Preschoolers' selective learning is guided by the principle of relevance

Annette M.E. Henderson [a,*], Mark A. Sabbagh [b], Amanda L. Woodward [c]

[a] School of Psychology, University of Auckland, New Zealand
[b] Department of Psychology, Queen's University, ON, Canada
[c] Department of Psychology, University of Chicago, IL, USA

ARTICLE INFO

ABSTRACT

We investigate whether preschoolers' word learning is selectively attuned to learning word–referent links that they expect will be relevant to their everyday communicative contexts. In two studies, 4-year-olds were taught the name of an unfamiliar toy that they were told was purchased either nearby or faraway. Children's memory for the link was assessed either by a speaker who was not present when it was taught or by the same speaker who taught it to them. Children who were told that the toys were from nearby learned the word–referent link, whereas children who were told the toys were from faraway did not. Our findings suggest that 4-year-olds' word learning is "attuned to relevance" – they selectively acquire new word meanings that will have communicative utility in their linguistic community. These findings provide the first evidence that children's selective word learning is driven by an overarching principle of prospective relevance.

1. Introduction

To effectively communicate with the other members of their linguistic community language learners must acquire new word meanings that are correct (i.e., shared by the members within a linguistic community) and useful for their everyday conversations. Previous work has demonstrated that young children are quite skilled at selectively acquiring new word–referent links that are likely to be correct over those that are likely to be incorrect (for a review see Sabbagh & Henderson, 2007, 2013). Yet, little is known about whether the potential relevance of a new word–referent link plays a role in children's word learning. The present research investigates whether preschoolers' word learning is specifically selective for word meanings that are likely to be useful in their everyday conversations within their own linguistic community.

Over three decades of research on children's word learning has demonstrated that children are extraordinary word learners who attain large vocabularies in a relatively short developmental period (for reviews see P. Bloom, 2000; Hall & Waxman, 2004; Sabbagh & Baldwin, 2005). Children make use of a number of sources of information to achieve this remarkable feat. For instance, in the earliest stages of word learning young children form new word–object mappings through the use of general associative learning mechanisms (e.g., Pruden, Hirsh-Pasek, Golinkoff, & Hennon, 2006) and constraints or principles that guide the inferences children make about the meanings of new words (e.g., Hollich et al., 2000; Markman, 1989, 1992). By their second birthday, children prioritize information gleaned from their social interactions as the information that they use to learn new word–object mappings (see Hollich et al., 2000; Moore, Angelopoulos, & Bennett, 1999). Specifically, children use referential cues provided by a speaker (e.g., eye gaze, body orientation, pointing, statement of impending event) to rapidly and reliably identify the correct referents of novel nouns, verbs, and adjectives (e.g., Akhtar, 2005; Akhtar & Tomasello, 1996; Baldwin,

* Corresponding author. Present address: 10 Symonds St., HSB Building, School of Psychology, University of Auckland, 1142, Private Bag 92019, Auckland, New Zealand. Tel.: +64 09 373 7599x82521; fax: +64 09 373 7450.
    E-mail address: a.henderson@auckland.ac.nz (A.M.E. Henderson).

1993a, 1993b; Baldwin et al., 1996; Tomasello & Barton, 1994; Tomasello, Strosberg, & Akhtar, 1996). Children's word learning skills play out even in highly challenging situations, such as learning the correct meaning of a new word in overheard speech, even when they are actively engaged in their own activity (e.g., Akhtar, Jipson, & Callanan, 2001; Floor & Akhtar, 2006).

Yet, children are not simply remarkable word learners – they are remarkably selective word learners. For example, children use information about a speaker's knowledge (or ignorance) to determine whether (or not) they should form a new word–referent association (e.g., Birch, Akmal, & Frampton, 2010; Nurmsoo & Robinson, 2009a, 2009b; Sabbagh & Baldwin, 2001; Sabbagh & Shafman, 2009; Sabbagh, Wdowiak, & Ottaway, 2003). In these situations children use information present in the context to avoid learning words from speakers who indicate in some way that they are unable to provide accurate information. Other situations in which children have shown selective word learning include experts versus novices (e.g., Jaswal & Neely, 2006; Sobel & Corriveau, 2010), historically reliable versus unreliable actors (e.g., Birch & Bloom, 2002; Koenig, Clément, & Harris, 2004; Koenig & Harris, 2005, 2007; Koenig & Woodward, 2010), familiar versus unfamiliar adults (e.g., Corriveau & Harris, 2009) and even live versus televised actors (e.g., Krcmar, Grela, & Lin, 2007). This selectivity is likely to be adaptive; live, reliable, knowledgeable, familiar, experts are putatively more likely to provide correct labels for objects than are speakers who lack these strong epistemic credentials.

Although there is now a considerable body of evidence demonstrating children's selective word learning, the considerations that are driving these effects remain unclear (see also Brosseau-Liard & Birch, 2011). Some have argued that children have a fairly narrow sensitivity to situations in which a speaker might be providing an incorrect word referent-link and adapt their word learning from that speaker accordingly. Within this perspective, children's selective word learning is an effort to learn conventional word–referent links and thus, specifically avoid adding error to the lexicon (see also Sabbagh & Henderson, 2007, 2013). Others have argued that children are making judgements about a speaker's epistemic credentials and avoid learning words from untrustworthy individuals (for reviews see Harris & Corriveau, 2011; Koenig, 2010). Both of these possibilities support the existing evidence; children do seem to avoid learning information if they are provided with some reason to doubt its veracity. However, explaining children's selective learning in terms of inaccuracy avoidance is narrow in scope and does not adequately capture *why* children avoid learning from speakers who lack the appropriate epistemic credentials. The purpose of the present investigation is to advance the hypothesis that the various situations in which children show selective learning may be the result of a broader more general principle at work – relevance. Specifically, the present research examines the possibility that children make judgments about the prospective relevance of a new word–referent link and adjust their word learning when the link is unlikely to be relevant to their future conversations with their linguistic community.

According to the principle of relevance as outlined by Sperber and Wilson (1986/1996), human cognition is geared towards maximizing the cognitive effect gained from (i.e., benefit of) acquiring a piece of information versus the effort required to process the information (see also Levinson, 1989; Scott-Phillips, 2010). A relevant utterance, or piece of information, is one in which an individual has determined that the likely gains of interpreting the utterance or learning the piece of information are greater than the efforts required to process them. According to Sperber and Wilson (1986/1996), relevance judgments offer a quick way of determining what gets attended to and what does not. For instance, we do not attend to every sound in our environments – it is only the distinctive sounds, such as an alarm, that we judge to be relevant and thus, attend to.

