acquisition of a proper name. For example, it is well known that the grammatical form class of a new word can help children make inferences about the grammatical category to which that new word belongs (e.g., Akiyama & Wilcox, 1993; P. Bloom, 1990, 1994, 1996; R. W. Brown, 1957; Gelman & Markman, 1985; Hall et al., 2000). In English, common names are usually syntactically marked by an article or determiner (e.g., words like *a*, *the*, and *his*), but proper names are not. As Katz et al. (1974) noted, a listener sensitive to whether a new label was preceded by an article would have a potentially important piece of information to use when deciding whether the new word was a common or proper name.

Another source of information that young children can use to determine the referent for a new word is semantic. Only those objects that are important to us as individuals receive proper names, whereas all objects can receive common ones (Macnamara, 1982). In particular, animate objects (or their surrogates in the case of dolls, photographs of individuals, etc.) take proper names more often than inanimate ones do. Thus, grammatical information can help a child determine that a new name is proper, and this in turn can constrain the possible referents to the class of animate things. This point will be revisited because it is key to how the referent of a proper name can be inferred.

In a seminal study, Katz et al. (1974) demonstrated that girls as young as 17 months could use syntactic and semantic information to discriminate between a category whose members take proper names (dolls) and one whose members do not (blocks). In their first experiment, these investigators taught 22-month-old girls a novel name for either a doll or a toy block. In the training phase, the experimenter introduced a pair of dolls (differing only in hair color) or a pair of blocks (differing only in the color of an attached ribbon). The experimenter drew children's attention to both objects in the pair and labeled one of them, the target, several times. Half of the girls were taught the name in a common name frame (e.g., "This is *a dax*"), and half were taught it in a proper name frame (e.g., "This is *Dax*"). In the testing phase, the same pair of objects (either two dolls or two blocks) was presented several times, and each time, children were asked to perform an action on one object. For example, girls in the common name conditions were asked to "hand [the experimenter] *the dax*," whereas those in the proper name conditions were asked to "hand [the experimenter] *Dax*."

If children chose equally between the named and unnamed category members, then generalization of the new label was assumed to have occurred, with the new label apparently serving as a common name. If, on the other hand, children restricted their choices to the named category member only, then they may have interpreted the new label as a proper name. Results showed that they generalized in all conditions but the doll-proper name one. That is, as predicted, only when the name was introduced without a determiner (i.e., in a proper name frame), and only when

the named object was a doll (i.e., animate) did the girls restrict their selections to the originally named object. The same pattern of results was obtained in a second experiment with 17-month-old girls and later with 28-month-old boys (Macnamara, 1982).

The interaction between grammatical form class and animacy in this example is striking. In the doll conditions, the children apparently understood that a name introduced in a proper name frame should be restricted to the original doll, whereas a name introduced in a common name frame could be generalized. In the block conditions, however, children ignored the frame in which the new word was presented and always treated a new name for a block as a generalizable common name. The animacy of the labeled object superseded the grammatical form class in which the label was presented.

When young children fail to generalize a new label to other objects of like kind, a proper name interpretation seems plausible; however, alternative explanations are possible. For example, children may treat proper names as subtype labels. To test this possibility, Liittschwager and Markman (1993) asked whether children might infer that a new proper name referred to an object with a property (e.g., doll + blonde hair) rather than an individual per se. If the individual no longer possessed that property, then children might not treat the new name as picking out that particular individual. Results, however, suggested that even when the property that made a named animate object distinctive was removed, 3-year-olds interpreted the proper name as referring to the same named individual (see also Sorrentino, 1999).

Another alternative interpretation is that children treat novel proper names as adjectives, a possibility tested by Hall (1994). Three- and 4-year-olds were taught a new label (e.g., *daxy*) for a target animate or inanimate object with a salient novel property (e.g., fluorescent multicolored circles). In test trials, they were asked which of several objects was *daxy.* When the target was a familiar inanimate object, children selected both the target and a distracter sharing the same novel property as the target. In this case, children seemed to be interpreting the novel label as if it were an adjective, referring to the shared property of the target and distracter. When the target was a familiar animate object, however, children restricted their responses to the target, which suggests that they had indeed made a proper name interpretation. Thus, when an object can sensibly receive a proper name, children do not treat the new name as an adjective, even when proper name and adjective frames are identical.

Although Liittschwager and Markman (1993) and Hall (1994) used substantially older children, it would appear that the interpretation of the original Katz et al. (1974) experiment—that children interpret new names as proper when applied in a proper name frame to an animate object—was correct. Recall, however, that Katz et al. used objects with which children were familiar (dolls and blocks). This presents a problem in that the children may have resisted assigning a second common name to an object to which they had already assigned a common name (Liittschwager & Markman, 1994; Macnamara, 1982). Although Katz et al. interpreted equal selection of the two objects as evidence of a common name interpretation, in fact, their procedure did not provide a way to distinguish between a common name interpretation and chance performance: Both predicted equal selections of the two objects.

To address this concern, Gelman and Taylor (1984) replicated Katz et al.'s (1974) study with 2.5-year-olds, but used completely novel objects for which children would not have common names (blocklike toys and monster toys). Additionally, two pairs of objects were used in their testing phase: One pair consisted of the target and another exemplar of the same category, whereas the other pair consisted of two objects from an entirely different category, opposite in animacy to the first pair. Their rationale was that if children learned the new label, they would choose from the target category rather than the distracter one. If they then generalized the learned label, they would choose the target and the other exemplar from the same category about equally. If, however, they made a proper name interpretation, then they would select the target exclusively. Training was conducted in a manner similar to that of Katz et al. In testing, children were asked to perform actions on one of the four objects (target, another exemplar from the target category, distracter, or another exemplar from the distracter category). Gelman and Taylor replicated the Katz et al. results, finding that children restricted to the target in the proper name-animate condition but selected about equally between the target and generalization in all other conditions. Additionally, unlike Katz et al., Gelman and Taylor found that boys and girls both restricted to the target in the proper name-animate condition.

One serendipitous finding resulting from the addition of a distracter category in the testing phase (and part of the motivation for the current studies) was that half the children in the proper name-inanimate condition chose consistently and predominantly from the animate, distracter category. That is, when a new proper name was trained to an inanimate blocklike toy (and ostensively labeled *six* times), these preschoolers chose to ignore the training altogether and, at test, selected

one of the animate monster distracters as the referent for the new name. They acted as if they were seeking out an object that could sensibly receive a proper name—an animate object. Thus, several children discounted all of the ostensive cues pointing to the inanimate object as the referent (e.g., deictic labeling, pointing, eye gaze, voice direction), as well as any more subtle pragmatic cues related to the adult's communicative intent. This leads to the interesting prediction, suggested by Gelman and Taylor (1984), that children may be able to use animacy to determine the referent for a new proper name without direct instruction.

As discussed earlier, learning a word inferentially requires a child to figure out both what the referent is and how to interpret the new word (Hall et al., 2000). In a classic study, Carey and Bartlett (1978) introduced 3- and 4-year-olds to a new color word (*chromium*) by contrasting it with an already known color word. In their procedure, a teacher casually requested one of two differently colored trays by saying, e.g., "You see those two trays over there? Bring me the *chromium* one, not the red one, the *chromium* one." After this single indirect exposure, about half of the children demonstrated some appropriate understanding of *chromium* 1 week later. The strength of this inferential learning, however, was never compared with the strength of learning following an analogous ostensive situation, in which the referent was unambiguously identified.

