Chapter 5
The Process of Active Word Learning

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Abstract Language learning is largely a robust process that seems to progress automatically in typically developing children. In the preschool years, some children may also make active, self-directed attempts at learning words that they are curious about. This may involve asking questions about unknown words that they encounter. We propose that asking information-seeking questions about word meanings requires preschoolers to monitor uncertainty, be aware of their lexical ignorance, and be motivated by curiosity. We provide some preliminary data that suggest questions about word meaning emerge during the preschool period, but children are not equally inclined to ask such questions. We also provide evidence that awareness of gaps in one's lexicon may benefit word learning and that children with larger vocabularies were more likely to ask about unknown words than those with smaller vocabularies.

Introduction

Preschoolers adroitly make use of most types of information to learn names for things. In experimental tasks, they have been shown to learn words in both ostensive and non-ostensive contexts, when being directly spoken to and when listening in on others' conversations, incidentally and with rich verbal support, with the help of constraints and heuristics, conceptual information, associations between names and objects, and social pragmatic supports (Bloom P., 2000; Hollich, Hirsh-Pasek, & Golinkoff, 2000; Shneidman & Woodward, 2016; Tare & Gelman, 2010; Waxman & Gelman, 2010). Clearly, preschoolers use multiple, redundant sources of information to learn names for things (Saylor, Baldwin, & Sabbagh, 2004).

With rare exceptions, the lion's share of research on preschoolers' word learning involves an informant providing information to a more or less passive child partici-

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pant. The researcher tightly controls the provision of information. This makes a great deal of sense—if the focus of a study is to determine whether children use a particular type of word learning cue, restricting the flow of the information so that it is equated across participants is a necessary design feature. However, one unintended consequence of this is that an additional mechanism that supports word learning during the preschool period may have been obscured. In particular, previous work has failed to account for preschoolers' explicit bids for information about words they do not know. As a result, it is unknown whether preschoolers engage in self-directed attempts to gather information about words or word meanings, whether conversations about word meaning benefit vocabulary growth, and when (or if) children become curious about word meanings.

In contrast, there is clear evidence that typically developing infants and toddlers actively solicit name information from their communicative partners. One way they accomplish this is with nonverbal behaviors—such as looking, pointing, and reaching. Seminal research in the area suggests that parents who respond to infants' nonverbal attention bids by providing labels (i.e., follow-in labeling) have children with larger receptive vocabularies (Tomasello & Farrar, 1986). Infants benefit from input that is tailored to their developmental needs, both in terms of the quality and content of the input (e.g., Golinkoff, Can, Soderstrom, & Hirsh-Pasek, 2015) and the timing of names relative to their focus of attention (Cartmill et al., 2013; Trueswell, Lin, Armstrong, & Cartmill, 2016). In addition, parental sensitivity to young infants' play and language behaviors predict earlier attainment of language milestones in infancy (e.g., Tamis-LeMonda, Kuchirko, & Song, 2014; Tamis-LeMonda & Bornstein, 2001). All together, this work clarifies that parents who tailor the content of their speech and nonverbal behaviors to their infants' interests have babies with more robust language skills.

In what follows, we take seriously the possibility that children's active bids for information about language continue past the infancy period and suggest that children ask questions about words and the meanings of words to gather information about their language. We begin with a discussion of what children need to understand to ask questions about word meanings and provide some data that suggest questions about word meaning emerge during the preschool period, but that children are not all equally inclined to ask such questions. We also provide evidence suggesting that awareness of lexical gaps and questions about words may benefit vocabulary growth.

What Do Children Need to Understand to Ask a Question About a Word Meaning?

To ask a question about a word meaning, at minimum, children must recognize that they (a) do not know a word and (b) know how to seek the information. However, it is possible to be aware of a gap in one's knowledge and to have the skills for

retrieving the information, while at the same time having no desire to fill the gap. One possibility is that variability in children's tendency to seek information about word meanings may also be related to the degree to which children are curious about or motivated to acquire information about words. Some children may be more curious about words than others, the types of words that individual children are interested in may also vary, and the contexts in which children are curious about word meaning may also vary. Our proposal is that children who know what they do not know, who have skills for seeking the missing information, and who are also interested in doing so will be the most likely to seek information about unknown word meanings. Research on preschoolers' metacognitive monitoring, question asking, and curiosity suggest that the three component processes involved in seeking information about words are available during the preschool period.