Judgements about relevance have been found to influence adults' communication and cognitive processing in a variety of contexts, including inductive reasoning (e.g., Feeney, Coley, & Crisp, 2010; Sperber, Cara, & Girotto, 1995), second language processing (e.g., Ying, 2004), and learning in educational contexts (e.g., Brown, Collins, & Duguid, 1989). Of particular importance to the present research, is the previous work that has applied the principle of relevance to children's word learning. For instance, Lois Bloom and colleagues argue that children use relevance within the word learning context insofar as children will map the new words they hear onto the object that they believe the speaker has 'in mind' (Bloom, Tinker, & Margulis, 1993; see also L. Bloom, 2000). To test the role of contextual relevance in children's word learning, Akhtar (2002) experimentally manipulated the word learning context to test whether 2- and 3-year-olds used relevance to guide their interpretation of the meaning of a new word. Akhtar established relevance by creating two different word learning contexts: one in which object shape was highlighted and the other in which object texture was highlighted. In a subsequent comprehension test, children used relevance to determine to which object property the new word referred. That is, in the shape-relevant context, children interpreted the new word as referring to the object's shape and in the texture-relevant context children interpreted the new word as referring to the object's texture. Thus, previous work examining the role of relevance in children's word learning has demonstrated that children make on-the-spot judgments about which referent a speaker "has in mind" when providing a new word (see Akhtar, 2002; L. Bloom, 2000; Bloom et al., 1993).

Our proposal of the role of relevance in children's word learning is much broader – we posit that children make judgements about the *prospective* relevance (see also Sperber and Wilson, 1986/1996) of a new word–referent link to future communicative exchanges. If children encounter a situation in which they encounter a new word–referent link that is unlikely to be useful to future conversations, they might not make the effort to processes the word–referent link (because the potential effect of knowing the word–referent link is predicted to be less than the processing efforts required to learn and store the link). To illustrate, children might assume that most of the new word–referent links they encounter are likely to be

relevant within their linguistic community. However, when a speaker who has questionable epistemic credentials provides the new word–referent link, children might reason that the link they are providing is of equally questionable relevance to their developing communicative repertoire. That is, because a word–referent link from a speaker who has previously labeled objects incorrectly is unlikely to be correct, acquiring the link is unlikely to have large effects (i.e., it will not be a useful communicative tool) and thus, the effort required to learn the link in this context is too much to rationally learn it. An overarching general principle of relevance may provide a basis for selective learning; children might be selectively learning only the words that they expect will be relevant to their future conversations.

Children do seem to be equipped with the foundation for using a general principle of relevance to guide their learning from a very early age. For instance, judgments about the relevance of a given word to future conversations are likely to be based upon an understanding of conventionality – the understanding that words are useful communicative tools because their meanings are shared by the individual members of linguistic groups (Clark, 1993, 2007). To illustrate, there is nothing inherent in the linguistic label "pig" that ties it to its referent, which is obvious when considering the fact that the same referent has wholly different names across languages (e.g., "pig", "cochon", "puaka"). However, the label "pig" is only relevant because the members of the English linguistic community share knowledge of its meaning. There is now considerable evidence demonstrating that even very young children understand that word meanings are shared by individuals within a linguistic community (e.g., Buresh & Woodward, 2007; Clark, 1993, 2007; Graham, Stock, & Henderson, 2006; Henderson & Graham, 2005; Henderson & Woodward, 2012). An appreciation of conventionality may provide a foundation for judgements about relevance insofar as the words that have communicative utility within a group of speakers are those, which have meanings that are shared among the group members. In turn, children's judgements about the likelihood that a word might be shared may provide a basis for selective learning such that children may avoid learning words that are unlikely to be shared within their linguistic group (see also Diesendruck, Carmel, & Markson, 2010; Diesendruck & Markson, 2011; Sabbagh & Henderson, 2007, 2013).

Relevance, however, is a broader consideration than conventionality. Specifically, conventionality provides a basis for evaluating the correctness of a word, but correctness is only one basis for determining whether a word meaning might be relevant. For instance, there are many situations in which words are correct, but not relevant to one's own linguistic community. For instance, specialized terms (i.e., jargon) are only relevant to specific groups of people and words from other languages are correct, but not relevant to individuals who do not speak the language. If relevance is a general principle driving children's word learning, it would be expected that children would avoid learning a new word–referent link in any context in which the link is likely to be a useless communicative tool. Herein lies one reason why our hypothesis is appealing – relevance offers a more parsimonious account of children's selective word learning, and possibly of children's selective learning across a broad range of contexts.

In sum, children have been shown to be remarkably selective word learners. However, it remains unclear whether children's selective word learning stems from a specific strategy such as avoiding learning incorrect word–referent links or a general strategy to avoid learning irrelevant word–referent links. The two experiments reported here provide the first investigation of this possibility by examining whether children would show selective learning effects when they are confronted with evidence that a word might be "correct" but the word has no obvious communicative utility and is thus irrelevant to their everyday communicative contexts. We tested this possibility by examining whether preschoolers will learn the name of an object from a faraway country. Unlike object labels provided by ignorant or inaccurate speakers, preschoolers do not have any reason to doubt the accuracy of the name of an object from a different country. However, without additional information to the contrary, preschoolers might also judge the label to be irrelevant within their own linguistic community because the referent of the label is unlikely to be widely known.

In the following experiments 4-year-old children were shown three unfamiliar toys and were provided with a new word–referent link in one of two conditions. Children in the *Nearby Condition* were told that the toys were purchased "downtown" and were special to kids who lived nearby. Children in the *Faraway Condition* were told that the toys were purchased in a faraway country and were special to kids who lived there. A second experimenter entered the room and labeled one of the toys. After a brief delay, children's memory for the word–referent link was assessed using a specially designed comprehension test. If preschoolers' word learning is attuned to relevance, children in the faraway condition should be less likely to learn the new word–referent link than the children in the nearby condition.

2. Experiment 1

2.1. Method

2.1.1. Participants

Twenty-four monolingual English-speaking 4-year-olds (12 males; *mean age* = 50 months, range = 48–54 months) were recruited to participate in this experiment from a database of families interested in volunteering for child development studies. Participants were primarily of Caucasian, middle-class background from a middle-sized university town in North America. Participants received a small toy and a gift certificate for their participation.

2.1.2. Materials and procedure

Children were randomly assigned to either the *Nearby Condition* or the *Faraway Condition*. Children were shown a set of three unfamiliar toys (Fig. 1), one of which was associated with one of two novel words (i.e., *uzma* or *medo*). Both the toy set and novel label to which children
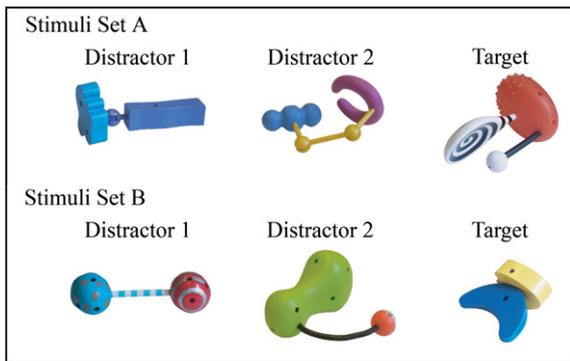
Fig. 1. Object sets used in both experiments.

were exposed were counterbalanced across participants, however toy Set A was always paired with the label uzma (i.e., Set B was paired with medo). The rationale for having two toy sets will become clear in the procedure section described below.