Although they did not address the relationship between ostension and inference either, results from a study by Golinkoff et al. (1992) suggested that a new word learned by inference can function quite robustly. In their study, 2.5-year-olds were presented with an unfamiliar object and three familiar ones. They were asked, for example, "Where's *the dax*?" Consistent with the results from a number of other studies (e.g., Markman & Wachtel, 1988; Merriman & Bowman, 1989), children selected the novel object most of the time. In a later trial, they were presented with that object, an exemplar from a different novel category, and two familiar objects. This time they were asked, for example, "Where's *the jick*?" Now children selected the only truly novel object (rather than either of the familiar ones or the object that had just been selected as *the dax*) the great majority of the time. In other words, the indirectly learned label seemed to be serving the role of a familiar one—at least in the short period between the initial mapping and this later trial. Again, there was no ostensive condition in this study, because it was not designed to directly compare inference with ostension. Nevertheless, the results are intriguing because they suggest that the mapping (learned inferentially) was very strong.

In the current set of studies, we set out to examine empirically the relation between learning following inferential and ostensive situations. On the basis of previous work involving the direct instruction of a proper name (Hall, 1991, 1994; Katz et al., 1974; Liittschwager & Markman, 1993), and the findings of Gelman and Taylor (1984) described earlier, we expected that children would be quite adept at using syntactic and semantic cues to infer that a proper name should be applied to an animate object. Indeed, in a pilot study, Liittschwager and Markman (1993) found that 3-year-olds could spontaneously use animacy cues to determine which of two objects should receive a proper name. In their study, children were shown two unfamiliar objects, one animate and one inanimate, and simply asked, for example, "Where's *Dax*?" (proper name condition) or "Where's *a dax*?" (common name condition). Children chose the animate object significantly more than chance in the proper name condition, but selected equally between the animate and inanimate objects in the common name condition.

Although Liittschwager and Markman (1993) showed that 3-year-olds spontaneously selected an animate referent for a proper name and had no preference in a common name condition, theirs was a small study and was not designed to test whether the indirectly learned words subsequently functioned appropriately—whether the new proper name was restricted to the particular object named and the new common name was generalized to other members of like kind. It is possible, for example, that children might infer that the referent for a proper name should be animate without also treating the new name as marking an individual. Furthermore, the Liittschwager and Markman study was not designed to test the robustness of inferential learning relative to ostension. The studies reported here used generalization tests to compare the mapping of new names following indirect learning in which the child inferred the meaning of the names, with the mapping following direct instruction in which the researcher trained the child on the new names. Studies 1 and 2 compared how 3-year-olds treated new common and proper names following indirect and direct instruction. Studies 3 and 4 extended this work developmentally by comparing learning following indirect and direct instruction in 2-year-olds.

STUDY 1

In Study 1, on the first trial, children were shown an animate–inanimate pair of objects and asked to select

the referent for a new name, presented in a common or proper name frame. Subsequently, they were shown the object they had just selected (target), another exemplar of like kind (generalization), and a distracter, and asked to perform five actions on an object requested by the same name. On the first trial, the results of Liittschwager and Markman (1993) anticipated that children would select equally between the animate and inanimate objects when the new name was introduced in a common name frame, but that they would select the animate referent when the new name was introduced in a proper name frame. The critical extension of Liittschwager and Markman was the subsequent Generalization trial, which would determine whether the newly mapped name was extended to other members of like kind (as a common name should be), or restricted to the particular individual named (as a proper name should be). For children this young who have limited exposure, an ambiguously used proper name might signal only that the referent should be animate, not that it should be treated as a marker for a unique individual.

Method

Participants

Sixteen 3-year-olds (M = 3,9, *range* = 3,3–4,0) of middle- and upper-middle-class backgrounds participated in a single, 10- to 15-min session at a university-affiliated preschool. Participants were 8 girls and 8 boys. The researcher was familiar to the children, having spent at least one half day in their classroom before testing.

Design

The design of the study was within-subjects, with type of name (common or proper) the only variable manipulated. Participants were presented one common name trial block and one proper name trial block, each of which consisted of three trials: (1) Inference, (2) Baseline, and (3) Generalization.

Materials

Four pairs of novel toys were used in the study: two pairs of animate toys (matched by the experimenter to be equivalent in attractiveness and size) and two pairs of inanimate toys (also matched to be equivalent in attractiveness and size). Novel toys were chosen so that the interaction between grammatical form class and animacy could be examined without also introducing familiarity, which may facilitate proper name interpretations (see Hall, 1991). Animate toys were those representing animals or creatures (e.g., stuffed mosquito-like creature, character made from a koosh ball), typically with a face and arms and legs, whereas inanimate toys were nonliving objects (e.g., a wand, a kaleidoscope). Before testing started, each animate pair was matched with an inanimate pair; an attempt was made to match attractiveness and size between animacy categories. (Baseline trials described later confirmed that the sets were equal in attractiveness.) The result, as shown in Table 1, was two sets of four stimuli (two animate and two inanimate). For purposes of the Generalization trial (described later), there were two slightly different exemplars of each toy. Exemplars of the same animate toy differed along dimensions such as hair color and style, clothing, and eye color, whereas exemplars of the same inanimate toy differed in color. Altogether, then, 16 objects were used in the study.

Table 1 Stimulus Sets Used in Studies 1–4

	Stimulus Set	
	A	B
Animate	Stuffed mosquito Kooshling doll	Seal character Dolphin character
Inanimate	Bendable wand Kaleidoscope	Shuttlecock Suction cup

Note: Two slightly different exemplars of each object were used in the studies.

In addition, a plastic shoe, dog, Barney, and Big Bird served as stimuli for warm-up trials, and a tray with three, equally spaced wells was used to present stimuli in the three-alternative Generalization trial. During the Generalization trial, seven activity pieces were used: a box, a balance, a bucket, a chute, a cloth, a mat, and a hamster ball.

Procedure

Warm-Up

Participants were tested individually in a quiet room at their preschool. The experimental session began with two warm-up trials, the purpose of which was to familiarize the children with the requirements of the task. In the first warm-up trial, participants were asked to select either a dog or a shoe when shown that pair of objects: "Can you show me a shoe (or a dog)?" Following a selection, the child was allowed to play with both objects. Subsequently, the objects were retrieved, and the child's attention was drawn to four of the activity pieces (randomly deter-

mined). Participants were shown the same pair of objects, and they were asked to perform an action on the same object they had just selected (e.g., "Can you put a shoe in the bucket?"). Following an appropriate response, the object was retrieved, the pair was presented again, and children were asked to perform three further actions on the same object. The purpose of requesting that several actions be performed on the same object was to make clear that repeatedly selecting the same object was acceptable. The second warm-up trial proceeded as the first, but the stimuli were Barney and Big Bird, and the request was "Can you show me Big Bird (or Barney)?" The subsequent actions were the four remaining ones. The particular object requested from a pair was randomly determined on the initial "show me" question, and left–right positions were randomly determined on each action request. Only 1 child had to be corrected because he selected Big Bird the first time Barney was requested.

Eight actions using the activity pieces were requested: put the object in the box, put it on the box, put it on the balance, put it in the bucket, put it down the chute, put the cloth over it, put it on the mat, and spin it in the hamster ball.

