

# The Principles of Conventionality and Contrast in Word Learning: An Empirical Examination

Gil Diesendruck  
Bar-Ilan University

In Study 1, 4-year-olds avoided 2 names for an object when exposed to a common or a proper noun in a puppet's presence or to a common noun in a puppet's absence, but not when exposed to a proper noun in a puppet's absence. In Study 2, 3-year-olds avoided 2 names for an object when the requester for the referent of a second label in a different language was bilingual and present during naming, but not when the speaker was bilingual but absent or monolingual. Study 3 followed up on the results of the first 2 studies. When children could assume that the puppet knew the name the experimenter used, they inferred that the puppet's use of a different name implied a different referential intent.

**Keywords:** word learning, pragmatics, disambiguation, speakers' intent

A key assumption underlying effective communication is that speakers of a common language tend to use the same words to express certain meanings. If I want to call an English speaker's attention to a four-legged mammal that barks, I am most likely to use the term *dog*. If I want to find a place to sit that is next to a dining table, I am most likely to ask for a *chair*. Not only are these words the ones that come most naturally to my mind, but they are also the ones addressees expect to hear in these given contexts. Addressees and I share an assumption that these are the conventional linguistic forms used to express the respective implied meanings—an assumption Eve Clark formally defined as the *principle of conventionality* (Clark, 1988, 1990).

This is an extremely helpful assumption because it saves a great deal of effort on the part of speakers in deciding how to refer to things and also on the part of addressees in figuring out what a speaker means. For the sake of effective communication, in any given context speakers will choose the expressions that most directly lead addressees to the correct interpretation of the speakers' communicative intent. Addressees, in turn, will rely on this

expectation when inferring that intent (see also Grice, 1975; Sperber & Wilson, 1986). To date, there is little experimental evidence about the existence of such an assumption in children (see Clark & Wong, 2002). My goal in the present studies was to provide this type of evidence.

In the present studies, I investigated the principle of conventionality in children specifically in the context of one of its implications, as outlined by Clark (1990)—namely, that whenever there is a conventional form to express a certain meaning and a speaker uses a different form instead, it is because the speaker has a different, contrasting meaning in mind. Clark formulated this implication in terms of the *principle of contrast*, which simply states that “every two forms contrast in meaning” (Clark, 1990, p. 417; see also Gathercole, 1989).

A widely studied situation in which this implication is manifest is when children are presented with two objects, one familiar (e.g., a cup) and one novel (e.g., tongs), and are simply asked to point to the referent of a novel noun (e.g., “Show me the *dax*”). According to the principle of conventionality, children in such a situation should assume that the speaker knows that the conventional name of one of the objects is *cup*. Tongs, being a new object to the child, should not generate any specific expectation about its name. According to the principle of contrast, children should reason that if a speaker uses a different name (*dax*), it is probably because he or she has a different object in mind. This inference should lead children to select the tongs as the referent for *dax*. And, indeed, that is what a number of studies with preschool children have found (Markman & Wachtel, 1988; Merriman & Bowman, 1989; Mervis & Bertrand, 1994).

Two crucial features of the pragmatic reasoning process outlined above are the nature of the linguistic form used by a speaker (i.e., whether or not it is a conventional form) and the knowledge state of the speaker with regard to that form (i.e., whether or not he or she knows it). In an attempt to address these two features more directly, Diesendruck and Markson (2001) systematically manipulated them. In their study, an experimenter showed children two novel objects and taught them either a novel label for or a novel fact about one of the objects. A puppet, who was either present or

---

Gil Diesendruck, Department of Psychology and the Gonda Brain Research Center, Bar-Ilan University, Ramat-Gan, Israel.

The research projects reported in this article were supported by an Internal Grant from Bar-Ilan University. The projects were reviewed and approved by Bar-Ilan University's Graduate School Committee regarding all ethical matters involving human subjects.

A portion of these studies was presented at the Biennial Meeting of the Society for Research in Child Development, April 2003, in Tampa, FL.

I am grateful to Rinat Yuval-Einot, Nancy Slotnik, and Sharon Levy for their help with stimuli preparation and data collection. Studies 1 and 2 were submitted by Mrs. Yuval-Einot and Mrs. Slotnik respectively, in partial fulfillment of the requirements for their MA degrees in psychology. I also thank the directors, teachers, parents, and children from the following preschools (“ganim”) for participating: Aliza, Eti, Ella, Sarit, Tova, and Ziva—all in Jerusalem; Linda, Rachel, Ruti, Sara, and Silvi—all in Ofra; and Bella, Eti, and Frida in Raanana.

Correspondence concerning this article should be addressed to Gil Diesendruck, Department of Psychology, Bar-Ilan University, Ramat-Gan 52900, Israel. E-mail: dieseng@mail.biu.ac.il

absent during this introduction, then asked children for an object associated with a different novel label or fact, accordingly. In the fact conditions, children avoided assigning two facts to an object only when the puppet was present during the experimenter's introduction of the fact, not when he was absent. In turn, in the label conditions, children avoided assigning two labels to an object both when the puppet was present and when he was absent. In fact, when directly asked whether the puppet knew the labels given by the experimenter, most children in the label/puppet-absent condition replied affirmatively. Diesendruck and Markson suggested that children might indeed presuppose that speakers of a language know the names of objects in that language but that children hold no such presupposition about arbitrary facts associated with objects. Children assumed the puppet knew the conventional names of objects and inferred that if he asked them for the referent of a different name it was because he had a different object in mind.

Even though these findings follow from the pragmatic principles of conventionality and contrast, they do not provide definitive evidence for the operation of these principles for at least two reasons. First, as Clark (1988, 1990) pointed out, the principle of contrast is an assumption about the relation between the *meanings*—not just the *referents*—of two linguistic forms. According to the principle of contrast, two names can refer to the same object as long as they have different meanings—a stipulation that renders the principle of contrast compatible with the fact that objects evidently have multiple names (e.g., *dog*, *pet*, and *animal*). In fact, a number of studies have shown that when indications about a contrast in the meanings of two names are provided, even 2-year-olds accept and spontaneously use more than one name as referring to the same object (Clark & Grossman, 1998; Clark & Svaib, 1997; Diesendruck & Shatz, 2001; Waxman & Hatch, 1992). Thus, on the one hand, if children were to respond in the above situation by accepting two names for the same object, this would still not necessarily be a violation of the principle of contrast. On the other hand, the above situation, in which children are not given any specific cues about alternative meaningful interpretations of the experimenter's novel label, may require children to guess what the experimenter's most plausible referential intent is. This could encourage a response, stipulated by the principle of contrast, that the label refers to the unnamed object (Clark, 1997).

Second, Diesendruck and Markson's (2001) findings reported above are consistent not only with a pragmatic account but also with the argument that children have specific lexical constraints that guide their word learning. According to this account, children select a novel object in response to a novel label either because they have a mutual exclusivity bias that prevents them from accepting more than one name per object (Markman & Wachtel, 1988; Merriman & Bowman, 1989) or because they have a tendency to map novel names onto nameless categories (Golinkoff, Mervis, & Hirsh-Pasek, 1994).

Given these qualifications, a more definitive demonstration of the operation of the principles of conventionality and contrast would come from finding that modulations of a speaker's knowledge of *words* affect children's inferences. In the present studies, I tackled this remaining issue, relying on specific premises of the principle of conventionality.

In an often-cited formulation of the principles of conventionality and contrast, Clark (1988) defined them in the following way: "For certain meanings, there is a conventional form that speakers expect

to be used in the language community, that is, if one does not use the conventional form that might have been expected, it is because one has some other, contrasting meaning in mind" (p. 319). This formulation entails at least three distinct assumptions speakers and addressees must make: (a) There are conventional forms to express certain meanings; (b) members of a linguistic community know these forms; and (c) members of a linguistic community expect these forms to be used when speakers intend to express their corresponding meanings. In the present studies, I investigated these assumptions by testing whether children are sensitive to two different manipulations of speakers' knowledge of words.

Study 1 contrasted a situation in which an experimenter taught children a common noun for a novel animate-like creature with a situation in which an experimenter taught children a proper noun for such a creature. Common nouns (e.g., *dog*, *chair*) are the standard lexical forms used for defining classes of objects and, as such, constitute the vocabulary shared by *all* members of a linguistic community. In contrast, proper nouns (e.g., *Mary*, *Pete*) are attributed to specific individuals and are known *only* by those who are familiar with those individuals. This study addressed whether children honor this distinction when inferring the referent of a second label.

Study 2 investigated whether children limit the premises implied by the principles of conventionality and contrast to members of their linguistic community. In Study 2 I addressed this issue by exposing Hebrew-English bilingual children to either a bilingual speaker or a monolingual Hebrew speaker. The hypothesis was that children would be justified in assuming that a bilingual speaker would know the novel English names of objects an experimenter taught them but that children would not make such an assumption about a monolingual Hebrew speaker. Study 3 followed up on the findings of Study 2. Together, the studies were intended to show that preschool children hold the three key premises of the principles of conventionality and contrast only with regard to certain lexical forms—that is, common nouns—and certain speakers—that is, those belonging to the same linguistic community.