Children in the *Faraway Condition* were told that a friend of the experimenter purchased the toys in Japan and that only children who lived in Japan would be able to play with these types of toys. Children in the *Nearby Condition* were told that a friend of the experimenter purchased the toys downtown and that only children who lived nearby would be able to play with these types of toys. After parents provided informed consent, the experimenter escorted children to the playroom. All children, regardless of condition, participated in the following three phases: warm-up, label training, and comprehension test. Thus, the only difference between conditions was whether children were told that the toys were purchased either faraway or nearby. Parents watched the session from the waiting room through a closed-circuit monitor.

2.1.2.1. Warm-up. The warm-up began with the experimenter telling children that she had to see if she had any messages on her 'TV phone'. She asked children to sit in a chair that was 55–60 cm from a 17″ computer monitor (i.e., the TV phone). Once children were seated, the experimenter played a pre-recorded message from a friend of the experimenter's (i.e., Sue). Sue said that she recently got back from either a trip to Japan (faraway condition) or a walk downtown (nearby condition). In both conditions, Sue said that she had bought a picture book that contained pictures of things found where they lived and things found in Japan, and encouraged the experimenter to have a look at it. When the message ended, the experimenter and children looked through the book, which contained eight pictures showing the clothing, food, houses, and games found in Japan and Canada. After finishing the book, the experimenter pressed a button on the hidden tape recorder to start the recording that set up the next phase.

2.1.2.2. Label training. In this phase, children overheard a mock phone call between the experimenter and Sue in which Sue said that she forgot to mention that she "also bought some toys that were special to kids who either lived in Japan" (faraway condition) or "around here" (nearby

condition) and that one of them was called an *uzma* (or *medo*). She said that the experimenter could play with the toys, but that she would come by soon to pick them up. After repeating this information, the experimenter 'found' the toys and placed them on the table in an order that was counterbalanced across participants. After stating that she had never seen these toys before, the experimenter and the child played with each toy in turn.

After 2 min, Sue entered the room, took two steps towards the table while looking at the toys and stopped. She then looked at the experimenter, the child, the target toy, and said, "Oh great! You found the *uzma* (or *medo*)". Keeping her attention on the target toy, she took two more steps to kneel beside the experimenter, grabbed the target toy and put it in her bag. She looked back up at the experimenter, the child, and then at the remaining toys and said, "And you found the other toys too". Sue put the remaining toys in her bag and left the room.

2.1.2.3. Comprehension test. After five minutes of completing an unrelated puzzle with the child, the experimenter inconspicuously started the recording of a mock phone call with "Danny" to set up the comprehension test. Danny said, "Sue gave me pictures of the toys that she bought in Japan/on her walk, but I do not know what they all are! Can you help me using the TV phone?" After agreeing to help, the experimenter invited children to sit in front of the TV phone to help Danny with the pictures. The experimenter explained that Danny would be requesting the child to point to pictures of objects and then initiated the comprehension test. Children were also told that some times Danny might not see the object that they pointed to so, might have to ask again. This statement was provided to provide children with a reason for the fact that there were three trials of each type of trial during the comprehension test (see below).

The comprehension test was designed using E-prime (Psychology Software Tools, Inc.; Schneider, Eschman, & Zuccolotto, 2002) and consisted of two practice trials, three test trials, three unknown-label trials, and three familiar-label trials. For the practice trials children were shown pictures of three familiar items (i.e., brush, cup, fork) and were asked to select the brush. Because each trial followed the same general structure (Fig. 2), the practice trials served to familiarize children to the trial structure and also to the fact that Danny might request objects more than one time. For the *test* trials, children saw a picture of the toys they saw during the training phase and were asked to select the toy that had been labeled (i.e., "Show me the uzma/medo"). For the *unknown-label* trials children saw a picture of the set of three unfamiliar toys they had not seen before and were asked to select the object that was the referent of the novel label that they had not heard during training (i.e., "Show me the medo/uzma"). That is, children who were introduced to toy Set A during training saw the Set B pictures in the unknown-label trials of the comprehension test and vice versa. Thus, the unknown-label trials enabled us to ensure that the target object in each toy set was not more salient than the other two objects. For the *familiar-label* trials children saw a picture of three familiar toys (i.e., car, motorcycle, helicopter) and were asked to
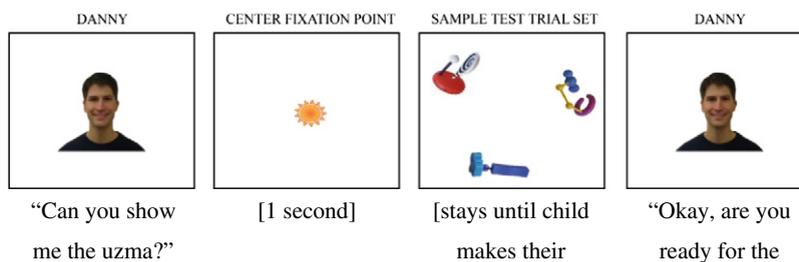
Fig. 2. Trial structure for the comprehension test used in both experiments.

point to a familiar object (i.e., "Show me the car"). These trials were administered to ensure that children in both conditions did not have any difficulties following the comprehension test instructions.

To control for any preferences that children might have with respect to where to point on the screen in response to Danny's request for objects, there were three trials of each trial type so that every toy appeared at each of the three possible locations. There were two versions of the comprehension test in which the order of the trials was randomly pre-determined with two constraints: any given trial type could not occur consecutively and all three trial types were presented once before a trial type was repeated. The experimenter stood behind children and controlled the flow of the comprehension test. For consistency across trials, the timing from the onset of the comprehension question to the onset of the pictures of the three objects was set to 1 s. There were six testing orders; the order to which children were assigned was randomly predetermined, but balanced across gender and condition.

Thus, our novel computerized comprehension test enabled us to conduct a series of comprehension test trials that were designed to: (1) assess children's memory for the word–referent link (i.e., the test trials), (2) control for children's preferences for a particular target object (i.e., the unknown-label trials), or object location (i.e., three types of each trial), and (3) ensure that children in both conditions were "playing along" with the comprehension test (i.e., the familiar-label trials).

2.1.3. Coding

Video recordings were used to code children's selections offline. Children received one point each time the target was selected. The target for the test trials was the toy that had been labeled in training. For the unknown-label trials, the target was the toy that was labeled during training for the children who were tested in the other counterbalancing orders. For the familiar-label trials, the target was the car. Participants' responses were summed resulting in a total score (Max = 3) for each trial type. A second coder coded 25% of the participants (percent agreement = 100%).

2.2. Results and discussion

Children performed at ceiling on the familiar-label comprehension test trials, which suggests that they had no trouble with the mechanics of the comprehension test

(Fig. 3). Further, children's performance on the unknown-label trials was at chance ($M = 1.00$), thereby showing that the target stimuli were equally salient.

In the focal analyses, children in the nearby condition ($M = 2.25$, $SE = 0.33$) were significantly more likely to select the target object during the test trials than were children in the faraway condition ($M = 1.08$, $SE = 0.31$), $t(22) = 2.57$, $p = .017$, $d = 1.10$. Further, children in the nearby condition selected the target object on the test trials significantly more often than what would be expected by chance, $t(11) = 3.80$, $p = .003$, $d = 1.09$, though children in the faraway condition did not, $t(11) = 0.27$, $p = .795$, $d = 0.07$.