Experimental Trials

Following the warm-up trials, each participant was presented with two experimental trial blocks: one common name and one proper name. In the common name trial block, the name was preceded by an indefinite article (e.g., *a dax*); in the proper name trial block, it was not (e.g., *Dax*). The word used as the name in a particular trial block was either *dax* or *wug*. To allow the same stimuli to serve as potential referents for proper names for half the participants and potential referents for common names for the other half, participants were yoked in pairs. For the first name and first set of stimuli, one member of each pair heard the name in a proper name frame and the other heard the name in a common name frame. For the second name and second set of stimuli, this was reversed. The two members of a pair, then, saw exactly the same stimuli in exactly the same configuration on the Inference and Baseline trials (described later); the only difference was that the opposite syntactic frame was used. The stimulus set (A or B in Table 1) assigned to a particular trial block was counterbalanced across pairs of subjects.

Regardless of whether a trial block was common or proper, it consisted of three trials: (1) Inference, (2) Baseline, and (3) Generalization. The top portion of Table 2 shows the design of each block of trials. The first time a particular animate–inanimate pair was introduced (either in an Inference or Baseline trial), the items were handed to the child, with the phrase: "Take a look at these." After allowing the child to handle the objects briefly, they were retrieved and the trial proceeded as described later. This pre-exposure was deemed necessary following pilot testing, which showed that without pre-exposure, many children did not look at both objects before making a selection. There was no pre-exposure for the stimuli in the Generalization trial.

Inference (Trial 1 or 2). The Inference trial was designed to determine whether children would spontaneously assume that a new proper name referred to

Table 2 Sample Design of Trial Blocks of Studies 1–4

Study	Stimuli	Request
Indirect studies (1 and 3)		
Inference	$Mosq_1$ versus $Wand_1$	"Point to *[a] Dax.*"
Baseline	$Mosq_1$ versus $Wand_1$	"Point to one."
Generalization[a]	$Mosq_1$ versus $Mosq_2$ versus Koosh *OR* $Wand_1$ versus $Wand_2$ versus Kaleido	Perform actions on *[a] Dax.*
Direct studies (2 and 4)		
Training	$Mosq_1$ and $Wand_1$	"This is *[a] Dax.*"
Baseline	$Mosq_1$ versus $Wand_1$	"Point to one."
Generalization	$Mosq_1$ versus $Mosq_2$ versus Koosh	Perform actions on *[a] Dax.*

Note: In all studies, half the children received the Inference (or Training) trial before the Baseline trial, and half received the reverse. Mosq = stuffed mosquito; Wand = bendable wand; Koosh = kooshling doll; Kaleido = kaleidoscope. Objects with different subscripts designate slightly different exemplars.
[a] In Studies 1 and 3, the triad of stimuli presented on the Generalization trial depended on the selection made on the Inference trial. For example, children selecting $Mosq_1$ on the Inference trial were shown a stimulus set containing $Mosq_1$, $Mosq_2$, and Koosh. Children selecting $Wand_1$ were shown a stimulus set containing $Wand_1$, $Wand_2$, and Kaleido.

an animate object, whereas a new common name could refer to either an animate or an inanimate object. Participants were shown one animate object and one inanimate one and requested to, for example, "Point to *[a] Dax*." Following a selection, the experimenter provided neutral feedback (e.g., "Thank you") and allowed the child to play with both objects. The particular animate–inanimate pair from the set assigned to that trial block (see Table 1) was counterbalanced across yoked pairs of participants. For example, for trial blocks involving Stimulus Set A (the mosquito–kooshling/wand–kaleidoscope stimulus set), two pairs saw mosquito–wand, two saw mosquito–kaleidoscope, two saw kooshling–wand, and two saw kooshling–kaleidoscope. The left–right position of the animate and inanimate objects on the Inference trial was counterbalanced so that the animate object fell on the left on one trial block and on the right on the other.

Baseline (Trial 1 or 2). The Baseline trial tested whether there was a preference for an animate or inanimate object when no new name was introduced. Participants saw the animate–inanimate pair associated with the particular trial block and were asked to, for example, "Point to one." Following a selection, the experimenter provided neutral feedback (e.g., "Thank you") and allowed the child to play with both objects. The left–right configuration of the stimuli on Baseline trials was opposite to that on Inference trials. The order of the Inference and Baseline trials was counterbalanced across pairs of children, with four pairs receiving the Inference trial first on both trial blocks and four receiving the Baseline trial first on both trial blocks.

Generalization (Trial 3). This third trial was designed to determine whether, having made a selection on the Inference trial, children would generalize the newly mapped word to another member of like kind (as would be expected when a new word was a common name) or whether they would restrict its mapping to the same object previously selected (as expected when a new word was a proper name). Children saw three objects presented on a tray: a target, a generalization stimulus, and a distracter stimulus. The target was the same object that the participant had selected on the Inference trial; the generalization stimulus was another exemplar from the same category as the target; and the distracter stimulus was an object from a different category than the target or generalization, but of the same animacy.

For example, as shown in the top portion of Table 2, suppose that on an Inference trial participants were presented with a mosquito–wand pair and asked to select *Dax.* Children who selected the mosquito would then, on the Generalization trial, be presented with that very same mosquito (target), another slightly different mosquito (generalization), and a kooshling (distracter). On the other hand, participants who selected the wand on the Inference trial would, on the Generalization trial, be presented with that very same wand (target), another slightly different wand (generalization), and a kaleidoscope (distracter). Because of the way in which the stimuli were counterbalanced, stimuli that served as targets for some children served as generalization stimuli for others. Similarly, stimuli that served as targets or generalization stimuli for some children served as distracters for others.

In a pilot study, on the Generalization trial, children were presented with the target, generalization, and distracter and simply asked to "Point to *[a] Dax*." Note that this request was the same as that made in the immediately preceding Inference trial. Children overwhelmingly selected either the generalization or distracter. In retrospect, this result is not surprising: When a child made a selection in the Inference trial, the experimenter did not confirm the accuracy of that selection. Thus, when shown another display containing the item just selected (target) and two others and asked again to make a selection, children may have inferred that the experimenter was asking them to select an object different from the one they had just chosen. That is, by seeking to explain the experimenter's intentions in making the same request a second time, they may have decided that their initial selection was wrong. Indeed, Siegal, Waters, and Dinwiddy (1988) found that repeated questioning can lead children to change their answers when asked conservation questions, for example.

As a result of this pilot study, the Generalization trial was made activity based, similar to that used by Katz et al. (1974) and Gelman and Taylor (1984). Children were asked to perform eight actions on the objects. As in Gelman and Taylor, on each trial block, five of the actions were randomly designated test actions, in which the child had to make a selection from the three stimuli on the basis of the new name (e.g., "Put *[a] Dax* in the box"), and three of the actions were randomly designated filler actions, in which the experimenter handed an object to the child (e.g., "Could you put this in the bucket?"). The target, generalization, and distracter each served as a filler object once. The fillers gave children the opportunity to handle each of the objects at least once and made the focus on the target less obvious. The order of test and filler items was random, with the constraints that the first action was always a test and no more than two fillers could occur successively. The position of the stimuli on the presentation tray was pseudorandom: The tar-

get appeared in each position (left, center, and right) at least once.

The eight actions were the same as those used during the warm-up trials.

Videotape

Sessions were videotaped and scored off-line.