## Study 1

As indicated by the quote from Clark (1988) cited above, the principle of conventionality is not a general assumption made by people that every linguistic form they know others know as well and use to express the same meaning. The principle of conventionality stipulates that for *certain* meanings that assumption holds. This is of theoretical importance because it implies that the principle of conventionality is not just a manifestation of some egocentric bias stating that everything I know others know as well, but rather is a principle derived from people's experience in communicative contexts. Presumably, early on in development, children realize that certain forms are more frequently used to express certain meanings, they notice that many speakers use that same form, and perhaps they even receive some fairly direct instruction about the appropriate forms to use (see, e.g., Callanan & Sabbagh, 2004; Clark & Wong, 2002; Masur, 1997; Ninio & Bruner, 1978).

Arguably, when people are referring to objects, the forms held as conventional are common nouns. These are nouns that identify objects in terms of their category membership. When countable entities are being referred to, they typically take the syntactic form

of count nouns. As Diesendruck and Markson (2001) found, it seems that preschoolers believe that speakers know the common noun for an object even if they do not know whether the speakers have ever been exposed to the noun.

In contrast, proper nouns name individual objects and, as such, are known only by those who are familiar with the specific denoted individual objects. A number of studies have shown that by their second birthdays, English-speaking children can distinguish between proper and count nouns on the basis of their syntactic frames (Gelman & Taylor, 1984; Hall, Lee, & Belanger, 2001; Katz, Baker, & Macnamara, 1974). Other studies have also revealed that preschoolers understand some of the semantic properties of proper nouns (e.g., Imai & Haryu, 2001; Sorrentino, 2001). Most crucial for the present purposes is that Birch and Bloom (2002) concluded that preschoolers understand that familiarity with an individual is required in order to know the individual's proper name. In Birch and Bloom's first study, children were presented with pairs of animals, only one of which was familiar to the experimenter (e.g., the experimenter explicitly said she had played before with one of two dogs). When the experimenter asked children, "Where's Jessie?" even 2-year-olds tended to bring her the familiar rather than the unfamiliar animal. Birch and Bloom's second study revealed that by 5 years of age, children can also draw the reverse inference—that is, children realize that if a speaker refers to an animal with a proper noun, it is because the speaker has seen that animal before.

In relating this distinction between common and proper nouns to the premises underlying the principles of conventionality and contrast outlined earlier, one could say that both types of nouns are "conventional" insofar as they are the standard ways to refer to certain individuals (e.g., my *cat*, whose name is *Fausto*). However, the second and third premises entail that this knowledge about the standard way to refer to various individuals, and the expectation that the standard forms will be used, is shared by *all* members of a linguistic community, not only by the very few who happen to know the individual and know also how those familiar with the individual refer to it. Clearly, in this fuller sense of the principle of conventionality, only common nouns are conventional (e.g., I expect everybody to call my cat a *cat*); proper nouns are not (e.g., I expect only those familiar with my cat, and with the way in which I refer to him, to call him *Fausto*). Study 1 assessed whether children are sensitive to this distinction.

In this study, the experimenter showed children a pair of novel animate-like creatures and taught children a novel name for one of the creatures by using either a count noun or a proper noun syntactic frame. A puppet who was either present or absent during the experimenter's labeling episode then asked children for the referent of a different novel name, using the syntactic frame opposite to the one used by the experimenter. In other words, children who were taught a count noun by the experimenter were asked for a proper noun by the puppet; and children who were taught a proper noun by the experimenter were asked for a count noun by the puppet.

There were two main reasons for this switch in the form class of the noun from the experimenter's introduction to the puppet's request. First, from a pragmatic perspective, what is crucial is whether the form class of the noun children were introduced to would affect their assumptions about the absent puppet's knowledge of the nouns. If one were to use the same form class in both

the introduction and the request (i.e., two proper nouns or two count nouns), one would not be able to determine whether children's responses resulted from the form used in the introduction, the form used in the request, or even from children's assumptions about the possibility of assigning two proper names or two common names to the same object. For that reason, I decided to keep the *relation* between the "introduced to" noun and the "requested" noun constant across conditions. The "switch" design adopted in this study is the most straightforward way to achieve that. Second, the switch allowed me to address a hypothesis regarding the role of lexical form class in children's inferences. Specifically, Hall and Graham (1999) found that under some circumstances, children accepted a proper name and an adjective for the same animal, implying that perhaps children allow two words for the same object as long as they are from different form classes. The present design allowed me to assess whether this implication is also true when the words are a proper noun and a count noun, and to what extent this implication is affected by assumptions about a speaker's knowledge of the nouns.

The pragmatic prediction was that children's responses would vary according to whether they could assume that the puppet knew a name for one of the objects. When the puppet was present during the experimenter's labeling episode, he presumably got to know the novel name attributed to one of the creatures, irrespective of whether it was a common or a proper noun. When the puppet was absent, and described by the experimenter as unfamiliar with the novel objects, children should not have assumed he knew the proper noun given by the experimenter to one of the creatures. Nonetheless, according to the principle of conventionality, children might assume that the puppet knew the common noun used by the experimenter—even if it was novel to them. Consequently, in all conditions except when the experimenter taught children a novel proper noun in the puppet's absence, the puppet was expected to use the mutually known form if he intended to refer to the creature labeled by the experimenter. In these conditions, if the puppet used a different form, children would be justified in inferring that he intended to refer to the other creature. The only condition in which this inference would not be warranted was when children were introduced to a proper noun in the puppet's absence. In this condition, children would have had to guess to which creature the puppet referred. Simply put, the prediction was that children exposed to a common noun in the puppet's presence, children exposed to a proper noun in the puppet's presence, and children exposed to a common noun in the puppet's absence would be more likely to select the unlabeled creature in response to the puppet's request using a different label than would children exposed to a proper noun in the puppet's absence.

Given that in Hebrew the syntactic distinction between count and proper nouns is somewhat less clear-cut than in English,<sup>1</sup> I took two methodological precautions in order to ascertain that children would notice the difference. First, I used both the definite article and a plural suffix when presenting the count nouns and omitted both when presenting the proper nouns. And second, I tested children who were at least 3½ years old, an age by which

<sup>1</sup> In Hebrew, the definite pronoun *ha-* (*the*) has approximately the same range of applications as the English pronoun, though in Hebrew it can also be used with generics. For the present issue, *ha-* marks common nouns



Hebrew-speaking children have already acquired these relevant syntactic markings (Berman, 1985).

### Method

#### Participants

Sixty-four preschool children (mean age = 4 years 5 months,  $SD = 5$  months, range = 3 years 5 months to 5 years 0 months), 40 girls and 24 boys, participated in this study. Children were recruited from local preschools in central Israel. All children were native Hebrew speakers from Jewish middle-class families. Signed parental consent was obtained for each child prior to his or her participation in the study.

#### Materials

Eight novel colored drawings of animate-like creatures were used as stimuli in the present experiment. The creatures were created by an artist specifically for the present experiment (see Figure 1 for examples). They were made to resemble animate creatures (e.g., they had eyes), because a number of studies revealed that children are more likely to attribute proper names to animate than to inanimate entities (Gelman & Taylor, 1984; Hall, 1994; Imai & Haryu, 2001). The creatures had a variety of distinctive colors and shapes and were presented on a 15 cm  $\times$  15 cm laminated paper

card. The creatures were divided into four pairs. The main criteria for generating the pairings were that the two creatures be saliently distinctive but of approximately the same size and complexity. The pairs were the same for all children in all conditions, but the order of presentation of the pairs was varied between subjects. A hand puppet and a puppet house were also used in the study.