In the last set of analyses we explored differences between conditions in children's target object selection on the first test and first unknown-label trials (see Table 1). Because all children in both conditions performed at ceiling on the familiar-label trials, analyses were not conducted on the first familiar-label trial. Analysis of the first unknown-label trial revealed no significant differences between conditions in the number of children who selected the target object on the first unknown-label trial, $X^2(1, N = 24) = 0.75$, $p = .39$. In contrast, a significantly greater number of children selected the target object on the first test trial in the nearby condition than in the faraway condition, $X^2(1, N = 24) = 8.22$, $p = .004$. Thus, the first trial analyses confirmed the results of the focal analyses; children in the nearby condition were more likely to evidence learning of the word–referent link than were children in the faraway condition.

Taken together, the above analyses demonstrate that 4-year-olds who were told that a toy was purchased nearby showed evidence of learning the name of a novel toy, whereas 4-year-olds who were told that the same toy was purchased in a faraway country did not. These findings provide the first evidence suggesting that children's word learning is attuned to learning the words that they expect will be relevant to their everyday conversations.

These findings are intriguing because for the most part, children are outstanding word learners who are exquisitely sensitive to covariances established by intentional, canonical, and ostensive labeling (see Smith & Yu, 2008). In the present study, there was no reason for children to doubt the speaker's epistemic credentials given that a live speaker who they were told had knowledge of the toys provided the label in a confident manner with all of the relevant ostensive cues (e.g., temporal contingency between providing the label and selecting the toy, eyegaze, joint
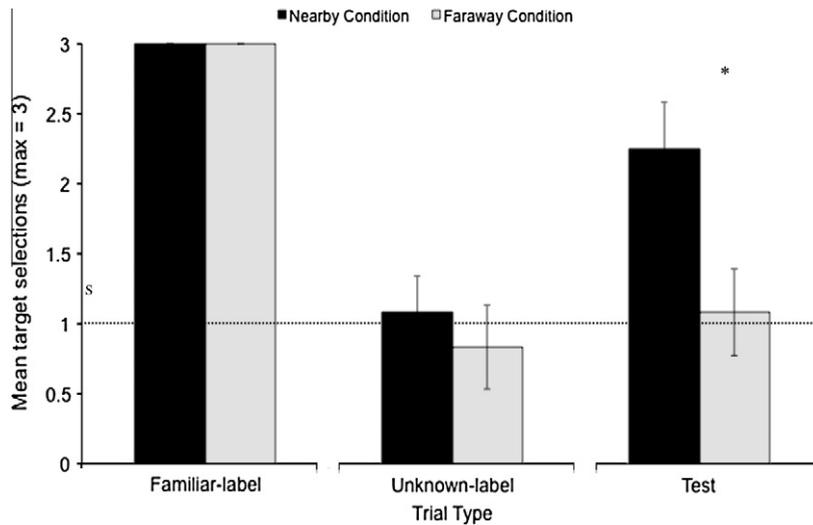
Fig. 3. Experiment 1: Mean number of target toy selections (±1 *SE*) across conditions for each trial type of the comprehension test. The horizontal line represents chance. *$p < .05$.

Table 1
Number of children in each condition of Experiment 1 who selected the target object on the first trial of each type of trial during the comprehension test.

Condition	Type of test trial		
	Test	Unknown-label	Familiar-label
Nearby ($n = 12$)	10	5	12
Faraway ($n = 12$)	3	3	12

attention). Despite the presence of all of the cues that typically ensure that children learn a new word–referent link, children in the faraway condition did not evidence learning of the link. These findings support the possibility that preschoolers' failure to learn in the faraway condition stems from a selectivity in their word learning that is more general than the specific 'error-avoidance' or 'epistemic vigilance' strategies hypothesized in the current literature. Our preferred interpretation is that, in line with the relevance hypothesis, children's selectivity is attributable to a general motivation to learn the words that are likely to be effective communicative tools within their own linguistic community and avoid learning the words that are not.

The novel nature of these findings requires that they be replicated, which was the main aim of our second experiment. A second aim was to gain insight into the extent to which learning was restricted. A strong prediction of the relevance hypothesis is that upon hearing that the toys were purchased faraway, preschoolers may have deemed the target toy as irrelevant and in turn, completely ignored its name when provided by the speaker. However, an alternative possibility is that children's performance in the faraway condition was a result of attenuated learning. That is, although children might have deemed the name of an object from a faraway country as irrelevant to the broader community of speakers, they might have deemed it to be potentially relevant to the current context; perhaps for use in the near future with the speaker who taught them

the link (for example see the results reported by Sabbagh & Shafman, 2009). If this were the case, children in the faraway condition might have directed some attention to encoding the word–referent link, which may have resulted in the formation of a weak representation of the link. If the children in the faraway condition did form some representation of the word–referent link, adding retrieval cues at the time of testing might help them evidence word learning in the comprehension test. Experiment 2 tested this possibility by having the same speaker who labeled the object ask the comprehension question in the faraway condition. We reasoned that the presence of the same speaker in training and testing could constitute a retrieval cue (see Samuelson & Smith, 1998) that may bolster children's responding in the comprehension test if they had established a weak word–referent link in the faraway condition.

3. Experiment 2

3.1. Method

3.1.1. Participants

Twenty-four typically developing monolingual English-speaking 4-year-olds (12 males; *mean age* = 51 months, range = 48–54 months) participated in this experiment. Two additional children participated, but were excluded because they did not watch the labeling episode ($n = 1$) or choose the car on at least two of the familiar trials ($n = 1$). Participants were primarily of Caucasian descent and were recruited in the same manner as in Experiment 1.

3.1.2. Materials and procedure

The design, materials, procedure, and scoring were identical to those in Experiment 1. Participants were randomly assigned to either the *Nearby Condition* or the *Faraway-Same Speaker Condition*. Children in the nearby condition were told that a friend of the experimenter (i.e., Sue) purchased the toys nearby and that only the

children who lived nearby played with these types of toys. Children in the faraway condition were told that Sue purchased the toys in a faraway country (Kaipang) and that only the children who lived there would be able to play with these types of toys. However unlike the faraway condition in Experiment 1, Sue provided the label during training and asked the comprehension test questions in the faraway condition of this experiment. Thus, to set-up for the comprehension test in the faraway condition Sue said "I have pictures of the toys that I bought in Kaipang, can you look at them with me using the TV phone?" A second coder coded 25% of the participants (percent agreement = 100%).

3.2. Results and discussion

Children performed at ceiling on the familiar-label comprehension questions, thereby showing that they had no trouble with the mechanics of the comprehension test (Fig. 4). Children's performance on the unknown-label trials suggests that the target stimuli were equally salient. Most important, children in the nearby condition ($M = 2.08$, $SE = 0.31$) selected the target object on significantly more of the test trials than did children in the faraway-same speaker condition ($M = 1.08$, $SE = 0.31$), $t(22) = 2.26$, $p = .03$, $d = 0.93$. Further, children in the nearby condition selected the target object on the test trials significantly more often than what would be expected by chance, $t(11) = 3.46$, $p = .005$, $d = 1.0$, whereas children in the faraway-same speaker condition did not, $t(11) < 1$, $d = 0.17$.