Results and Discussion

Scoring of selections was relatively straightforward. On Inference and Baseline trials, children's selections of animate and inanimate objects were recorded. On each of the five test requests on the Generalization trial, selections of the target, generalization, and distracter stimuli were recorded. If a child selected more than one object on a Generalization request, the score was split between the objects selected. For example, if a child performed an action on both the target and generalization when asked to "Put *a dax* down the chute," both objects received a score of 0.5 for that request. Preliminary analyses indicated no differences in response patterns due to gender, order of trial blocks, or order of Baseline and Inference trials; subsequent analyses collapsed across these factors. Results are presented in two parts, the first corresponding to selections on Inference and Baseline trials and the second corresponding to selections on Generalization trials.

Do 3-Year-Olds Spontaneously Select an Animate Referent for a Proper Name?

If animacy is an important cue in determining the referent for a proper name, then given a proper name and a choice between an animate and inanimate object, children should select the animate object more frequently than by chance (50%). Given a common name (or no name at all), however, there is no reason to expect them to have a preference, and so they should select the animate object only at chance levels. Results were directly in line with these predictions. When an object was requested by a common name, 8 of the 16 children selected the animate object, a number obviously not different from chance. Similarly, in the Baseline trial preceding or following the common name Inference trial (and with the same stimuli), 6 of 16 children selected the animate object, a number not more than chance ($p > .8$, binomial expansion). A sign test confirmed that children were equally likely to select the animate object following common name requests and Baseline requests ($p > .75$, two-tailed).

When an object was requested by a proper name, however, 15 of the 16 children selected the animate object, a number significantly more than expected by chance ($p < .001$, binomial expansion). In contrast, in the Baseline trial preceding or following the proper name Inference trial (and with the same stimuli), 7 of the 16 children did so, a number not more than expected by chance ($p > .75$). Sign tests confirmed that children were more likely to select the animate object following proper name requests than following Baseline or common name requests (ps $< .05$, two-tailed). Finally, the approximately equal selections of animate and inanimate objects in the common and proper name Baseline trials confirmed that the attempt to match the stimuli for attractiveness was successful.

Do 3-Year-Olds Restrict Newly Inferred Proper Names and Generalize Newly Inferred Common Ones?

That 3-year-old children use animacy to determine the referent for a proper name (but not a common one) is clear and replicates the results of Liittschwager and Markman (1993), described earlier. Next, we asked whether the newly mapped proper and common names actually functioned appropriately—that is, whether the proper name was restricted to the particular individual named, whereas the common name was generalized to another member of like kind. In the Generalization trial, children were presented with the particular object they had just selected as the referent for the new name (target), a member of like kind (generalization), and a noncategory object (distracter). Children who selected an animate referent on the Inference trial were shown a stimulus set consisting of animate objects; children who selected an inanimate referent were shown a stimulus set consisting of inanimate objects. Because a common name can refer to a category, in the common name Generalization trial, children should be equally likely to select the target or generalization stimulus. In contrast, in the proper name Generalization trial, if the proper name serves as a marker for a particular individual, children should restrict their selections to the target stimulus.

Common Name

Recall that 8 children selected the animate object as the referent for the common name in the Inference trial. These 8 children went on to select the animate target, generalization, and distracter 49%, 40%, and 10% of the time, respectively, in the Generalization trial. The 8 children who selected the inanimate object

Table 3 Average Percentage of Actions Performed on the Target, Generalization, and Distracter Objects in the Generalization Trials of Studies 1–4

	Common Name Trial Block				Proper Name Trial Block (Animate Only)			
Study	Target	Generalization	Distracter	*N*	Target	Generalization	Distracter	*N*
3-year-olds								
1: Indirect	49 (29)*$_a$	44 (29)	7 (12)*	16	66 (37)*$_a$	32 (34)	2 (5)*	15
2: Direct	58 (29)*$_b$	30 (25)	12 (17)*	16	77 (29)*$_b$	16 (19)*	8 (18)*	16
2-year-olds								
3: Indirect	31 (31)$_c$	55 (36)*	14 (32)*	16	73 (34)*$_c$	25 (33)	2 (7)*	12
4: Direct	54 (37)*	37 (32)	10 (22)*	16	60 (31)*	34 (32)	6 (14)*	16

Note: SD are in parentheses. Data in the common name column for the indirect studies (Studies 1 and 3) were collapsed across animacy. In contrast, data in the proper name column for the indirect studies come from only those children who spontaneously selected the animate object as the referent for the proper name. Means with the same subscript differ from each other by paired *t* tests, $_a p = .05$, one-tailed; $_b p < .05$; $_c p < .01$.
*Significantly different from chance of 33%, $p < .05$ by *t* test.

as the referent for the common name went on to select the inanimate target, generalization, and distracter 49%, 48%, and 4% of the time, respectively. As these figures would suggest, the percentage of selections of each type of object was the same regardless of the animacy of the stimulus set, all *p*s > .30 by *t* tests. We therefore collapsed across animacy in the common name trial block. The resulting data are shown in Table 3.

Given that there were three alternatives (target, generalization, and distracter) in the Generalization trial, chance performance was 33%. As Table 3 shows, the children selected the distracter in the common name trial block just 7% of the time, clearly less frequently than chance, $t(15) = 8.58$, $p < .001$. They learned at the least, then, that the new name should not apply to the distracter. Moreover, as predicted by a common name interpretation, they selected the generalization and target stimuli about equally (44% and 49% of the time, respectively). They selected the generalization at chance levels, $t(15) = 1.46$, $p > .10$, and the target more frequently than chance, $t(15) = 2.15$, $p < .05$. Because the children selected the distracter so infrequently (and because of the problem of dependence), performing analyses comparing, for example, the number of selections of the target to the number of selections of the generalization was not possible.

Proper Name

As shown in Table 3, on proper name trial blocks, the 15 children who chose the animate object as the referent for the proper name selected the target, generalization, and distracter 66%, 32%, and 2% of the time, respectively. As in the common name trial block, they selected the distracter less frequently than chance, $t(14) = 22.91$, $p < .001$, and the generalization at chance levels, $t(14) < 1$. (Note that the *df* for this *t* test depended on the number of participants who ever selected the animate object when a proper name request was made in the Inference trial. Because 15 of the 16 did so, the *df* for this test was 14. A similar logic applies to the other statistical analyses reported for Generalization trials in Studies 1 through 4.) Also as in the common name trial block, these 3-year-olds selected the target more frequently than by chance, $t(14) = 3.60$, $p < .01$. Importantly, however, their restriction to the target was marginally greater following proper name requests than common name ones, paired $t(14) = 1.72$, $p = .05$, one-tailed.

Summary

Three-year-olds presented with an animate–inanimate pair of objects spontaneously selected the animate object as the referent for an ambiguously used proper name, but had no animacy preference when an object was requested by common name or no name at all. Additionally, on the Generalization trials of both common and proper name trial blocks, they selected the target more frequently than chance; however, they were more likely to restrict their selections following proper name requests than common name ones.

Previous researchers (Gelman & Taylor, 1984; Katz et al., 1974) have used direct instruction to train children on a new proper or common name and asked them to carry out a series of activities with a named object. These researchers found that children who

were taught a proper name restricted their selections to the target object when that object was animate, but children taught a common name generalized, regardless of the animacy of the object. In the present study, the outcome was similar even though children had to infer the referents of the new names. Indeed, in the proper name condition, the target was selected at similar levels across the three studies: In this study, children restricted to the target 66% of the time; in Katz et al. (Study 1, girls), 75%; and in Gelman and Taylor, 69%. Similarly, in the common name condition, the target was selected at equivalent (less frequent) levels across the three studies: In this study, children selected the target 49% of the time; in Katz et al. (Study 1, girls), 46%; and in Gelman and Taylor, 49%. That these figures are so similar is intriguing, given that the present study was based on inference, whereas the other two were based on ostensive naming. It would seem that learning a new name indirectly may be as robust as learning one ostensively. To make this comparison directly, we conducted a training analog of Study 1.