#### Design

The study included four between-subjects conditions derived from the crossing of two factors: experimenter's noun type (common, proper) and puppet's state (present, absent). Sixteen children participated in each of the four resulting conditions: common-present, proper-present, common-absent, and proper-absent. There were no significant age differences between conditions. Each condition consisted of four trials, and each trial included two phases: (a) a teaching phase, in which the experimenter introduced a novel label for one of the creatures (Creature A), and (b) a question phase, in which a puppet asked children to point to the referent of a different novel label.<sup>2</sup>

#### Procedure

Children were tested individually, in Hebrew, by a female experimenter in a quiet area of their preschool (see the Appendix for the exact Hebrew instructions). In all conditions, a hand puppet (named Percy) and his house were introduced to the children. The puppet was manipulated by the experimenter, who also spoke for him in a slightly different tone of voice. As the child and the experimenter sat together at a table, the puppet came out of his house exclaiming to the child and the experimenter, "Hi there! Who are you, and what are you doing here?" The experimenter replied by introducing herself and the child and asked the puppet, "Who are you?!" In the present conditions, the puppet replied with his name and immediately asked if he could stay to play with them. In these conditions, the puppet remained visible during the entire procedure, intervening as specified below. In the absent conditions, the puppet also replied with his name and then excused himself, saying he was tired and wanted to take a nap in his house. He added that they should not worry about talking loudly because he could not hear anything that went on outside when he was in his house. To make this point clearer to the child, the experimenter in these conditions

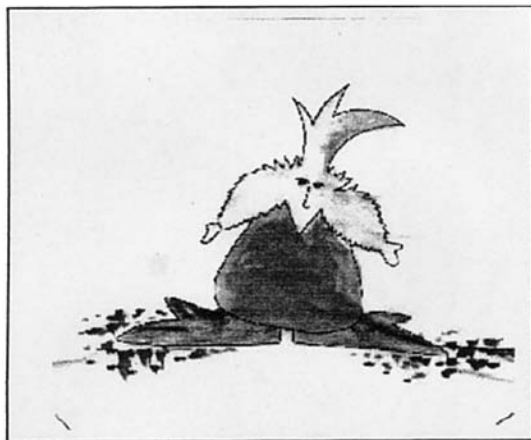


Figure 1. Black-and-white examples of the stimuli used in Study 1.

(e.g., "ha-kelev tafas et ha-kadur" = "the dog caught the ball"), but proper nouns appear in their bare form (e.g., "Fido tafas et ha-kadur" = "Fido caught the ball"). Unlike English, Hebrew does not have indefinite pronouns (e.g., *a* or *an*), and thus common nouns in indefinite phrases also appear in their bare form (e.g., "ze kelev" = "this is a dog"). In other words, indefinite common nouns frequently appear in sentences with syntactic structures identical to those of sentences involving proper nouns. It is this feature, in particular, that possibly makes it more difficult to acquire the distinction between common and proper nouns in Hebrew than in English.

<sup>2</sup> In addition to the experimental task described in the text, initial participants also performed an "extension task" after the standard four-trial experimental procedure. This task was modeled after one used by Hall, Quantz, and Persoage (2000), and its goal was to assess further how children interpreted the new label. In this task, children saw a series of three pictures depicting (a) the labeled creature, (b) a similar creature but in a different position and color, and (c) a distractor inanimate object. The experimenter asked about each picture whether it was also a referent of the novel label. Administration of this task was stopped once I realized that the language being used in the question was too ambiguous with regard to the novel label's syntactic form. Given that this extension task was administered only at the end of the session, it did not affect the children's responses in the standard procedure described in the text.

called out for the puppet, but after two unsuccessful attempts, she exclaimed, "Oh, I forgot that Percy cannot hear us when he's in his house. Let me knock on his door to get him to come out." When the puppet appeared, the experimenter asked if he wanted to join them, and the puppet politely declined.

After the introduction of the puppet, the experimenter went on to present the children with the four pairs of novel creatures. Within a given condition, the teaching and question phases were identical in all trials.

**Teaching phase.** The experimenter showed children a pair of novel creatures, laying them down simultaneously on a table in front of the child and saying, "Look here!" The experimenter then pointed to one of the creatures (Creature A) and in the common noun conditions said, "You know, this one is called (a) teega. Yes, this is the teega. Teegas are like this. Have you ever seen teegas? This is the teega." Both the definite article and the plural forms were used to mark the noun as a count noun. In the proper noun conditions, the experimenter said, "Here's Teega. Yes, his name is Teega. Do you know Teega? Yes, he's called Teega. This is Teega." The two syntactic markers mentioned above were omitted in this condition. In all conditions, the experimenter pointed to the other creature (Creature B) and made a nonlabeling comment about it, for example, "Look at this one. Do you see this one? Look at this." Children were then encouraged to hold and look more closely at the pictures for about 20 s.

The assignment of nouns to the creatures (i.e., which creature in a pair was A and which was B) was counterbalanced across children. The order in which Creatures A and B were presented was counterbalanced within and between children, so that in two of the four trials, the first creature commented on was labeled, and in the other two trials, it was not. The right-left placement of the creatures was also counterbalanced within and between subjects.

**Question phase.** After children had examined the pictures, the experimenter laid them back on the table in their original places. In the puppet-present conditions, the puppet looked at the creatures and then, staring at the child, asked for the referent of a novel label. In the puppet-absent conditions, the puppet suddenly came out of his house saying he had just woken up from a nap, looked at the creatures, and then, staring at the child, asked for the referent of a novel label. The form of the label used by the puppet was always the opposite from the one used by the experimenter. That is, in the common noun conditions, the puppet used proper noun syntax in his request, for example, "I really want to see Meloo. Can you show me Meloo? I really want to see Meloo." In the proper noun conditions, the puppet used count noun syntax, for example, "I really want to see meloos. Is there a meloo here? Show me the meloo."

The first creature pointed to by the child in response to the puppet's request was recorded as the child's selection. After the selection, the puppet thanked the child, and the two pictures were taken off the table. In the puppet-present conditions, the puppet simply went back to sit in front of his house. In the puppet-absent conditions, the puppet excused himself, again saying he wanted to take a nap, and went back inside his house. The same teaching and question phases were then repeated for a new pair of creatures, for a total of four trials.

The eight novel Hebrew-sounding labels used were *teega*, *uzo*, *meloo*, *dushee*, *zavee*, *bonee*, *chupee*, and *tsiki*.

## Results and Discussion

The main dependent measure was the number of trials (0 to 4) in which children selected Creature B in response to the puppet's request. Recall that by selecting Creature B, children avoided two names for the same creature. Preliminary analyses revealed no effect of gender on this measure, and therefore this variable was not included in all subsequent analyses. To examine potential general effects of the two main experimental factors, I conducted an analysis of variance with experimenter's noun type (common, proper) and puppet's state (present, absent) as between-subjects

factors. The results revealed no significant main effects or interaction, indicating that the overall differences between the common and proper noun conditions and between the present and absent conditions were not significant. The means for each condition are presented in Table 1.

To address the pragmatic hypothesis, I conducted a contrast analysis in which the common-present, common-absent, and proper-present conditions were given equal weights (1, 1, and 1, respectively) and were contrasted with the proper-absent condition (weight = -3). This contrast turned out to be significant,  $t(60) = 2.03$ ,  $p < .05$ ,  $SE = 1.20$ , indicating that children's responses in the latter condition were different from those in the other three conditions. To substantiate this conclusion, I evaluated children's performance in each condition against chance (chance = 2 selections of Creature B). I found that children in all but the proper-absent condition selected Creature B more than expected by chance (all one-tailed tests). In the common-present condition, children selected Creature B on 75% of the trials,  $t(15) = 3.46$ ,  $p < .01$ ; in the common-absent condition, on 72% of the trials,  $t(15) = 2.91$ ,  $p < .05$ ; and in the proper-present condition, on 68% of the trials,  $t(15) = 1.82$ ,  $p < .05$ . Children in the proper-absent condition selected Creature B on 52% of the trials, which was evidently no greater than chance ( $p > .4$ ).

To examine whether the group differences revealed by the parametric analyses held also at the level of individual participants, I conducted a series of nonparametric analyses. For this purpose, children were classified as "avoiders of overlap" if they selected Creature B on three or four of the four trials, and as "accepters of overlap" if they selected Creature B on fewer than three trials. Table 2 displays this breakdown across conditions. If one assumes there is a 50/50 chance of any given child selecting Creature A or Creature B on any given trial, the binomial theorem stipulates that the probability of any given child selecting Creature B on three or four trials is 0.3125. Translating this probability in terms of the distribution of 16 children renders the chance expectation of 11 children being classified as accepters and 5 as avoiders. Chi-square analyses evaluating the actual distributions against this chance distribution revealed that the distributions shown in Table 2 for the common-present,  $\chi^2(1, N = 16) = 14.25$ ,  $p < .01$ , common-absent,  $\chi^2(1, N = 16) = 7.27$ ,  $p < .01$ , and proper-present conditions,  $\chi^2(1, N = 16) = 7.27$ ,  $p < .01$ , were all significantly different from chance. The distribution of children in the proper-absent conditions was not ( $p > .5$ ).

A chi-square test parallel to the contrast analyses described above, comparing the first three conditions combined against the proper-absent condition, also revealed a significant difference in the distribution of avoiders and accepters of overlap,  $\chi^2(1, N =$

Table 1  
Mean Number of Creature B Selections (0 to 4) Across  
Conditions in Study 1

Condition	<i>M</i>	<i>SD</i>
Common/Present	3.0*	1.2
Common/Absent	2.9*	1.2
Proper/Present	2.7*	1.6
Proper/Absent	2.1	1.5

\* Significantly greater than chance (chance = 2) at  $p < .05$  (one-tailed).