As in the previous experiment, the last set of analyses explored differences between conditions in children's target object selection on the first test and first unknown-label trials of the comprehension test (see Table 2). Again, because all children in both conditions performed at ceiling on the familiar-label trials, analyses were not conducted on the first familiar-label trial. First trial analyses revealed no differences between conditions in the number of children who selected the target object on

Table 2
Number of children in each condition of Experiment 2 who selected the target object on the first trial of each type of trial during the comprehension test.
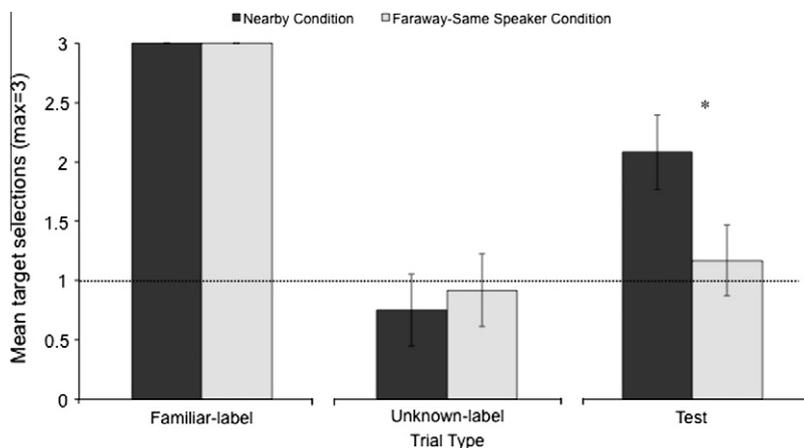
Condition	Type of test trial		
	Test	Unknown-label	Familiar-label
Nearby ($n = 12$)	10	4	12
Faraway-same speaker ($n = 12$)	5	3	12

the first unknown-label trial, $X^2(1, N = 24) = 0.20$, $p = .65$. In contrast, a significantly greater number of children selected the target object on the first test trial in the nearby condition than in the faraway-same speaker condition, $X^2(1, N = 24) = 4.44$, $p = .035$. Thus, the findings of the first trial analyses confirm the findings of the focal analyses; children in the nearby condition were more likely to select the target object on the test trials than were children in the faraway-same speaker condition.

Together, the above analyses clearly replicate and extend those of Experiment 1. Four-year-olds learned the name of an unfamiliar object if they were told that the object was purchased and special to children who lived nearby, but not if they were told that it was purchased and special to children who lived in a different country. Further, providing children in the faraway condition with a retrieval cue at the time when their comprehension of the word–referent link was assessed did not help them remember the link thereby suggesting that they may not have encoded it in the first place.

4. General discussion

Children are remarkably selective word learners (e.g., Birch & Bloom, 2002; Jaswal & Neely, 2006; Koenig & Harris, 2005; Koenig & Woodward, 2010; Koenig et al., 2004; Nurmsoo & Robinson, 2009a, 2009b; Sabbagh & Baldwin, 2001; Sabbagh & Shafman, 2009; Scofield & Behrend, 2008). There is debate surrounding the considerations that

Fig. 4. Experiment 2: Mean number of target toy selections (±1 *SE*) across conditions for each trial type of the comprehension test. The horizontal line represents chance. *$p < .05$.

drive children's selective word learning (see also Brosseau-Liard & Birch, 2011). Preschoolers' selectivity in word learning contexts might be accuracy driven and thus, stem from a narrow sensitivity to avoid learning inaccurate word–referent links (e.g., Sabbagh & Henderson, 2007, 2013), or it might extend more broadly based on a general principle of avoiding learning word–referent links that are unlikely to be relevant to their future conversations. The present research provides the first investigation of whether children's selective learning might be motivated by a general principle of relevance by providing a context in which children were presented with a new word–referent link that was likely to be correct, but irrelevant. Our results demonstrate that despite the presence of the speaker's certainty and clear ostensive cues highlighting an accurate word–referent link, children did not learn the name of an object that they were told was specific to children who lived outside their community. These results held even when children were provided with a retrieval cue at the time of the comprehension test. Together, our findings suggest that the potential relevance of a new word–referent link provides a basis for children's selectivity in learning such that if there is evidence that the word is unlikely to be relevant then children avoid learning. As noted above, there is a large body of evidence suggesting that even very young children are extremely capable of learning words even in the most challenging and demanding situations (for a review see Sabbagh & Baldwin, 2005). Thus, the fact that relatively subtle evidence about the origins of an object somehow disrupted these usually efficient mechanisms is intriguing, noteworthy, and extends the literature in a number of ways.

Prior to discussing how these findings contribute to the extant literature, it is important to note the elements within our design and analyses that rule-out artefactual explanations. First, care was taken to ensure that any condition differences could not be attributed to design or procedural issues that would result in variations in the treatment of children in each condition. For instance, the experimenter's script across conditions was nearly identical, all children participated in *every* phase of the study and importantly, all children were exposed to both the name of a foreign country as well as the novel word. Thus, there were no obvious differences in cognitive load across conditions. Second, we were aware that one way in which children might deal with lack of relevance is that they might be less engaged in the task once they deemed the context to be irrelevant. We believe that it is unlikely that the differences between conditions were a result of children in the faraway condition being less engaged in the task; any child who did not watch the labeling episode (coded offline via a blind coder, percent agreement = 100%) or follow the rules of the comprehension test was excluded from the analyses. Further, all children included in analyses played with all three objects during the object familiarization phase, completed the entire procedure, and cooperated attentively. Thirdly, because we saw no way in which the main experimenter could be blind to condition (i.e., she had to follow a specific script for each condition), several considerations were made to minimize the possibility of this necessary aspect of the design influencing the condition differences: (1)

the labeling event was provided by "Sue" who was not informed of the condition, (2) the experimenter was not the one requesting the objects during the comprehension test, and (3) the experimenter sat behind the child during the comprehension test to reduce the chances of any subtle cues being offered to the child.

We also do not believe that our findings are a reflection of a general aversion children have to learning words that they believe are from other languages. Although, the evidence on this question is sparse, children are skilled at learning words from a foreign language when there are clear ostensive signals that should do so (e.g., Akhtar, Menjivar, Hoicka, & Sabbagh, 2012; Au & Glusman, 1990; Diesendruck, 2005; Koenig & Woodward, 2012). Considering this evidence, we think that children's learning was diminished in the faraway conditions in both experiments not because of a bias against learning foreign words, per se, but because of something related to their consideration of the fact that the object came from a faraway country.