STUDY 2

The purpose of Study 2 was to determine whether directly training a new proper or common name to an animate object would result in the same type of performance on a generalization test as indirect learning. Results similar to those of Study 1 would suggest that indirect learning of a new name is as robust as direct instruction.

This study was nearly identical in design to Study 1: The same stimuli, names, left–right positions, activities, and so forth were used. The only difference was that there was no Inference trial where children selected between an animate and inanimate object. Instead, children were given a Training trial, where they were shown the animate–inanimate pair, and the experimenter labeled the animate object with either a common or proper name. The stimuli presented in the Generalization trial were always animate. An inanimate analog of the design of Study 1 was not conducted because only 1 child (out of 16) in Study 1 selected the inanimate object when a request was made in a proper name frame.

Method

Participants

Sixteen different 3-year-olds (M = 3,7, *range* = 3,4–3,10) of middle- and upper-middle-class backgrounds participated in a single, 10- to 15-min session at a university-affiliated preschool. Participants were 8 girls and 8 boys. The experimenter was familiar to the children, having spent at least one half day in their classroom before testing.

Design, Materials, and Procedure

The design, materials, and procedure were generally the same as those in Study 1. In place of the Inference trial, however, children were given a Training trial, in which they were shown an animate–inanimate pair and the experimenter labeled the animate object with either a common or proper name and made four comments while holding and pointing to the animate object: "This is *[a] Dax.* Would you like to look at *[a] Dax*? Here, why don't you have a look at *[a] Dax.* This is *[a] Dax.*" The experimenter then allowed the child to play with both the animate (labeled) object and the inanimate one. As in Study 1, each trial block also included Baseline and Generalization trials. Because the labeled object during Training was always the animate one, in Generalization, the target, generalization, and distracter, too, were always animate. The lower half of Table 2 shows the design of each block of trials. Sessions were videotaped and scored off-line.

Results and Discussion

Scoring of selections was conducted as in Study 1. Preliminary analyses failed to reveal any effect for gender or the order of trial blocks, and so subsequent analyses collapsed across these factors. There was an effect for the order of Baseline and Training trials on selections during the Generalization trial, which is described later. Results are presented in two parts: The first determines whether children in the present study had an animacy preference in Baseline trials, and the second examines performance on the Generalization trial.

Was There an Animacy Preference in Baseline Trials?

As in Study 1, children were no more likely than chance to select the animate object than the inanimate one on Baseline trials. In the Baseline trial of proper name trial blocks, 7 of the 16 children selected the animate object, and in the Baseline condition of common name trial blocks, 8 of the 16 children selected the animate object, which is obviously, not different from chance. This provides further confirmation that the animate–inanimate pairs were matched in attractiveness to the children.

Do 3-Year-Olds Restrict Newly Trained Proper Names and Generalize Newly Trained Common Ones?

The results of this analysis paralleled those of Study 1. Table 3 shows the average percentage of test actions performed on each type of object (target, generalization, and distracter) in the common name trial block and the proper name trial block. As the table shows, in both trial blocks, and as in Study 1, children selected the distracter infrequently (less than 12% of the time)—and less frequently than expected by the chance level of 33%, both ps $< .001$ by t tests. Although they selected the generalization stimulus more frequently than the distracter, the level was still at or below chance in the common and proper name trial blocks, respectively, common: 30%, $t(15) < 1$; proper: 16%, $t(15) = 3.75$, $p < .01$. Selections of the target were the most frequent response: Children restricted to the target 58% and 77% of the time in the common and proper name trial blocks, respectively. In both cases, this restriction was significantly higher than expected by chance, common: $t(15) = 3.42$, $p < .01$; proper: $t(15) = 5.94$, $p < .001$. As in Study 1, however, restriction to the target was more frequent following proper name requests than following common name ones, paired $t(15) = 2.18$, $p < .05$.

As alluded to earlier, a 2 × 2 (Baseline Order × Frame) mixed ANOVA performed on the proportion of target selections showed that those children whose Baseline trial intervened between the Training and Generalization trials were less likely to restrict to the target in Generalization than those whose Baseline trial did not intervene, $F(1, 14) = 4.88$, $p < .05$. One explanation for this difference could be that more time elapsed between training and test when the Baseline trial intervened, which meant that there was more time for the mapping to decay before test. As expected, given the results of the paired t test, there was also a main effect for frame, with more target selections following a proper name request than a common name one, $F(1, 14) = 4.55$, $p = .05$. There was, however, no interaction, $F(1, 14) < 1$, which indicates that restriction to the target was greater following proper name requests than common name ones, regardless of whether the Baseline trial intervened between the Training and Generalization trials.

Were Generalization Results the Same Following Inference (Study 1) and Training (Study 2)?

To answer this question, we used target selection data from those 15 children who had spontaneously selected the animate object on the proper name Inference trial of Study 1 and data from all 16 children in Study 2. Recall that in Study 1, it did not matter whether children selected the animate or inanimate exemplar on the common name Inference trial—in both cases, the target was selected at about the same levels. Therefore, as in earlier analyses, we collapsed across animacy in the common name Generalization trial of Study 1.

Using these data, a two-way mixed ANOVA was conducted on the proportion of target selections in the Generalization trial. The between-subjects variable was study: whether the child inferred the new word (Study 1) or learned it directly (Study 2). The within-subjects variable was trial block (common versus proper). The only significant effect was for trial block, $F(1, 29) = 7.27$, $p < .05$, with more target selections being made following proper name requests (72%) than common name ones (53%). The effect for study was not significant, $F(1, 29) = 1.57$, $p > .05$, nor was there a significant interaction, $F(1, 29) < 1$. In other words, learning from inference led to performance that was equivalent to learning from ostension, and in both cases, children restricted to the target more following proper name requests than common name ones.

Summary

Following direct instruction of a proper or common name to an animate object, during the Generalization test children selected the target more than chance in both cases, but more often in the proper name one. Recall that following the Inference trial of Study 1, instead of confirming the validity of a child's selection, the experimenter responded neutrally. On the other hand, during the Training trial of Study 2, the experimenter clearly and unambiguously labeled the animate object. One might have expected that children in Study 1 would have been less confident about the mapping they made than children in Study 2; however, the pattern of results following inference (Study 1) was the same as that following training (Study 2): restriction to the target in the proper name condition and generalization in the common name one.

Much of the classic work involving proper name learning used subjects younger than the 3-year-olds of Studies 1 and 2. In particular, Katz et al. (1974) used infants under 2 years of age, and Gelman and Taylor (1984) used children aged 2,6. In Studies 3 and 4, the question investigated was whether younger children would also show equally robust learning following inferential and ostensive situations.