Table 2  
*Distribution of Children in Each Condition According to  
 Consistency of Creature B Selection in Study 1*

Condition	Avoiders of overlap (selected Creature B on 3 or 4 trials)	Accepters of overlap (selected Creature B on fewer than 3 trials)
Common/present**	12	4
Common/absent**	10	6
Proper/present**	10	6
Proper/absent	6	10
Random	5	11

\*\* Significantly different from random distribution at  $p < .01$ .

64) = 4.23,  $p < .05$ . (In the first three conditions, 67% of the children were classified as avoiders, whereas in the proper-absent condition, only 38% were.) A very similar distributional difference between the first three conditions and the proper-absent condition was also found when only children's responses in the first trial were considered. Here, 73% of children in the three conditions selected Creature B in response to the puppet's request in the first trial, whereas 38% of children in the proper-absent condition did so,  $\chi^2(1, N = 64) = 6.54$ ,  $p < .05$ .

The overall pattern of results is consistent with the pragmatic hypothesis. In the two conditions in which the puppet was present, children had clear reason to believe that he knew the name given by the experimenter to one of the creatures. Children could thus reasonably expect the puppet to use that name if he intended to refer to that creature. When they heard the puppet use a different name, they inferred that he intended to refer to the other creature.

This explanation notwithstanding, the conditions that were most important from a pragmatic perspective were the ones in which the puppet was absent. According to the pragmatic account, these latter conditions involved a more complicated reasoning process because they required children to presuppose, without any clear evidence, what the puppet might and might not know about words. Children's responses revealed that they seemed to limit appropriately the three premises of Clark's (1988, 1990) principle of conventionality. They assumed that the puppet would know the common nouns used by the experimenter—consistent with Diesendruck and Markson's (2001) findings—but would not know the proper nouns she used—consistent with Birch and Bloom's (2002) findings. Moreover, children responded as if they expected the puppet to use the common noun if he intended to refer to Creature A, and once the puppet did not use it, they inferred that he had Creature B in mind. Children had no such expectation when the experimenter taught them a proper noun for Creature A.

These findings reinforce the conclusion that children avoid two names for an object because of their assumptions about speakers' knowledge of the words used in the discourse context, and consequent inferences about speakers' referential intents. Study 2 was carried out to provide converging evidence in support of this conclusion.

## Study 2

A crucial factor underlying the principles of conventionality and contrast is children's assumption about a speaker's knowledge of

certain linguistic forms—be they nouns, verbs, adjectives, prepositions, and so forth. As an addressee, I can only expect a certain linguistic form from a speaker if I am certain he or she knows that form. Study 1 demonstrated how preschoolers appropriately limit this assumption to the case of common nouns. In Study 2, I addressed a more radical limitation of this assumption by testing whether preschoolers understand that in certain cases, even common nouns might not be known to a speaker. Specifically, in Study 2, I investigated whether children appropriately limit their expectations regarding the principles of conventionality and contrast to speakers who know the language used to name objects.

In Study 2, a Hebrew-English bilingual experimenter introduced an *English* novel name for one of two novel objects to Hebrew-English bilingual children. A puppet then asked children for the referent of a novel *Hebrew* name. The crucial manipulation was that for half of the children, the puppet was bilingual himself and thus understood both languages, whereas for the other half of the children, the puppet was a monolingual Hebrew speaker and thus could not understand the experimenter's English conversation with the child.

The pragmatic hypothesis was that children might believe that a bilingual puppet knew the name used by the experimenter and might thus expect such a puppet to use it if he intended to refer to that object—especially if he was present when the experimenter labeled the object. In turn, children would not hold such expectations for a monolingual puppet, even if he was present when the experimenter labeled the object. Consequently, children exposed to a bilingual puppet might be more likely to infer that he intended to refer to the unlabeled object than might children exposed to a monolingual puppet, even though both puppets used a novel name in a language different from the one used by the experimenter. Again, this was particularly expected to be the case given the lack of cues about alternative interpretations of the meanings of the labels provided by the puppet.

Some indirect evidence in support of this hypothesis can be found in a study conducted by Au and Glusman (1990) in which children were exposed to monolingual speakers of English and Spanish. The English-speaking experimenter taught children a novel English name for a novel object, and then a Spanish-speaking experimenter asked children for the referent of a novel Spanish name. Au and Glusman found, consistent with the above hypothesis, that children did not avoid lexical overlap in this situation and accepted both an English and a Spanish name for the same object. From this finding, the authors concluded that children might suspend the mutual exclusivity bias across languages (see also Markman, 1991; Merriman & Kutlesic, 1993).

Intriguingly, in that same article, the authors described an unpublished study conducted in 1988 by Glusman (cited in Au & Glusman, 1990) in which children avoided two names from different languages for the same object. From their description of that study, it appears that the main methodological difference between it and the one conducted by Au and Glusman (1990) is that in the former study, children saw the experimenters speaking both languages. In other words, in Glusman's study, children had reason to believe that the experimenter asking for a novel Spanish name also knew English. As outlined above, speakers' knowledge of the languages might play a crucial role in children's inferences in this task. In Study 2, I directly tested this hypothesis.



It is important to note that the present hypothesis is not especially about bilingual children. I investigated bilingual children because it was crucial that the participants understand both languages and realize that in some cases, the puppet spoke only one of them. There is evidence that because of their experiences with cross-language equivalents, bilingual children are in general more prone to accept two names from the same language for an object than are monolingual children (Davidson, Jergovic, Imami, & Theodos, 1997; but see Merriman & Kutlesic, 1993). There is also some evidence that, indeed, from very early on, bilingual children have cross-language equivalents in their vocabularies (Pearson, Fernandez, & Oller, 1995; cf. Volterra & Taeschner, 1978). These baseline differences between bilinguals and monolinguals notwithstanding, the argument presented here is that assumptions about speakers' knowledge of words will have a similar effect on both populations.

### Method

#### Participants

Sixty-four preschool children (mean age = 3 years 11 months,  $SD = 7$  months, range = 3 years 0 months to 4 years 11 months), 31 girls and 33 boys, participated in this study. Children were recruited from preschools in Israel, in an area with a large population of middle-class Jewish immigrants from English-speaking countries. Parents of the children almost exclusively spoke English at home, but all children went to Hebrew-speaking preschools. All children could maintain a fluent conversation in both languages. Signed parental consent was obtained for each child prior to his or her participation in the study.

#### Materials

Twelve novel objects were used as stimuli in the present experiment. The objects were purchased or created specifically for the present experiment and were of a variety of colors, materials, and shapes. The objects were divided into six pairs. The main criteria for generating the pairings were that the two objects be saliently distinctive but of approximately the same size, complexity, and attractiveness to children. In order to ensure equivalence in attractiveness, 10 different children were presented with 20 pairs of objects and simply asked to choose one with which to play. The pairs of objects used in the study were ones for which no clear asymmetries in children's preferences were found. The pairs were the same for all children in all conditions, but the order of presentation of the pairs was varied between children. A hand puppet and a puppet house were also used in the study.

#### Design

The study included four between-subjects conditions derived from the crossing of two factors: puppet's language status (bilingual, monolingual) and puppet's state (present, absent). Sixteen children participated in each of the four resulting conditions: bilingual-present, monolingual-present, bilingual-absent, and monolingual-absent. There were no significant age differences between conditions. Each condition consisted of six trials, and each trial included two phases: (a) a teaching phase, in which the experimenter introduced a novel English label for one of the objects (Object A), and (b) a question phase, in which in all conditions a puppet asked children to point to the referent of a different novel Hebrew label.

#### Procedure

Children were tested individually by a Hebrew-English bilingual female experimenter in a quiet area of their preschool. In all conditions, a hand

puppet (named Yossi) and his house were introduced to the children in the same way as in Study 1. In the monolingual conditions, the puppet spoke exclusively in Hebrew. In the bilingual conditions, the puppet switched freely from Hebrew to English, explicitly pointing out that he could speak both languages. As in Study 1, in the puppet-present conditions, the puppet sat in front of his house "watching" the remainder of the procedure and intervening when required. In the puppet-absent conditions, the same exchange between the puppet and the experimenter described in Study 1 took place. In these conditions, the puppet remained inside his house during the teaching phases and came out only for the question phases.

After the introduction of the puppet, the experimenter went on to present the children with the six pairs of novel objects. Within a given condition, the teaching and question phases were identical in all trials.

**Teaching phase.** The experimenter showed children a pair of novel objects, placing them simultaneously on a table in front of the child and saying, "Look at these!" The experimenter then pointed to one of the objects (Object A) and said in English, "Look at this one. It is a dax. See, it is a dax." In all conditions, the experimenter pointed to the other object (Object B) and made a nonlabeling comment about it, for example, "Look at this one, it is neat. This is cool." Children were then encouraged to hold and play with the objects for about 20 s. The same counterbalancing precautions taken in Study 1 regarding assignment of names to objects, presentation order, and right-left object placement were taken in Study 2.