Knowing What They Don't Know

Although early studies on metacognitive ability suggested that preschoolers could not make reliable judgments about their learning (e.g., Brown, 1978; Flavell, 1979; Flavell, Friedrichs, & Hoyt, 1970), more recent studies have shown that preschoolers make judgments about what they do and do not know. For example, preschoolers can make implicit judgments about whether they would be able to remember a recently learned bit of information (Balcomb & Gerken, 2008) and are more likely to have high confidence in their responses in object naming tasks when they give accurate responses on subsequent recall tests (Lyons & Ghetti, 2011). These and similar findings have been taken as an indication that preschoolers can sense when they are uncertain in what they know. Their uncertainty monitoring is related to control processes. In particular, preschoolers use judgments about whether they know something to decide whether to seek help on memory tasks (Coughlin, Hembacher, Lyons, & Ghetti, 2014; Lyons & Ghetti, 2013). Children's ability to make accurate judgments about their uncertainty increases with age. Three-year-old children do not always show clear evidence of uncertainty monitoring (Hembacher & Ghetti, 2014) and are sometimes overconfident in what they know (e.g., Lipowski, Merriman, & Dunlosky, 2012). Together, these results clarify that preschoolers have an emerging set of skills for monitoring their knowledge and may also use these intuitions to guide their information-seeking behaviors.

Metacognitive monitoring skills have also been revealed in studies of preschoolers' judgments of lexical ignorance. In particular, 4-year-old children reliably predict whether words are known versus unknown (e.g., "Do you know what a hat/zav is?") and whether they will be able to name familiar and novel objects (e.g., when shown pictures and asked, "Do you know what the name for this is?" Lipowski & Merriman, 2011; Merriman & Lipko, 2008). Similar to uncertainty monitoring, across the preschool period, children become better able to recognize when a word is unknown and when they do not know the name of an object. In particular, three-year-olds tend to

overestimate their knowledge of unknown words and novel objects (Merriman & Marazita, 2004).

Both uncertainty monitoring (Ghetti, Hembacher, & Coughlin, 2013; Lyons & Ghetti, 2011) and awareness of lexical ignorance (Lipowski et al., 2012) may contribute to the likelihood of preschoolers asking questions about unknown words. The precise relation between these two metacognitive skills is unclear at present. Lyons and Ghetti (2011) suggested that the familiarity judgments that support lexical awareness emerge prior to children's ability to make more nuanced judgments about the quality or certainty of their knowledge. However, there has not yet been a direct test of this possibility and on the whole the existing evidence suggests that both uncertainty monitoring and lexical awareness share a similar trajectory in development with both skills becoming more robust across the preschool period. It seems likely that the skills may share similar underlying constraints, such as memory representations that enable on-line comparisons of what is known and unknown. Nevertheless, both metacognitive skills may support children's information seeking in the context of word knowledge.

One question is whether there is evidence that metacognitive judgments, such as awareness of lexical ignorance, are related to inferences about word meaning. One piece of evidence comes from work by Merriman and colleagues: children who make accurate judgments about a word or object being unknown justify extending novel names to novel objects with their desire to avoid overlapping labels. For example, preschoolers who answered "no" when asked "Do you know what a *zav* is?" asserted that a novel (e.g., garlic press) versus a familiar object (e.g., a cup) was a "dax" because the familiar object already had a name (Marazita & Merriman, 2004; Merriman & Schuster, 1991). One question is whether a similar relation between recognition of lexical ignorance and word learning holds when children are tested in more naturalistic learning contexts.