STUDY 3

Study 3 addressed the same issues as Study 1, but with 2-year-olds. Pilot testing indicated that the procedure used in Study 1 needed to be modified for use with the younger children. In particular, the warm-up trials were lengthened to more fully demonstrate the requirements of the task. To compensate for this increased warm-up period (and to prevent the session from becoming too long), the number of test and filler activities in the Generalization trial was reduced. Finally, stimuli were made more distinctive to facilitate discrimination between the target and generalization. These changes are described in detail later. The basic procedure, however, was unchanged: As in Study 1, children were first shown an animate–inanimate pair of objects and were asked to select the referent for a new name, presented in a common or proper name frame. Subsequently, they were shown the object they had just selected (target), another exemplar of like kind (generalization), and a distracter, and asked to perform a number of actions on the named object.

Method

Participants

Sixteen 2-year-olds (M = 2,9, *range* = 2,7–3,1) of middle- and upper-middle-class backgrounds participated in a single, 10- to 15-min session at a university-affiliated preschool (13 of the children were enrolled in the school, and 3 were recruited from advertisements placed in local parenting magazines). Participants were 8 girls and 8 boys. One additional child was excluded because she refused to participate, and another was excluded because of experimenter error. The experimenter was familiar to the children, having spent at least one half day in their classroom before testing or several minutes getting acquainted with them.

Design

As in Study 1, the design of Study 2 was within-subjects, with type of name (common or proper) being the only variable manipulated. Children participated in one common name trial block, and one proper name one, each of which consisted of three trials: (1) Inference, (2) Baseline, and (3) Generalization.

Materials

The stimuli were those used in Study 1 and shown in Table 1. Changes were made, however, to members of the same animate categories to make them more distinctive. Extra coloration was added to one of the mosquitoes, a hat was added to a seal-like character, and a dress was added to a dolphin-like character. The four warm-up stimuli (a plastic shoe, dog, Barney, and Big Bird) were unchanged, and two additional warm-up stimuli were also used: a plastic chair and a plastic Winnie-the-Pooh. The display tray with three, equally spaced wells was unchanged.

Only six activity pieces were used in this study: a box, a bucket, a chute, a trash can, a mat, and a hamster ball.

Procedure

Warm-Up

During two warm-up trials, participants were asked to select between a dog and a shoe, and between Big Bird and Barney. They were asked to point to one of the objects by name and were given positive feedback following a correct selection (e.g., "Yeah! Here you go!"). After allowing the child to play with both objects for a few seconds, the researcher retrieved the objects. The child's attention was then drawn to the six activity pieces, and the child was asked to perform an action on the same object just selected. The display tray was then moved into view. If the initial choice had been between the dog and the shoe, the tray contained the dog, the shoe, and a miniature chair; if the initial choice had been between Big Bird and Barney, the tray contained Big Bird, Barney, and Winnie-the-Pooh. Following an appropriate response, the object was retrieved, and the child was asked to perform the five remaining actions on the same object. The second warm-up trial proceeded exactly as the first, but with the other set of warm-up stimuli. The pair of warm-up stimuli shown in the first warm-up trial, the particular object requested, their left–right positions, positions of the objects on the display tray, and the action requested were randomly determined. Nine children had to be prevented from selecting the wrong object at least once during this warm-up period.

The six actions were: put the object in the box, put it in the bucket, put it down the chute, put it on the mat, put it in the trash can, and spin it in the hamster ball.

Experimental Trials

As in Study 1, following the warm-up trials, children received one common name trial block and one proper name one. As shown in the top half of Table 2, each trial block consisted of an Inference trial, a Base-

line trial, and a Generalization trial. The only difference from Study 1 was that six (rather than eight) actions were requested for each Generalization trial: Four were designated test actions, and two were designated filler items. The generalization and distracter each served as a filler object once for each trial block; the target did not. The six actions were the same as those used during the warm-up trials.

Videotape

Sessions were videotaped and scored off-line.

Results and Discussion

Scoring of selections was conducted as in Studies 1 and 2. Preliminary analyses failed to reveal any effect for gender, trial block order, or order of trials within a trial block; therefore, subsequent analyses collapsed across these factors. Results are presented in two parts, the first corresponding to the Inference and Baseline trials, and the second to the Generalization trial.

Do 2-Year-Olds Spontaneously Select an Animate Referent for a Proper Name?

Like the 3-year-olds in Study 1, most 2-year olds in the present study selected the animate object as the referent for a proper name, but had no animacy preference when an object was requested by a common name. When a request was made in a proper name frame, 12 of the 16 children selected the animate object, which was significantly more than by chance, $p < .05$, binomial expansion, and not different from the number of proper name animate selections in Study 1, $p > .33$, Fisher exact test, two-tailed. In the immediately preceding or following Baseline trial (with the same stimuli), 7 of the 16 children selected the animate object, which was not more than by chance, $p > .75$, binomial expansion. In the common name trial blocks, 9 of the 16 children selected the animate object, which was also not more than by chance, $p > .4$. In the Baseline trial preceding or following the common name Inference trial, however, 12 children selected the *inanimate* object, which suggests a preference for the inanimate object, $p < .05$. Although this was certainly unexpected given the results from Studies 1 and 2 in which children showed no preference in Baseline trials, a preference for an inanimate object in a Baseline trial makes the finding of a preference for an animate one in the proper name Inference trial all the more impressive.

Do 2-Year-Olds Restrict a Newly Inferred Proper Name and Generalize a Newly Inferred Common One?

Like the 3-year-old children in Study 1, these 2-year-olds used animacy to determine the referent for a proper name. Discovering whether they would subsequently restrict in the proper name trial block and generalize in the common name one was the purpose of the Generalization trial.

Common Name

The 9 children who selected the animate object in the common name Inference trial went on to select the animate target, generalization, and distracter 35%, 54%, and 11% of the time, respectively, in the Generalization trial. The 7 children who selected the inanimate object as the referent for the common name showed a similar response pattern: They selected the inanimate target, generalization, and distracter 26%, 57%, and 18% of the time, respectively. As in Study 1, the percentage of selections of each type of object was the same regardless of the animacy of the stimulus set, all ps $> .60$ by t tests. The decision was therefore made to collapse across animacy in the common name trial block. The resulting data are shown in Table 3.

As in the earlier studies, children selected the distracter infrequently (just 14% of the time), which was less frequently than chance, $t(15) = 2.44$, $p < .05$. Interestingly, however, unlike children in the earlier studies who favored the target following common name requests, the 2-year-olds in this study actually favored the generalization stimulus: They selected the generalization stimulus 55% of the time, which was *more* frequently than chance, $t(15) = 2.42$, $p < .05$, and they selected the target just 31% of the time, which was not different from chance, $t(15) < 1$. One possible explanation for this preference for the generalization stimulus is that, like the older children in Studies 1 and 2, these 2-year-olds understood that the common name could apply to both the target and generalization stimuli. They may, however, have been attracted to the generalization stimulus because it was novel. Importantly, this preference was for novelty within a named category: The distracter, which was also novel but which was a member of a different category, was rarely selected. Additionally, this preference for novelty occurred only in the common name trial block of this study, not in the proper name one (where it would have been inconsistent with a proper name interpretation). Why the older children of Studies 1 and 2 did not also have the same novelty preference is not clear.

Proper Name

Generalization trial response patterns in the proper name trial block were more similar to those of the earlier studies. As Table 3 shows, the 12 children who spontaneously chose the animate object as the referent for the proper name selected the distracter less frequently than by chance, 2%, $t(11) = 14.98$, $p < .001$, and the generalization object at chance levels, 25%, $t(11) < 1$. They restricted to the target 73% of the time, which was more frequently than by chance, $t(11) = 4.03$, $p < .01$. As in Studies 1 and 2 with 3-year-olds, these 2-year-olds restricted to the target more following proper name requests than common name ones, paired $t(11) = 4.14$, $p < .01$.