**Question phase.** After children had examined the objects, the experimenter laid them back on the table in their original places. In the puppet-present conditions, the puppet looked at the objects and then, staring at the child, asked in Hebrew for the referent of a novel label, for example, "Can you give me the patoo?" In the puppet-absent conditions, the puppet suddenly came out of his house, saying that he had just awakened from a nap, looked at the objects, and then, staring at the child, asked in Hebrew for the referent of a novel label. It is important to note that in both the monolingual and bilingual conditions, the puppet's request for the referent of a novel label was always in Hebrew. Children's responses were coded as in Study 1. The procedure continued as in Study 1, but here for a total of six trials.

After the second trial, the experimenter remarked on how much fun it was that the puppet was monolingual or bilingual, depending on the condition. After the third trial, the experimenter reminded children in the puppet-absent conditions that the puppet could not hear their conversation while inside his house. As a manipulation check, at the end of the procedure, the experimenter asked all children directly whether the puppet knew how to speak English, Hebrew, or both.

The six English novel labels used were *bip*, *lof*, *bem*, *kiv*, *zort*, and *dax*. The six Hebrew novel labels were *teega*, *patoo*, *zabi*, *malo*, *kolo*, and *shami*.

### Results and Discussion

Because of an experimenter's error, only 41 of the 64 children were asked the manipulation check question. Nonetheless, the pattern of responses was clear-cut, showing that children distinguished between the two kinds of speakers. Specifically, all but 1 of the 21 children in the bilingual conditions who were asked said that the puppet knew how to speak both languages, whereas all 20 children in the monolingual conditions who were asked said that the puppet did not know English,  $\chi^2(1, N = 41) = 37.19, p < .01$ . This was extremely important because it showed that even though the bilingual experimenter spoke for the puppet in both conditions, children treated the puppet as a separate speaker with a distinct language status. This conclusion is consistent with the claim that under certain conditions, young children are as likely to attribute mental states to puppets as they are to real people (Diesendruck,

Markson, Akhtar, & Reudor, 2004; Wellman, Cross, & Watson, 2001).

The main dependent measure was the number of trials (0 to 6) in which children selected Object B in response to the puppet's request. Recall that by selecting Object B, children avoided two names for the same object. Preliminary analyses revealed no effect of gender on this measure, and therefore this factor was not included in subsequent analyses.

To examine potential general effects of the two main experimental variables, I conducted an analysis of variance with language status (bilingual, monolingual) and puppet's state (present, absent) as between-subjects factors. The results revealed a significant effect of language status, with children exposed to a bilingual puppet ( $M = 3.7$ ,  $SD = 1.2$ ) being more likely to avoid two names for the same object than were children exposed to a monolingual puppet ( $M = 2.9$ ,  $SD = 1.5$ ),  $F(1, 60) = 6.05$ ,  $p < .05$ ,  $\eta^2 = .09$ . This effect is better interpreted in light of the significant interaction between the two factors,  $F(1, 60) = 4.33$ ,  $p < .05$ ,  $\eta^2 = .07$ . Specifically, as can be seen in Table 3, the only condition in which the children's performance was significantly different from chance (chance = 3 selections of Object B) was the bilingual-present condition,  $t(15) = 4.70$ ,  $p < .01$ . In the other three conditions, children selected randomly between the two objects ( $ps > .4$ ).

To more directly address the pragmatic hypothesis that children in the bilingual-present condition were justified in expecting a puppet to use the label used by the experimenter, I conducted a contrast analysis in which that condition (weight = 3) was contrasted with the other three conditions (weights = -1, -1, and -1). This contrast was significant,  $t(60) = 3.17$ ,  $p < .01$ ,  $SE = 1.14$ , indicating that children's responses in the former condition were indeed different from those in the latter three conditions.

As in Study 1, nonparametric analyses were conducted in which children were classified as "avoiders of overlap" if they selected Object B on four or more of the six trials and as "accepters of overlap" if they selected Object B on fewer than four trials. Table 4 displays this breakdown across conditions. If one assumes a 50/50 chance of any given child selecting Object A or Object B on any given trial, the binomial theorem stipulates that the probability of any given child selecting Object B on four, five, or six trials is 0.344. Translating this probability in terms of the distribution of 16 children renders the chance expectation of 10.5 children being classified as accepters and 5.5 as avoiders. Chi-square analyses evaluating the actual distributions against this chance distribution revealed that only the distribution of children in the bilingual-present conditions shown in Table 4 was significantly different from chance,  $\chi^2(1, N = 16) = 11.71$ ,  $p < .01$ . The distributions of children in the other three conditions were not ( $p > .7$ ).

Table 3  
Mean Number of Object B Selections (0 to 6) Across Conditions in Study 2

Condition	<i>M</i>	<i>SD</i>
Bilingual/present	4.2*	1.1
Bilingual/absent	3.2	1.2
Monolingual/present	2.7	1.3
Monolingual/absent	3.1	1.7

\* Significantly different from chance (chance = 3) at  $p < .05$ .

Table 4  
Distribution of Children in Each Condition According to Consistency of Object B Selection in Study 2

Condition	Avoiders of overlap (selected Object B on 4 or more trials)	Accepters of overlap (selected Object B on fewer than 4 trials)
Bilingual/present**	12	4
Bilingual/absent	6	10
Monolingual/present	5	11
Monolingual/absent	6	10
Random	5.5	10.5

\*\* Significantly different from random distribution at  $p < .01$ .

A chi-square test parallel to the contrast analyses described above, comparing the bilingual-present condition with the other three conditions combined, also revealed a significant difference in the distribution of avoiders and accepters,  $\chi^2(1, N = 64) = 7.59$ ,  $p < .01$ . In the bilingual-present condition, 75% of the children were classified as avoiders, whereas in the other three conditions combined, only 35% were. A similar distributional difference between the bilingual-present condition and the other three conditions combined was also found when only the children's responses in the first trial were considered. Here, too, 75% of children in the bilingual-present condition selected Object B in response to the puppet's request on the first trial, whereas 48% of the children in the other three conditions did so,  $\chi^2(1, N = 64) = 3.55$ ,  $p = .059$ .

These findings are consistent with the idea that the only condition in which children expected the puppet to use the English novel name attributed by the experimenter to one of the objects was the bilingual-present condition. In that condition, children seem to have reasoned according to the principle of contrast. Namely, given that the puppet knew that one of the objects was named *dax*, the easiest way for him to get the child to pick that object would be to simply ask for a *dax*. The fact that the puppet chose to use a different name—even if in a different language—likely indicated that he had a different object in mind. Crucially for the pragmatic hypothesis, children correctly inferred that a monolingual puppet would not understand the experimenter's labeling instructions, and thus children had to guess to which object the puppet intended to refer.

The finding that children in the bilingual-absent condition chose randomly between objects requires a bit more analysis. On the basis of Diesendruck and Markson's (2001) findings and the findings from Study 1, one might have expected children in that condition to perform exactly as did the children in the bilingual-present condition. That is, the children could have expected an absent bilingual puppet to know the English name that the experimenter had used, and thus they may have applied the same pragmatic reasoning as described above. That would have led the children to avoid overlap and infer that the puppet had Object B in mind.

One clear difference between the studies has to do with the fact that in Study 2, the names came from different languages. It is possible that children a priori have different expectations about



multilanguage versus single-language contexts. As noted above, however, it is unclear how this explanation would account for the finding that children in the bilingual-present condition avoided two names for the same object. An alternative possibility has to do with the fact that the present study not only involved two languages but also had bilingual children as participants. In particular, children's responses in the bilingual-absent condition may derive from peculiar metalinguistic expectations bilingual children have, especially regarding people's linguistic knowledge. Study 3 was designed to address this possibility.

### Study 3

Unlike monolingual children, bilingual children often encounter interlocutors who do not understand or speak one of their languages (Taeschner, 1983). Studies show that, indeed, even prior to their second birthdays, and thus perhaps even before they realize that they know two separate languages, bilingual children use language in context-sensitive ways irrespective of language dominance. For instance, they tend to speak in Language A to a person who primarily speaks Language A, and they tend to speak in Language B to a person who primarily speaks Language B (Deuchar & Quay, 1999; Genesee, Boivin, & Nicoladis, 1996; Nicoladis, 1998; Petitto et al., 2001). This sensitivity is a precondition for—or perhaps even an index of—awareness of what languages others know or do not know. Bilingual children also seem to grasp the arbitrary nature of language better or earlier than do monolingual children (Bialystok, 1988; Eviatar & Ibrahim, 2000; Ianco-Worrall, 1972). For instance, Cummins (1978) found that 70% of bilingual children, but only 27.5% of monolingual children, responded that in a pretending game, the sun could be called “moon.” Moreover, although only one young bilingual child said that one cannot switch the names because “these are their *right* names,” 20% of the young monolingual children said so (see Rosenblum & Pinker, 1983, for a similar finding). In other words, bilingual children seem more aware that names are arbitrary social conventions rather than absolute or intrinsic attributes of objects.