As noted from the outset, we believe that children's selective word learning in the present context is attributable to children following the cognitive principle of relevance (Sperber & Wilson, 1986/1996). We posit that the children in our experiments were making a prospective relevance judgement and determined that, because the object was unlikely to be relevant to their future conversations, the cognitive effect (i.e., the benefit) of knowing the name of an object from a faraway country was not worth the resources that would be required to encode and remember it. Although, there has been some attention directed towards the role of relevance in children's word learning (e.g., Akhtar, 2002; L. Bloom, 2000; Bloom et al., 1993) this attention has focused on the evidence that children are extremely adept at using information present in the word learning context to identify relevant word–referent links (i.e., the referent to which a speaker intended to refer). The present research demonstrates a different way in which relevance judgments play a role in children's word learning. In a case in which the relationship between a word and its referent is clear, children use information in the word learning context to determine the potential relevance of the link itself. Our findings suggest that when children determine that a word–referent link is unlikely to be relevant to future conversations, children avoid learning it. Interestingly, evidence suggests that children are sensitive to the prospective relevance of linguistic input quite early in development (e.g., Spelke & Kinzler, 2007). For instance, within the first year of their lives, infants direct their attention towards the sounds of their own language (see Gervain & Mehler, 2009), as well as the individuals who are providing them (Kinzler, Dupoux, & Spelke, 2007; Kinzler, Shutts, DeJesus, & Spelke, 2009). Early preferences for individuals from one's own linguistic community support the exciting possibility that, from an early age, children's information processing systems are geared towards linguistic information that is likely to be relevant to them on some level or another (see also Kuhl, 2007).

Evidence that children make judgments about the prospective relevance of a new word–referent link and adjust their word learning accordingly demonstrates an

impressive depth of children's selective word learning and thus, extends our understanding of the considerations that underlie children's selective word learning. To date, investigations of the situations in which children show selective word learning have focused on manipulating the extent to which a particular speaker is likely to have the appropriate knowledge of a new word–referent link (e.g., Birch & Bloom, 2002; Brosseau-Liard & Birch, 2011; Jaswal & Neely, 2006; Koenig & Harris, 2005; Koenig & Woodward, 2010; Koenig et al., 2004; Nurmsoo & Robinson, 2009a, 2009b; Sabbagh & Baldwin, 2001; Sabbagh & Shafman, 2009; Scofield & Behrend, 2008). The results of this prior work suggest that children are at the mercy of the person who is providing the new word–referent link; children will learn a new word–referent link, unless the person providing the link has given them some reason to doubt the accuracy of the link. These prior findings have led researchers to argue that children's selective word learning is motivated by a desire to avoid learning inaccurate word–referent links. Our findings do not rule out the possibility that the evidence, which has been collected under the broad heading of "epistemic vigilance" could reflect children's use of some criterion for selectivity. However, we propose that children recognize a diverse array of speaker characteristics that signal when a speaker is unlikely to provide relevant information, and as a result, do not exert the effort to learn the word. Within this perspective, a speaker's knowledge (or ignorance) or history of accuracy (or inaccuracy) might be two (of the many) cues that children might use to determine the potential relevance of a new word–referent link. The present findings support this possibility by revealing that any information present in the word learning context, which signals the potential relevance of a new word–referent link may affect the pattern of selectivity that children show in their word learning, even when the speaker's epistemic credentials are unmarked. Thus, these findings spark a new line of enquiry that will be focused on identifying additional factors that signal the potential relevance (or irrelevance) of a new word and thus, influence children's word learning.

We posit that the children in the present research were making a judgement about the prospective relevance of the new word–referent link, which involved a decision about whether (or not) the link would be useful to them in the future. Of course, there is likely to be large variability in what children might deem to be relevant (Sperber & Wilson, 1986/1996). Considering this, an important open question concerns the scope of the relevance judgements that children in the present research were making. One possibility is that children's judgments were self-focused – children deemed the word–referent link as irrelevant because they were unlikely to encounter the object again. The fact that children in the Faraway condition were told that the toys were special to children who live in Japan/Kaipang could have shaped this conclusion. A second possibility is that children made a group-focused relevance judgement in which they determined that the object label would not be known by the other members of their linguistic community. The growing body of evidence demonstrating an early emergence of the shared nature of words (e.g., Buresh & Woodward, 2007; Graham et al., 2006; Henderson &

Woodward, 2012) suggests that preschool-aged children would have the cognitive resources to make such considerations. A third possibility is that children used the potential relevance (or irrelevance) to self as a basis for making a broad judgment about what was likely to be relevant within their group and thus, future interactions. The current research cannot tease apart these three possibilities, however future work will address these questions by investigating whether children always avoid learning the names of foreign objects.

Within the relevance perspective, children might deem the name of an object purchased faraway worthwhile to learn if the potential effect (i.e., the potential utility of the word) were enhanced. For instance, if children were told that the object was purchased faraway, but that all of the children nearby will soon be able to play with this kind of object. If children were to evidence learning in this situation, it would be similar to previous work which has demonstrated that children will learn from ignorant or previously unreliable speakers when there is evidence to suggest that it would be appropriate to do so (e.g., Brosseau-Liard & Birch, 2011; Sabbagh & Baldwin, 2001). Investigating the range of contexts in which children show selective word learning beyond the manipulations of a speaker's knowledge and previous accuracy will enable us to identify the considerations that children use to make relevance judgements.

An open question concerns whether children seek information confirming that a new word–referent link is likely to be relevant and thus worthy of learning, or whether they assume relevance and look for cases in which a new link is likely to be irrelevant, and thus unworthy of learning. The present research does not address this specific question because children were provided with information about relevance or irrelevance depending on condition. However, relevance is assumed to underlie our everyday communicative contexts (e.g., Grice, 1975; Levinson, 1989; Scott-Phillips, 2010; Sperber & Wilson, 1986/1996). If this were the case, children might assume relevance, unless they are provided with some reason to think otherwise. Recent investigations of parents' labeling patterns during conversations with their young children lead us to speculate that children's everyday word learning contexts contain specific information about *irrelevance* rather than relevance (e.g., Henderson & Sabbagh, 2010; Luce & Callanan, 2010). For instance, Henderson and Sabbagh (2010) demonstrated that parents do not typically mark their knowledge of conventional labels (i.e., parents did not say "I know this is a car"). However, parents do mark when the label that they are providing is unlikely to be conventional (e.g., "I have no idea what this is, maybe it's a skateboard") and thus, unlikely to be relevant to conversations with the broader community. These findings are consistent with the possibility that children can assume that new word–referent links will be relevant, unless they are provided with information, such as an explicit statement of ignorance, which suggests irrelevance. When such information is encountered, young children might learn to modify their word learning accordingly. One interesting possibility open for further investigation is whether expressions of ignorance signal to children that a particular label is not worth

learning, whereas information about an object's foreign origins signals that there is no point in learning any label for that item. Future work will investigate the ways in which parents highlight irrelevance and how such information influences children's word learning.

Another open question concerns the cognitive mechanisms that account for children's selective learning with respect to relevance. The present research is consistent with the possibility that children's selectivity manifests at encoding such that they do not engage the necessary resources for encoding the association between the word and the object in the faraway conditions. This is consistent with principle of relevance outlined above, and adds the specification that children are withholding their learning efforts at the stage of encoding. Further support for this speculation comes from our finding that providing children with retrieval cues during the comprehension tests did little to improve children's performance in the faraway condition. Our studies were not designed to address this question directly, however methods exist for conducting such investigations (e.g., Sabbagh & Shafman, 2009; Sabbagh et al., 2003). Future studies using similar methods might be used to shed light on the mechanisms by which young children selectively avoid learning the names of toys that come from far away.