The Generalization trial data from the 4 children who chose the inanimate object as the referent for the proper name are informative because they emphasize the importance of the semantic cue of animacy in the learning (and appropriate use) of a proper name: None of these children made primary or exclusive selections of the target, which indicates that none treated their originally selected inanimate object as a viable candidate for a proper name. Instead, two selected the (inanimate) target and generalization stimulus about equally, as if they had made a common name interpretation of the new name (despite the fact that it was presented in a proper name frame). The other two children made exclusive selections of the distracter, which suggests that they simply failed to learn anything about how the new name should be applied.

Summary

Like the 3-year-olds in Study 1, most 2-year-olds spontaneously selected an animate object as the referent for a proper name but had no animacy preference in a common name condition. In the common name Generalization test, in contrast to earlier studies, children selected primarily the generalization stimulus. In the proper name Generalization test, however, as in the earlier studies, those who had selected the animate object as the referent for the proper name tended to restrict to the target. The strength of this indirect learning relative to the strength of direct instruction was investigated in Study 4.

STUDY 4

Study 4 was a replication of Study 2, but with 2-year-olds. As in that ostensive training study, the experimenter labeled only animate objects with a proper or common name. Of interest was whether, for 2-year-olds, direct instruction would lead to generalization performance that differed from performance obtained after indirect learning (Study 3), or whether the two would be equivalent as they were for the 3-year-olds in Studies 1 and 2.

Method

Participants

Sixteen different 2-year-olds (M = 2,10, *range* = 2,7–3,1) of middle- and upper-middle-class backgrounds participated in a single, 10- to 15-min session at a university-affiliated preschool. Participants were 8 girls and 8 boys. The experimenter was familiar to the children, having spent at least one half day in their classroom before testing.

Design, Materials, and Procedure

The design, materials, and procedure were the same as those in Study 3; however, there was no Inference trial. Instead, children received a Training trial, like that in Study 2, and as shown in the lower half of Table 2. During the activity component of the warm-up trials, 6 children were corrected at least once. Sessions were videotaped and scored off-line.

Results and Discussion

Scoring of selections was conducted as in earlier studies. Preliminary analyses revealed no effect for gender, trial block order, or order of trials within a block; therefore, subsequent analyses collapsed across these factors. Results are presented in two parts: The first concerns whether children in the present study had an animacy preference in Baseline trials and the second examines how restriction in the proper name Generalization trial of the present study compared with that in Study 3.

Was There an Animacy Preference in Baseline Trials?

As in Studies 1 and 2, children were no more likely than chance to select the animate object than the inanimate one on Baseline ("Find one") trials. In the Baseline trial of proper name trial blocks, 7 of the 16 children selected the animate object, and in the Baseline condition of common name trial blocks, 8 of the 16 children selected the animate object, numbers which were obviously not different from chance.

Do 2-Year-Olds Restrict a Newly Trained Proper Name and Generalize a Newly Trained Common One?

As shown in Table 3, in both the common name trial block and the proper name one, the pattern of actions performed on each type of object was similar. In both, children rarely selected the distracter; they did so less frequently than expected by chance (both ps $< .001$). The generalization stimulus was occasionally selected, but only at chance levels, both ts < 1. As in Studies 1 and 2, children most often restricted to the target, more frequently than expected by chance, common: 54%, $t(15) = 2.20$, $p < .05$; proper: 60%, $t(15) = 3.64$, $p < .01$. Unlike the earlier studies, however, the target was selected at equivalent levels following both common and proper name requests, paired $t(15) < 1$.

Were Generalization Results the Same Following Inference (Study 3) and Training (Study 4)?

A two-way mixed ANOVA analogous to the one conducted between Studies 1 and 2 was performed on the proportion of target selections in the Generalization trials of Studies 3 and 4. The between-subjects variable was study: whether the child inferred the new word (Study 3) or learned it directly (Study 4). The within-subjects variable was trial block (common versus proper). Although there was no effect for study, $F(1, 26) < 1$, there was the expected effect for trial block, with more target selections being made following proper name requests (66%) than following common name ones (43%), $F(1, 26) = 10.09$, $p < .01$. Additionally, and unlike the analysis between Studies 1 and 2, there was a significant interaction between trial block and study, $F(1, 26) = 6.93$, $p < .05$. Comparisons revealed that this interaction was driven by lower restriction to the target following *common name requests* when the name had been inferred (Study 3: 31%) than when the name had been trained (Study 4: 54%), $t(26) = 1.94$, $p = .06$. Notably, following *proper name requests*, children restricted to the target at similar levels regardless of whether the name was inferred (Study 3: 73%) or had been trained (Study 4: 60%), $t(26) = 1.03$, $p > .3$. Two-year-olds who were trained on a new common name selected the target more frequently than 2-year-olds who inferred the referent for the name; however, both children who were trained on a new proper name and those who inferred it restricted to the target at similar levels.

Surprisingly, 2-year-olds who received training on the referent for a new common name restricted their activity selections to the originally named toy more than children who inferred the referent. It is possible that this difference was due to a demand characteristic created in the training protocol, in which the experimenter repeatedly handled, pointed to, and labeled only the target. This exclusive focus on the target may have led the children to restrict more often simply because the experimenter unambiguously singled it out as the referent. Children who inferred the new common name, on the other hand, received no information other than grammatical form class from the experimenter, and so they may have been more willing to generalize to a novel instance of the category. This point is revisited in the general discussion.

Summary

Following direct instruction of a new name to an animate object, 2-year-olds tended to restrict their selections on a generalization test to the originally labeled object, regardless of whether the name was introduced in a proper or common name frame. Although the level of restriction was higher in the proper name case, this difference was not significant. Unexpectedly, comparisons of Studies 3 and 4 revealed that 2-year-olds were less likely to select the target following indirect instruction of a common name than they were following direct instruction of that name. Their level of restriction in the proper name case was the same.

GENERAL DISCUSSION

These four studies compared the inferential learning of proper and common names with the direct instruction of those names and found the two to be largely equivalent. Learning from a situation with clear joint reference established by ostensive cues, such as pointing, eye gaze, and deictic labeling, was no more robust than learning from a situation without these cues. In Study 1, most 3-year-olds spontaneously selected an animate object as the referent for a proper name, but had no animacy preference in common name or baseline conditions. In a subsequent Generalization trial, they treated this indirectly learned proper name as a marker for a unique individual, but generalized an indirectly learned common name to another member of like kind. Study 2 showed that direct training on the new proper and common names yielded the same pattern and strength of results as inference in Study 1. Studies 3 and 4 showed that even for 2-year-olds, a single indirect exposure to a new name could create a mapping as robust as explicit instruction of that name. In the remainder of the discus-

sion, we consider the role that animacy and grammatical form class played in children's spontaneous inferences, and then turn to the issue of how learning words in nonostensive situations compares with learning them in ostensive ones.