Given these early experiences and metalinguistic awareness, bilingual children might be more cautious overall than monolingual children in automatically presuming that others know the conventional linguistic forms they know. Monolingual children, having more rarely encountered people who do not speak their language, might be more prone to believe that what they know about language others know as well. If this analysis is correct, then it is possible that children in the bilingual-absent condition of Study 2 thought that the puppet did not know the names that the experimenter had just taught them. This interpretation would lead to the prediction that even in a one-language scenario, bilingual children might be more likely than monolingual children to assume that an absent speaker will not know the names of objects they had been taught. That is, in an absent-speaker condition, bilingual children might be less likely than monolingual children to avoid two names from the same language for an object. In Study 3, I tested this hypothesis.

There are some indications that both in their spontaneous speech (Pearson et al., 1995) and in experimental tasks (Merriman & Kutlesic, 1993), bilingual children are willing to accept two names from *different* languages for the same object. There is conflicting evidence about how bilingual and monolingual children compare

in terms of their tendencies to avoid two names from a *single* language for the same object (Davidson et al., 1997; Merriman & Kutlesic, 1993). However, and crucially for the present hypothesis, none of these studies addressed the issue of speakers' absence, a situation that calls for the child to presuppose a certain state of knowledge on the part of the speaker.

### Method

#### Participants

Twelve bilingual preschool children (mean age = 4 years 0 months,  $SD = 6$  months, range = 3 years 5 months to 5 years 0 months; 8 girls and 4 boys), and 12 Hebrew monolingual preschool children (mean age = 3 years 9 months,  $SD = 6$  months, range = 3 years 0 months to 4 years 6 months; 8 girls and 4 boys) participated in this study. Recruitment of bilingual children was the same as in Study 2. Monolingual children were recruited from similar preschools. All children were from middle-class Jewish families in Israel. The age difference between the two groups was not significant.

#### Materials

The materials were the same as those used in Study 2.

#### Design

All children participated in a Hebrew-only, puppet-absent condition. The experiment consisted of eight trials, and each trial included a teaching phase and a question phase. Unlike in Study 2, in Study 3 both the experimenter and the puppet spoke to all children only in Hebrew.

#### Procedure

The procedure was identical to the procedure in Study 2's puppet-absent conditions with the exceptions that the puppet was introduced to all children as being monolingual and that all of the conversation, labeling, and requests took place in Hebrew. As in Study 2, the novel labels taught by the experimenter and requested by the puppet were in count noun syntax.

### Results and Discussion

The main hypothesis for this one-language absent-speaker condition was that although bilingual children might accept two names for the same object, monolingual children would tend to avoid doing so. The dependent measure used in the analyses was the number of trials, out of eight, in which children selected the unlabeled object in response to the puppet's request.

A  $t$  test revealed that, indeed, monolingual children ( $M = 5.4$ ,  $SD = 1.4$ ) were more likely to select the unlabeled object than were bilingual children ( $M = 4.2$ ,  $SD = 1.6$ ),  $t(22) = 2.06$ ,  $p < .05$  (one-tailed),  $SE = 0.61$ . Comparisons against chance (chance = 4 selections) revealed that although monolingual children's frequency of unlabeled object selection significantly differed from chance,  $t(11) = 3.56$ ,  $p < .01$ , bilingual children's did not,  $t(11) = .36$ ,  $p > .7$ .

As in the previous studies, children in Study 3 were also classified in terms of their individual selection strategies. Children who selected the unlabeled object on at least six out of the eight trials were classified as “avoiders of overlap”; children who selected the unlabeled object on fewer than six trials were classified as “accepters of overlap.” Of the 12 monolingual children, 7 were

classified as avoiders. Of the 12 bilingual children, only 3 were. Comparisons of these distributions with the expected chance distributions calculated according to the binomial theorem revealed that whereas the distribution of monolingual children significantly differed from chance,  $\chi^2(1, N = 12) = 18.44, p < .01$ , the distribution of bilingual children did not,  $\chi^2(1, N = 12) = 1.04, p > .3$ .

The findings of this study are consistent with the idea that bilingual children might have different assumptions than monolingual children about the knowledge other speakers have of language. This conclusion helps elucidate the apparent disparity in the findings in the absent conditions of Studies 1 and 2. Specifically, in Study 1's common-absent condition, children tended to select the unlabeled creature in response to the absent puppet's request. In contrast, in Study 2's bilingual-absent condition, children tended to select randomly between the objects. The findings of Study 3 intimate that this disparity might have to do with the fact that whereas participants in Study 1 were monolinguals, participants in Study 2 were bilinguals. Monolingual children seem to assume that everybody knows conventional count nouns. Bilingual children might believe that there are conventional ways to refer to objects, but they do not presuppose that everybody knows them.

### General Discussion

My goal in the present studies was to provide convergent evidence regarding children's assumptions of conventionality and contrast. Specifically, I aimed to show that children assume certain words are known by speakers of their language, expect speakers to use those words to refer to their conventional referents, and infer a contrasting referent if speakers do not use these words.

Study 1 revealed that children make the assumption about word knowledge only with respect to common nouns, not with respect to proper nouns. Accordingly, they followed the reasoning process described above and inferred that a speaker who presumably knew a common noun for an animate-like creature but asked children for the referent of a different name likely had a different referent in mind. The findings of this study are important for a number of reasons.

First, the fact that children responded differently when taught a common noun for a novel creature than when taught a proper noun for a creature indicates that children do not have a general assumption that everything they know others know as well. Moreover, it revealed that children do not even assume that others know all the names they know. These findings are consistent with recent studies showing children's sensitivity to the knowledge conditions underlying the distinction between common and proper nouns (Birch & Bloom, 2002) and to speakers' knowledge of words in general (Sabbagh & Baldwin, 2001).

Second, the finding that the children in the common-absent condition responded differently from those in the proper-absent condition, as described above, also shows that grammatical cues—here, lexical form class—are evidently taken into account by children in their word-learning inferences. A number of studies have shown that English-speaking children even younger than the ones tested in Study 1 are capable of distinguishing between proper and count nouns (Gelman & Taylor, 1984; Hall et al., 2001; Katz et al., 1974). Hall and Graham (1999) further found that children made different inferences in a task similar to the one used

in Study 1 depending on whether the labels used were proper nouns or adjectives. Study 1 showed that despite the more ambiguous syntactic distinction between proper and count nouns in Hebrew, Hebrew-speaking preschoolers could distinguish between the two. More generally, nonetheless, Study 1 demonstrates that lexical form class cues are not sufficient to account for children's inferences in this particular communicative context. In this sense, the findings are in line with current proposals that multiple cues, available to different degrees, with different weights, and perhaps at different developmental stages, are recruited in children's inferences about word meanings (Hollich, Hirsh-Pasek, & Golinkoff, 2000; Woodward & Markman, 1998).

Last and most important, the findings of Study 1 support the pragmatic explanation of children's inferences about noun referents expressed in Clark's (1988, 1990) principles of conventionality and contrast and empirically tested by Diesendruck and Markson (2001). The two puppet-present conditions in Study 1 provide indirect evidence for this claim by showing the importance of the knowledge component in children's inferences. Specifically, when the puppet was present during the experimenter's presentation of Creature A's name, the children inferred that the puppet knew that name and interpreted his use of a different name as implying a different referential intent. The strongest evidence for Clark's argument, however, comes from the common-absent condition. Here—but not in the proper-absent condition—even though the puppet did not hear Creature A's name, the children behaved as if he knew it and interpreted his use of a different name as indicating a contrasting referential intent.

Diesendruck and Markson (2001) proposed that the reasoning process described by Clark (1988, 1990) might in fact be applicable to a variety of referential acts. They tested this proposal by manipulating a speaker's state of knowledge and teaching children either names for or facts about novel objects. They found that when children were given a name for an object (always a count noun), it did not matter whether the speaker was present or absent—in both cases the children responded to the puppet's request for the referent of a different name by selecting the unlabeled object. However, when the children were told a fact about an object, the puppet's knowledge state became crucial. When the puppet was present, the children selected the object without a fact in response to the puppet's request for the referent of a different fact. When the puppet was absent, the children selected randomly between the two objects. The similarity between children's responses to facts in Diesendruck and Markson's study and to proper nouns in the present Study 1 supports the idea that the reasoning process is one and the same in both communicative contexts. In this process, what is crucial is not whether children are exposed to words or facts but rather what children can assume about speakers' knowledge of the particular words and facts and their consequent plausible referential intent. To put it differently, the present findings add to those of Diesendruck and Markson in showing that also in lexical contexts, assumptions about speakers' knowledge—that is, conventionality—guide children's inferences.