Applying the cognitive principle of relevance to children's selective word learning is alluring because it has the potential to provide an overarching and thus, more parsimonious explanation of the results within the selective word learning literature. Importantly, the cognitive principle of relevance might also provide a viable explanation for the children's selective learning across a broad range of contexts. Preschool-aged children have also been shown to be skilled at using a diverse array of speaker characteristics (e.g., history of accuracy versus inaccuracy, foreign versus native accent, own versus other race) to guide their acquisition of information beyond word–referent links, such as object facts and functions (see Harris & Corriveau, 2011 for a review), non-obvious properties of objects (Stock, Graham, & Chambers, 2009), actions (e.g., Buttelmann, Zmyj, Daum, & Carpenter, 2012; Schimdt, Rakoczy, & Tomasello, 2011), and game rules (e.g., Rakoczy, Warneken, & Tomasello, 2009). As with the word learning literature, *why* children avoid learning in these situations remains unclear. One well-supported possibility is that children's selective learning stems from epistemic vigilance – children avoid learning information from untrustworthy individuals (for a review see Harris & Corriveau, 2011). Our findings help explain why factors that exercise children's epistemic vigilance have been shown to play such an important role in children's knowledge acquisition. Our findings suggest that information about a speaker's trustworthiness may be one cue (out of many possible cues) that children might use to determine whether a new piece of information is likely to be relevant to their future interactions. Future studies will employ similar methods to that recruited in the present research to examine the extent to which prospective relevance judgments guide children's knowledge acquisition at a more general level.

Language development theories often assume that the ultimate goal of children's word learning is to learn the word meanings that would ensure successful communication with others (e.g., Akhtar & Tomasello, 2000). Although previous work has offered some support towards this possibility, this research tests this assumption. The present research provides evidence that children will not learn words for objects that they are told come from far away. When put together with the extant literature on selective learning, we believe that our evidence strongly suggests that children's word learning is guided by a concern for acquiring word meanings that they expect will be relevant to their everyday conversations with their own linguistic community.

Acknowledgements

References

Akhtar, N. (2002). Relevance and early word learning. *Journal of Child Language, 29*, 677–686.

Akhtar, N. (2005). The robustness of learning through overhearing. *Developmental Science, 8*, 199–209.

Akhtar, N., & Tomasello, M. (2000). The social nature of words and word learning. In M. Marschark (Series Ed.), *Counterpoints: Cognition, memory, and language. Becoming a word learner: A debate on lexical acquisition* (pp. 115–135). New York: Oxford University Press.

Akhtar, N., Menjivar, J., Hoicka, E., & Sabbagh, M. A. (2012). Learning foreign labels from a foreign speaker: The role of (limited) exposure to a second language. *Journal of Child Language, 39*, 1135–1149.

Akhtar, N., Jipson, J., & Callanan, M. (2001). Learning words through overhearing. *Child Development, 72*, 416–430.

Akhtar, N., & Tomasello, M. (1996). Two-year-olds learn words for absent objects and actions. *British Journal of Developmental Psychology, 14*, 79–93.

Au, T., & Glusman, M. (1990). The principles of mutual exclusivity in word learning: To honor or not to honor. *Child Development, 61*, 1474–1490.

Baldwin, D. A. (1993a). Early referential understanding: Infants' ability to recognize referential acts for what they are. *Developmental Psychology, 29*, 832–843.

Baldwin, D. A. (1993b). Infants' ability to consult the speaker for clues to word reference. *Journal of Child Language, 20*, 395–418.

Baldwin, D. A., Markman, E. M., Bill, B., Desjardins, R. N., Irwin, J. M., & Tidball, G. (1996). Infants' reliance on a social criterion for establishing word–object relations. *Journal of Child Development, 67*, 3135–3153.

Birch, S. A. J., Akmal, N., & Frampton, K. L. (2010). Two-year-olds are vigilant of others' non-verbal cues to credibility. *Developmental Science, 13*, 363–369.

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, P. (2000). *How children learn the meanings of words*. Cambridge: MIT Press.

Bloom, L. (2000). The intentionality model of word learning: How to learn a word, any word. In R. M. Golinkoff & K. Hirsh-Pasek (Eds.), *Becoming a word learning: A debate on lexical acquisition* (pp. 19–50). Oxford: Oxford University Press.

Bloom, L., Tinker, E., & Margulis, C. (1993). The words children learn: Evidence against a noun bias in early vocabularies. *Cognitive Development, 8*, 431–450.

Brosseau-Liard, P. E., & Birch, S. A. J. (2011). Epistemic states and traits: Preschoolers appreciate the differential informativeness of situation-specific and person-specific cues to knowledge. *Child Development, 82*, 1788–1796.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18*, 32–42.

Buresh, J. S., & Woodward, A. L. (2007). Infants track action goals within and across agents. *Cognition, 104*, 287–314.

Buttelmann, D., Zmyj, N., Daum, M., & Carpenter, M. (2012). Selective imitation of in-group over out-group members in 14-month-old infants. *Child Development*. http://dx.doi.org/10.1111/j.1467-8624.2012.01860.x.

Clark, E. V. (1993). *The lexicon in acquisition*. Cambridge: Cambridge University Press.

Clark, E. V. (2007). Conventionality and contrast in language and language acquisition. *New Directions for Child and Adolescent Development, 115*, 11–23.

Corriveau, K. H., & Harris, P. L. (2009). Choosing your informant: Weighing familiarity and recent accuracy. *Developmental Science, 12*, 426–437.

Diesendruck, G. (2005). The principles of conventionality and contrast in word learning: An empirical examination. *Developmental Psychology, 41*, 451–463.

Diesendruck, G., Carmel, N., & Markson, L. (2010). Children's sensitivity to the conventionality of sources. *Child Development, 81*, 652–668.

Diesendruck, G., & Markson, L. (2011). Children's assumption of the conventionality of culture. *Child Development Perspectives, 5*, 189–195.

Feeney, A., Coley, J. D., & Crisp, A. (2010). The relevance framework for category-based induction: Evidence from garden-path arguments. *Journal of Experimental Psychology. Learning, Memory, and Cognition, 36*, 906–919.

Floor, P., & Akhtar, N. (2006). Can 18-month-old infants learn words by listening in on conversations? *Infancy, 9*, 327–339.

Gervain, J., & Mehler, J. (2009). Speech perception and language acquisition in the first year of life. *Annual Reviews of Psychology, 61*, 191–218.

Graham, S. A., Stock, H., & Henderson, A. M. E. (2006). Nineteen-month-olds' understanding of the conventionality of object labels versus desires. *Infancy, 9*, 341–350.

Grice, H. P. (1975). *Studies in the ways of words*. Cambridge, MA: Harvard University Press.

Hall, G. D., & Waxman, S. (2004). *Weaving a lexicon*. Cambridge: MIT Press.

Harris, P. L., & Corriveau, K. H. (2011). Young children's selective trust in informants. *Philosophical Transactions of the Royal Society B, 366*, 1179–1187.