The preference for an animate object as the referent for a proper name replicates the preliminary results of Liittschwager and Markman (1993) and highlights the salience of animacy in children's construal of proper names. Indeed, both the animate and inanimate objects were equally novel and attractive (as Baseline and common name trials indicated); the only cue that children could use in deciding which one was the referent for the proper name was animacy. It should be pointed out that, of course, real animate objects were not used in these studies. Real objects provide many more cues to animacy. One salient perceptual feature separating animate from inanimate objects is the capacity for self-propelled motion, which even 7-month-olds notice (Spelke, Phillips, & Woodward, 1995). In the present studies, motion cues were not available; rather, animacy was represented in the objects' faces, eyes, body shapes, and clothing—features often possessed by animate beings. The children in these studies apparently interpreted possession of these features as indicating that an object represented something that could be moving and living. By the age of 2, children have had much experience with surrogates for living things (e.g., dolls, stuffed animals, photographs, and so forth), and moreover, some of these surrogates have received proper names.

Attributions made concerning objects can also convey information about animacy. Some verbs, for example, have selection restrictions that require animate objects. The verb *to feed* constrains possible direct objects to the class of living things because only living things can be fed. Goodman, McDonough, and Brown (1998) showed that even 2-year-olds who heard a sentence like "Mommy feeds the ferret" could infer correctly that the referent for the novel word *ferret* had to be animate. Mental states also strongly imply animacy. In a striking demonstration, Sorrentino (1997) showed that 2-year-old girls who were told that an *inanimate* object had mental states (e.g., hopes, likes, wants) allowed that object to receive a proper name, thereby overriding their normal bias against attributing proper names to inanimate objects.

Earlier, it was noted that the Kaluli do not typically engage in the ostensive naming games found in Western societies. Nonetheless, Kaluli children, according to Schieffelin (1985, p. 534) "are consistently encouraged to master a large number of proper names." Citing this evidence, P. Bloom (1999) argued that proper names may represent a class of words that all cultures ostensively teach to their children. It is interesting that in the present experimental studies, 2- and 3-year-old English-speaking children learned as much about a proper name from a nonostensive situation as from an ostensive one.

Although the present research focused on proper and common names, a number of other studies have demonstrated how other lexical form classes can drive understanding of a new word. For example, R. W. Brown (1957) introduced a new word while showing 3- and 4-year-olds, for example, a picture of a pair of hands kneading a mass of material in a container. Subsequently, the children were asked to find another example of the new word from among three pictures: one showing the kneading motion on different material in a different container, another showing the mass of material, and the third showing the container. Depending on how the new word was introduced, it was possible to predict children's selections of particular referents for that word. When the new word was introduced as a verb (*sibbing*), children selected the picture of movement; when it was a noun (*a sib*), they selected the container; and when it was a mass noun (*some sib*), they selected the mass of material (but see Dockrell & McShane, 1990, for an alternative explanation of the verb results).

Gelman and Markman (1985) found that 2- to 5-year-olds could use grammatical form class in conjunction with the range of possible referents to determine whether a new word was a common name or an adjective. In their study, children were asked to find *the fep* or *the fep one* from an array consisting of three pictures of unfamiliar objects from the same category (two of which were identical and one of which had a different property) and a fourth picture from a different category. Those children without systematic response biases tended to select the singleton more often on hearing a common name (*the fep*) than when they heard an adjective (*the fep one*). Additionally, they tended to select the category member with the different property more often when they heard an adjective than when they heard a common name. The frame in which the new word appeared apparently directed their attention to the relevant feature of the stimuli, just as the proper name frame in the present studies directed children's attention to the animacy of the stimuli.

In a recent study, Hall and Graham (1999) showed that when interpreting a new word, young children considered the grammatical form class of that new word in conjunction with the grammatical form class of recently learned words associated with the same referent. When two new words were modeled succes-

sively as proper names (e.g., "This dog is named *Daxy*") or adjectives (e.g., "This dog is very *blicky*"), 3- and 4-year-olds resisted assigning two proper names to a single animate object, but allowed two adjectives or one proper name and one adjective to be assigned to the same object. In a related study, Hall (1996) showed that children considered the number of referents labeled by the speaker when interpreting a new word. When the same word was trained to two slightly different animate exemplars in a proper name/adjective frame ("This is *Daxy*"), children interpreted the word as an adjective, contrary to what they did when the word was trained to a single animate object (in which case they made a proper name interpretation; Hall, 1994).

Clearly, in the current studies, grammatical form class and semantic cues lined up to lead children to select an animate object as the referent for a proper name—even in the absence of overt ostensive cues. Moreover, having made this inference spontaneously, children treated the new proper name appropriately: They *restricted* it to one particular individual. These same children also treated an inferred common name appropriately: They *generalized* it to another member of like kind. Thus, it cannot be argued that children who have made an inference about the referent of a new word are overly conservative about its meaning; if this were true, restriction would have been expected in both proper and common name frames. Finally, the pattern and strength of generalization results were very similar in both nonostensive and ostensive situations.

It is possible that the researcher's neutral feedback following the initial selection in the inference studies (Studies 1 and 3) was taken as implicit acknowledgment of the child's accuracy. This seems a reasonable possibility and would certainly demonstrate the kind of subtle pragmatic reasoning that many have argued contribute to children's word learning ability (e.g., L. Bloom, 1993; Nelson, 1988; Tomasello, 2000). Recall, however, that in a pilot study described in the Method section of Study 1, slightly different task demands apparently led children to discount the putative implicit acknowledgment and instead interpret their initial inference as incorrect. In any case, in the current studies, it has been shown that children who infer the referent for a new word (and perhaps receive implicit acknowledgment) treat the new word in the same way as children who receive unambiguous and explicit training.

Surprisingly, there may actually be advantages to learning a word in a nonostensive situation. Recall that the 2-year-olds in Study 4 who learned a common name ostensively were less likely to generalize that name than the children in Study 3, who inferred it. (A similar, although not significant, trend was found for the 3-year-olds in Studies 1 and 2.) In other words, ostension and all of its unambiguous cues, including pointing, eye gaze, and voice direction, seemed to lead the 2-year-olds to behave conservatively, regardless of the grammatical form class of the new word. Of course, conservatism is not wrong, but it does restrict the range of possible exemplars. Hall et al. (2000) have also argued that indirect labeling situations may have advantages. In their studies, they showed that preschoolers seemed to pay more attention to grammatical form class in indirect labeling situations than direct ones. Hall et al. argued that having to both identify a referent and interpret the meaning of a new word may lead children to pay more attention to cues such as grammatical form class. Additionally, indirect labeling, which requires the identification of a referent from among a number of alternatives, may cause children to compare the possible referents on a number of potentially relevant dimensions. This seems an appealing possibility, analogous to the levels-of-processing approach in memory research (e.g., Craik & Lockhart, 1972). That is, having to infer both referent and meaning may initiate more thorough processing of the available linguistic and nonlinguistic information.

The nonostensive experimental situation used in these studies lacked many of the social-pragmatic cues that young children are known to exploit in word learning, including eye gaze, pointing, voice direction, and other cues related to the speaker's communicative intent (e.g., Akhtar et al., 1996; Baldwin, 1991, 1993; Tomasello & Barton, 1994). Nonetheless, the learning of proper and common names resulting from this nonostensive situation was as robust as the learning resulting from an ostensive one. Although explicit social-pragmatic cues are undoubtedly important, they need not always be present to guide the effective learning of new words. In their absence, young children appear to find some kinds of syntactic and semantic information equally compelling.

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ADDRESSES AND AFFILIATIONS

Corresponding author: Vikram K. Jaswal, Department of Psychology, Stanford University, Jordan Hall, Bldg. 420, Stanford, CA 94305-2130; e-mail: jaswal@psych.stanford.edu. Ellen M. Markman is also at Stanford University.

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