Study 2 presented a different test of the importance of speakers' knowledge of words to children's inferences. Here what varied was not the type of word children were exposed to but the type of speaker asking the question. My goal in Study 2 was to create a situation in which children would be justified in believing that a speaker did not know even the common nouns used to label

objects. This was accomplished by introducing children to a speaker who did not know the language that the experimenter used to name an object. Given the speaker's ignorance, I hypothesized that the children would have to guess what he had in mind when asking for the referent of a different novel label. In contrast, when the speaker did know the language used by the experimenter, then the children could expect him to use the name the experimenter used to refer to Object A, and thus his choice of a different name—even if in a different language—likely stemmed from a contrasting referential intent. The findings of Study 2 supported this hypothesized pattern.

Only in the bilingual-present condition did the bilingual children consistently choose Object B in response to the puppet's request. It is striking that even when the monolingual puppet was present during the experimenter's naming of Object A, children still responded as if the puppet did not know that name, selecting randomly between the two objects in response to his request. This response is consistent with the finding that from very early on, bilingual children reveal awareness of the language known by their interlocutors and choose their language accordingly (Deuchar & Quay, 1999; Nicoladis, 1998; Taeschner, 1983). This finding further indicates that the difference between Au and Glusman's (1990) study and Glusman's unpublished 1988 study (cited in Au & Glusman, 1990) was not so minor. Specifically, the fact that in the former study, children were led to believe that speakers were monolinguals whereas in the latter study, children might have believed that the speakers were bilingual has important pragmatic implications that could indeed explain the different results in the studies. Children honor the principle of contrast only when they are certain that the speaker knows the alternative form for referring to an object.

The finding that children in the monolingual-absent condition also selected randomly between the objects is not surprising. After all, children thought that even if present, a monolingual puppet would not know the names used by the experimenter. The finding that children in the bilingual-absent condition also chose randomly between objects, however, is less trivial. One could have predicted that children in this condition would believe that the puppet knew the names used by the experimenter, would expect the puppet to use these names, and would thus select Object B in response to his request for a different label. In a way, that would have paralleled the findings from Study 1.

Study 3 addressed the possibility that the disparity between the findings of Studies 1 and 2 might have to do with different assumptions monolingual and bilingual children make about what others know about language. As Taeschner (1983) described, even before bilingual children become aware that they have two languages, they frequently encounter interlocutors who do not understand one of their languages. Thus, from very early on, bilingual children are faced with other people's linguistic ignorance. Parents sometimes even reinforce children's realization that some people do not know the languages by explicitly asking children to translate from one language to the other. Moreover, and perhaps relatedly, a number of studies indicate that bilingual children are more aware than monolingual children that names are not intrinsic attributes of objects but rather are arbitrary conventions (Bialystok, 1988; Cummins, 1978; Eviatar & Ibrahim, 2000; Ianco-Worrall, 1972; Rosenblum & Pinker, 1983).

The hypothesis tested in Study 3 was that given bilinguals' early communicative experiences and their awareness of linguistic arbitrariness, bilingual children might hold more conservative assumptions than monolingual children regarding their interlocutors' linguistic knowledge. Consistent with this hypothesis was the finding that bilingual, but not monolingual, children were willing to accept two names from the same language for an object when one of the names was provided by an absent speaker.

The important conclusion to be drawn from Studies 2 and 3 is that children's inferences about the referent of a new word in a multilingual context are not so much dependent on the number of languages being used as on the number of languages—or words—believed to be known by the speaker asking for the referent. In this sense, children's inferential process in a multilingual context is not an exceptional case that requires some a priori reformulation of the principles guiding children's reasoning. Rather, it is just one more communicative situation in which children's reasoning is guided by beliefs about speakers' knowledge and their probable consequent referential intents.

Previous studies had demonstrated that children are sensitive to speakers' knowledge state when inferring the referent of utterances (Akhtar, Carpenter, & Tomasello, 1996; Birch & Bloom, 2002; Diesendruck et al., 2004; Sabbagh & Baldwin, 2001). Furthermore, there was suggestive evidence that in drawing inferences about plausible referents, children discriminate between linguistic forms that are presumably known by all speakers (i.e., common nouns) from those that are not (i.e., arbitrary facts; Diesendruck & Markson, 2001). The present findings contribute to this literature by demonstrating that preschool children have fairly sophisticated assumptions about which types of *words* are generally known and by whom they are known and that children draw pragmatically sensible inferences on the basis of these assumptions. This is fundamental experimental evidence in support of the proposal that children's avoidance of two names for the same object in communicative contexts similar to the one instantiated in the present experimental task may derive from the pragmatic inferences endorsed by Clark's (1988, 1990) principles of conventionality and contrast.

The importance of these findings with words is further heightened when taking into consideration the lexical constraints account of this particular phenomenon and of word learning in general. Children's avoidance of lexical overlap is not an unwavering response driven by the strict honoring of lexical principles such as mutual exclusivity (Markman & Wachtel, 1988; Merriman & Bowman, 1989) or the novel-name nameless-category principle (Golinkoff et al., 1994). Rather, it is a context-dependent response that may in part develop from children's experiences in communicative interactions (Callanan & Sabbagh, 2004; Hollich et al., 2000; Woodward & Markman, 1998).

Taken together, the present studies contribute to a growing body of literature arguing that from an early age, children infer the referents of words by paying attention to cues regarding speakers' intents (e.g., Baldwin, 1993; Tomasello & Barton, 1994). The studies remind us of a perhaps trivial fact: For the young children participating in our word-learning experiments, the task is not some mathematical problem to be solved with pure logic. Rather, it is a communicative interaction to be solved by trying to figure out what is in a speaker's mind (Akhtar & Tomasello, 2000;



Baldwin & Moses, 2001; L. Bloom, 1998; P. Bloom, 2000; Clark & Grossman, 1998).