Henderson, A. M. E., & Graham, S. A. (2005). Two-year-olds' appreciation of the shared nature of novel object labels. *Journal of Cognition and Development, 6*, 381–402.

Henderson, A. M. E., & Sabbagh, M. A. (2010). Parents' use of conventional and unconventional labels in conversations with their preschoolers. *Journal of Child Language, 37*, 793–816.

Henderson, A. M. E., & Woodward, A. L. (2012). Nine-month-old infants generalize object labels, but not object preferences across individuals. *Developmental Science, 15*, 641–652.

Hollich, G. H., Hirsh-Pasek, K., Michnick-Golinkoff, R., Brand, R. J., Brown, E., Chung, H. L., et al. (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*, 138.

Jaswal, V. K., & Neely, L. A. (2006). Adults don't always know best: Preschoolers use past reliability over age when learning new words. *Psychological Science, 17*, 757–758.

Kinzler, K. D., Dupoux, E., & Spelke, E. S. (2007). The native language of social cognition. *The Proceedings of the National Academy of Sciences of the United States of America, 104*, 12577–12580.

Kinzler, K. D., Shutts, K., DeJesus, J., & Spelke, E. S. (2009). Accent trumps race in children's social preferences. *Social Cognition, 27*, 623–634.

Koenig, M. A., Clément, F., & Harris, P. L. (2004). Trust in testimony: Children's use of true and false statements. *Psychological Science, 15*, 694–698.

Koenig, M. A., & Harris, P. L. (2005). Preschoolers mistrust ignorant and inaccurate speakers. *Child Development, 76*, 1261–1277.

Koenig, M. A., & Harris, P. L. (2007). The basis of epistemic trust: Reliable testimony or reliable sources? *Episteme, 4*, 264–284.

Koenig, M. A., & Woodward, A. L. (2010). Sensitivity of 24-month-olds to the prior inaccuracy of the source: Possible mechanisms. *Developmental Psychology, 46*, 815–826.

Koenig, M. A., & Woodward, A. L. (2012). Toddlers learn words in a foreign language: The role of native vocabulary knowledge. *Journal of Child Language, 39*, 322–337.

Koenig, M. A. (2010). Selective trust in testimony: Children's evaluation of the message, the speaker and the speech act. In *Oxford studies in epistemology* (Vol. 3, pp. 253–273). Oxford: Oxford University Press.

Krcmar, M., Grela, B., & Lin, K. (2007). Can toddlers learn vocabulary from television? An experimental approach. *Media Psychology, 10*, 41–63.

Kuhl, P. K. (2007). Is speech learning 'gated' by the social brain? *Developmental Science, 10*, 110–120.

Levinson, S. C. (1989). A review of relevance. *Journal of Linguistics, 25*, 455–472.

Luce, M. R., & Callanan, M. A. (2010). Parents' object labeling: Possible links to conventionality of word meaning? *First Language, 30*, 270–286.

Markman, E. M. (1989). *Categorization and naming in children*. Cambridge: MIT Press.

Markman, E. M. (1992). Constraints children place on word meanings. *Cognitive Science, 14*, 57–77.

Moore, C., Angelopoulos, M., & Bennett, P. (1999). Word learning in the context of referential and salience cues. *Developmental Psychology, 35*, 60–68.

Nurmsoo, E., & Robinson, E. J. (2009a). Identifying unreliable informants: Do children excuse past inaccuracy? *Developmental Science, 12*, 41–47.

Nurmsoo, E., & Robinson, E. J. (2009b). Children's trust in previously inaccurate informants who were well or poorly informed: When past errors can be excused. *Child Development, 80*, 23–27.

Pruden, S. M., Hirsh-Pasek, K., Golinkoff, R. M., & Hennon, E. A. (2006). Birth of words: Ten-month-olds learn words through perceptual salience. *Child Development, 77*, 266–280.

Rakoczy, H., Warneken, F., & Tomasello, M. (2009). Young children's selective learning of rule games from reliable and unreliable models. *Cognitive Development, 24*, 61–69.

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.

Sabbagh, M. A., & Baldwin, D. A. (2005). Understanding the role of perspective taking in young children's word learning. In N. Eilan, C. Hoerl, T. McCormack, & J. Roessler (Eds.), *Joint attention: Communication and other minds* (pp. 165–184). Oxford: Oxford University Press.

Sabbagh, M. A., & Henderson, A. M. E. (2007). How an appreciation of conventionality shapes early word learning. *New Directions for Child and Adolescent Development, 115*, 25–37.

Sabbagh, M. A., & Henderson, A. M. E. (2013). Preschoolers are selective word learners. In M. R. Banaji & S. A. Gelman (Eds.), *Navigating the social world: What infants, children, and other species can teach us*. New York: Oxford University Press.

Sabbagh, M. A., & Shafman, D. (2009). How children block learning from ignorant speakers. *Cognition, 112*, 415–422.

Sabbagh, M. A., Wdowiak, S. D., & Ottaway, J. M. (2003). Do word learners ignore ignorant speakers? *Journal of Child Language, 30*, 905–924.

Samuelson, L. K., & Smith, L. B. (1998). Memory and attention make smart word learning: An alternative account of Akhtar, Carpenter, and Tomasello. *Child Development, 69*, 94–104.

Schimdt, M. F. H., Rakoczy, H., & Tomasello, M. (2011). Young children attribute normativity to novel actions without pedagogy or normative language. *Developmental Science, 14*, 530–539.

Schneider, W., Eschman, A., & Zuccolotto, A. (2002). *E-prime reference guide*. Pittsburgh: Psychology Software Tools Inc.

Scofield, J., & Behrend, D. A. (2008). Learning words from reliable and unreliable speakers. *Cognitive Development, 23*, 278–290.

Scott-Phillips, T. C. (2010). The evolution of relevance. *Cognitive Science, 34*, 583–601.

Smith, L., & Yu, C. (2008). Infants rapidly learn word–referent mappings via cross-situational statistics. *Cognition, 106*, 1558–1568.

Sobel, D. M., & Corriveau, K. (2010). Children monitor individuals' expertise for word learning. *Child Development, 81*, 669–679.

Spelke, E. S., & Kinzler, K. D. (2007). Core knowledge. *Developmental Science, 10*, 89–96.

Sperber, D., & Wilson, D. (1986/1996). *Relevance. Communication and cognition*. Oxford: Blackwell.

Sperber, D., Cara, F., & Girotto, V. (1995). Relevance theory explains the selection task. *Cognition, 57*, 31–95.

Stock, H. R., Graham, S. A., & Chambers, C. G. (2009). Generic language and speaker confidence guide preschoolers' inferences about novel animate kinds. *Developmental Psychology, 45*, 884–888.

Tomasello, M., & Barton, M. (1994). Learning words in non-ostensive contexts. *Developmental Psychology, 30*, 639–650.

Tomasello, M., Strosberg, R., & Akhtar, N. (1996). Eighteen-month-old children learn words in non-ostensive contexts. *Journal of Child Language, 23*, 157–176.

Ying, H. G. (2004). Relevance mapping: A study of second language learners' processing of syntactically ambiguous sentences in English. *Second Language Research, 20*, 232–255.