## References

- Akhtar, N., Carpenter, M., & Tomasello, M. (1996). The role of discourse novelty in early word learning. *Child Development*, 67, 635–645.
- Akhtar, N., & Tomasello, M. (2000). The social nature of words and word learning. In R. M. Golinkoff & K. Hirsh-Pasek (Eds.), *Becoming a word learner: A debate on lexical acquisition* (pp. 115–135). Oxford, England: Oxford University Press.
- Au, T. K., & Glusman, M. (1990). The principle of mutual exclusivity in word learning: To honor or not to honor? *Child Development*, 61, 1474–1490.
- Baldwin, D. A. (1993). Early referential understanding: Young children's ability to recognize referential acts for what they are. *Developmental Psychology*, 29, 832–843.
- Baldwin, D. A., & Moses, L. J. (2001). Links between social understanding and early word learning: Challenges to current accounts. *Social Development*, 10, 309–329.
- Berman, R. A. (1985). The acquisition of Hebrew. In D. I. Slobin (Ed.), *The crosslinguistic study of language acquisition: Vol. 1. The data* (pp. 255–371). Hillsdale, NJ: Erlbaum.
- Bialystok, E. (1988). Levels of bilingualism and levels of linguistic awareness. *Developmental Psychology*, 24, 560–567.
- Birch, S. A. J., & Bloom, P. (2002). Preschoolers are sensitive to the speaker's knowledge when learning proper names. *Child Development*, 73, 434–444.
- Bloom, L. (1998). Language acquisition in its developmental context. In W. Damon (Series Ed.) & D. Kuhn & R. S. Siegler (Vol. Eds.), *Handbook of child psychology: Vol. 2. Cognition, perception, and language* (5th ed., pp. 309–370). New York: Wiley.
- Bloom, P. (2000). *How children learn the meanings of words*. Cambridge, MA: MIT Press.
- Callanan, M. A., & Sabbagh, M. A. (2004). Multiple labels for objects in conversations with young children: Parents' language and children's developing expectations about word meanings. *Developmental Psychology*, 40, 746–763.
- Clark, E. V. (1988). On the logic of contrast. *Journal of Child Language*, 15, 317–335.
- Clark, E. V. (1990). On the pragmatics of contrast. *Journal of Child Language*, 17, 417–431.
- Clark, E. V. (1997). Conceptual perspective and lexical choice in acquisition. *Cognition*, 64, 1–37.
- Clark, E. V., & Grossman, J. B. (1998). Pragmatic directions and children's word learning. *Journal of Child Language*, 25, 1–18.
- Clark, E. V., & Svaib, T. A. (1997). Speaker perspective and reference in young children. *First Language*, 17, 57–74.
- Clark, E. V., & Wong, A. D. W. (2002). Pragmatic directions about language use: Offers of words and relations. *Language and Society*, 31, 181–212.
- Cummins, J. (1978). Bilingualism and the development of metalinguistic awareness. *Journal of Cross-Cultural Psychology*, 9, 131–149.
- Davidson, D., Jergovic, D., Imami, Z., & Theodos, V. (1997). Monolingual and bilingual children's use of the mutual exclusivity constraint. *Journal of Child Language*, 24, 3–24.
- Deuchar, M., & Quay, S. (1999). Language choice in the earliest utterances: A case study with methodological implications. *Journal of Child Language*, 26, 461–475.
- Diesendruck, G., & Markson, L. (2001). Children's avoidance of lexical overlap: A pragmatic account. *Developmental Psychology*, 37, 630–641.
- Diesendruck, G., Markson, L., Akhtar, N., & Reudor, A. (2004). Two-year-olds' sensitivity to speakers' intent: An alternative account of Samuelson and Smith. *Developmental Science*, 7, 33–41.
- Diesendruck, G., & Shatz, M. (2001). Two-year-olds' recognition of hierarchies: Evidence from their interpretation of the semantic relation between object labels. *Cognitive Development*, 16, 577–594.
- Eviatar, Z., & Ibrahim, R. (2000). Bilingual is as bilingual does: Metalinguistic abilities of Arab-speaking children. *Applied Psycholinguistics*, 21, 451–471.
- Gathercole, V. C. (1989). Contrast: A semantic constraint? *Journal of Child Language*, 16, 685–702.
- Gelman, S. A., & Taylor, M. (1984). How two-year-old children interpret proper and common names for unfamiliar objects. *Child Development*, 55, 1535–1540.
- Genesee, F., Boivin, I., & Nicoladis, E. (1996). Talking with strangers: A study of bilingual children's communicative competence. *Applied Psycholinguistics*, 17, 427–442.
- Golinkoff, R. M., Mervis, C. B., & Hirsh-Pasek, K. (1994). Early object labels: The case for a developmental lexical principles framework. *Journal of Child Language*, 21, 125–156.
- Grice, P. H. (1975). *Studies in the ways of words*. Cambridge, MA: Harvard University Press.
- Hall, D. G. (1994). Semantic constraints on word learning: Proper names and adjectives. *Child Development*, 65, 1299–1317.
- Hall, D. G., & Graham, S. A. (1999). Lexical form class information guides word-to-object mapping in preschoolers. *Child Development*, 70, 78–91.
- Hall, D. G., Lee, S. C., & Belanger, J. (2001). Young children's use of syntactic cues to learn proper names and count nouns. *Developmental Psychology*, 37, 298–307.
- Hall, D. G., Quantz, D. H., & Persoage, K. A. (2000). Preschoolers' use of form class cues in word learning. *Developmental Psychology*, 36, 449–462.
- Hollich, G. J., Hirsh-Pasek, K., & Golinkoff, R. M. (2000). Breaking the language barrier: An emergentist coalition model for the origins of word learning. *Monographs of the Society for Research in Child Development*, 65(3, Serial No. 262).
- Ianco-Worrall, A. (1972). Bilingualism and cognitive development. *Child Development*, 43, 1040–1053.
- Imai, M., & Haryu, E. (2001). Learning proper nouns and common nouns without clues from syntax. *Child Development*, 72, 787–802.
- Katz, N., Baker, E., & Macnamara, J. (1974). What's in a name? A study of how children learn common and proper names. *Child Development*, 45, 469–473.
- Markman, E. M. (1991). The whole object, taxonomic, and mutual exclusivity assumptions as initial constraints on word meanings. In S. A. Gelman & J. P. Byrnes (Eds.), *Perspectives on language and thought* (pp. 72–106). New York: Cambridge University Press.
- Markman, E. M., & Wachtel, G. F. (1988). Children's use of mutual exclusivity to constrain the meaning of words. *Cognitive Psychology*, 20, 121–157.
- Masur, E. F. (1997). Maternal labeling of novel and familiar objects: Implications for children's development of lexical constraints. *Journal of Child Language*, 24, 427–439.
- Merriman, W. E., & Bowman, L. L. (1989). The mutual exclusivity bias in children's word learning. *Monographs of the Society for Research in Child Development*, 54(3–4, Serial No. 220).
- Merriman, W. E., & Kutlesic, V. (1993). Bilingual and monolingual children's use of two lexical acquisition heuristics. *Applied Psycholinguistics*, 14, 229–249.
- Mervis, C. B., & Bertrand, J. (1994). Acquisition of the novel name nameless category (N3C) principle. *Child Development*, 65, 1646–1662.
- Nicoladis, E. (1998). First clues to the existence of two input languages: Pragmatic and lexical differentiation in a bilingual child. *Bilingualism: Language and Cognition*, 1, 105–116.
- Ninio, A., & Bruner, J. S. (1978). The achievement and antecedents of labeling. *Journal of Child Language*, 5, 1–15.
- Pearson, B. Z., Fernandez, S., & Oller, D. K. (1995). Cross-language

- synonyms in the lexicons of bilingual infants: One language or two? *Journal of Child Language*, 22, 345–368.
- Petitto, L. A., Katerelos, M., Levy, B. G., Gauna, K., Tetreault, K., & Ferraro, V. (2001). Bilingual signed and spoken language acquisition from birth: Implications for the mechanisms underlying early bilingual language acquisition. *Journal of Child Language*, 28, 453–496.
- Rosenblum, T., & Pinker, S. A. (1983). Word magic revisited: Monolingual and bilingual children's understanding of the word-object relationship. *Child Development*, 54, 773–780.
- Sabbagh, M. A., & Baldwin, D. A. (2001). Learning words from knowledgeable versus ignorant speakers: Links between preschoolers' theory of mind and semantic development. *Child Development*, 72, 1054–1070.
- Sorrentino, C. (2001). Individuation, identity, and proper names in cognitive development. *Developmental Science*, 4, 399–407.
- Sperber, D., & Wilson, D. (1986). *Relevance: Communication and cognition*. Cambridge, MA: Harvard University Press.
- Taeschner, T. (1983). *The sun is feminine: A study on language*. Berlin: Springer-Verlag.
- Tomasello, M., & Barton, M. (1994). Learning words in nonostensive contexts. *Developmental Psychology*, 30, 639–650.
- Volterra, V., & Taeschner, T. (1978). The acquisition and development of language by bilingual children. *Journal of Child Language*, 5, 311–320.
- Waxman, S. R., & Hatch, T. (1992). Beyond the basics: Preschool children label objects flexibly at multiple hierarchical levels. *Journal of Child Language*, 19, 153–166.
- Wellman, H. M., Cross, D., & Watson, J. (2001). Meta-analysis of theory of mind development: The truth about false-belief. *Child Development*, 72, 655–684.
- Woodward, A. L., & Markman, E. M. (1998). Early word learning. In W. Damon (Series Ed.) & D. Kuhn & R. S. Siegler (Vol. Eds.), *Handbook of child psychology: Vol. 2. Cognition, perception, and language* (5th ed., pp. 371–420). New York: Wiley.

## Appendix

### Hebrew Instructions in Study 1

#### Common Noun Conditions

##### Teaching Phase

"Tistakel lekan [pointing to Creature A]. Ata yodea, korim leze *teega*."  
Look here. You know, this (neutral) one is called (a) *teega*.  
"Ken, ze ha-*teega*. *Teegot* hen kaele. Raita paam *teegot*? Ze ha-*teega*."  
Yes, this (neutral) is the *teega*. *Teegas* are like this. Have you ever seen *teegas*? This (neutral) is the *teega*.

##### Question Phase (With a Proper Noun)

"Ani meod rotze lirot et *Meloo*. Ata yachol leharot li et *Meloo*? Ani meod rotze lirot et *Meloo*."  
I really want to see *Meloo*. Can you show me *Meloo*? I really want to see *Meloo*.

#### Proper Noun Conditions

##### Teaching Phase

"Tistakel lekan [pointing to Creature A]. Hine *Teega*. Ken, hashem shelo hu *Teega*."  
Look here. Here's *Teega*. Yes, his name is *Teega*.  
"Ata makir et *Teega*? Ken, korim lo *Teega*. Zehu *Teega*."  
Do you know *Teega*? Yes, he's called *Teega*. This (masculine) is *Teega*.

##### Question Phase (With a Common Noun)

"Ani meod rotze lirot *melooim*. Yesh kan *meloo* echad? Tare li et ha-*meloo*."  
I really want to see *meloo*s. Is there a *meloo* here? Show me the *meloo*.

Received February 3, 2004

Revision received October 31, 2004

Accepted November 14, 2004 ■

### E-Mail Notification of Your Latest Issue Online!

Would you like to know when the next issue of your favorite APA journal will be available online? This service is now available to you. Sign up at <http://watson.apa.org/notify/> and you will be notified by e-mail when issues of interest to you become available!