In recent unpublished work conducted with an undergraduate student, Jordan Crawford, we have investigated the relation between metacognitive judgments and word learning during a shared reading activity. We measured awareness of lexical ignorance, general language ability (using the TELD-3, Hresko, Reid, and Hammill, 1999), and the ability to learn novel words during a book-reading task in 3- to 4-year-old ($N = 154$) children. For the test of awareness of lexical ignorance, children were asked to identify unknown words in pairs of novel and familiar words (e.g., "Which is the *new* word? The word that you *don't* know. Dax or Sock?"). In the novel word identification task, children were read a description of a novel creature (e.g., grimp as in, "The grimp is orange, lives in a tree, and has a droopy nose.") and were then asked to identify the novel creature on a subsequent comprehension test. Scores on the test of awareness of lexical ignorance were positively correlated with both novel word identification ($r\ (152) = 0.30$, $p < 0.001$) and scores on the TELD-3 ($r\ (147) = 0.34$, $p < 0.001$). These findings provide suggestive evidence that the metacognitive judgment that a word is unknown may not only be related to general language skill, but also to word-learning potential.

Wanting to Know About a Word

For children to go from recognizing that a word is unknown to obtaining a definition for the word, they have to be motivated to ask a question about its meaning. That is, in addition to the metacognitive skills described above, children's tendency to ask questions about novel words may be affected by how curious they are about words in general. Like adults, children may vary in how interested they are in words and word meanings; that is, some children may be more likely to be "word-nerds" than others. These word-interested children may be more prone to make spontaneous queries about what words mean. At present there are no available measures for testing preschoolers' interest in vocabulary (independent of their vocabulary size, which may be related to interest in words, but is likely also heavily input driven). We view interest in words as an ancillary skill; that is, children will, of course, learn words regardless of whether they find themselves pondering the meaning of unknown words, because they have access to many robust, more automatic processes to support word learning. What we are proposing is that interest in words in general or interest in particular types of words may give some children a boost. This previously untested factor might predict variability in the size and scope of children's vocabulary.

Others have suggested that children propel their word learning with their unique interests and moment-to-moment affective states. One notable example is Lois Bloom who proposed that the interests and intentions of children, rather than the language skills of adults, provided the impetus for language development (e.g., Bloom L., 1998, 2000; Bloom, Margulis, Tinker, & Fujita, 1996; Bloom, Tinker, & Kofsky Scholnick, 2001). This view of children's label acquisition put children's motivation and affective states during conversation in center stage and represented an exception to input driven and constraint based explanations of word learning (Bloom L., 2000). Bloom L. (2000) argued forcefully that word-learning researchers were ignoring children and their everyday behaviors "at the peril of the theories that … explain those behaviors," (Bloom L., 2000, p. 165). The crux of her argument was that "children do not just wait around for other people to construct the word-learning scenario for them…they create the word-learning process themselves. The words they learn are the words they want to learn, the words they need to learn" (Bloom L., 2000, p. 165). She proposed that the inferences children made about word meaning were guided, in part, by a social pragmatic constraint, the principle of relevance, which held that children's mental states—their beliefs, desires, and intentions—motivated them to determine what others' speech was most likely about. Unfortunately, without a clear framework for understanding what factors predicted individual children's interests and therefore what they would want to learn about the social pragmatic constraint did not gain traction among language researchers.

One construct that may be useful for developing a measure of children's interest in words is curiosity. Research on curiosity as a driving force in guiding children's learning was quite in fashion in the middle of the twentieth century. From the mid-

1950s to the late 1970s many studies investigated how children's minds and features of their learning environment stimulated exploration and discovery (e.g., Berlyne, 1954, 1960, 1966; Cantor & Cantor, 1964; Charlesworth, 1964; Greene, 1964; Mittman & Terrell, 1964; Smock & Holt, 1962). Daniel Berlyne (1924–1976), in particular, provided an influential framework for understanding the roots of exploratory behavior in humans (and other animals). Central to the discussion here is that Berlyne defined curiosity as, "the condition of discomfort, due to the inadequacy of information, that motivates specific exploration" (Berlyne, 1966, p. 26). Curiosity, according to Berlyne (1954, 1966) was aroused, in part, by percepts or ideas that are novel, irregular, and incongruous. He also alluded to the notion of an information-seeking sweet spot—"optimum dosages" of novelty and complexity at which information seeking is most likely to occur (Berlyne, 1966, p. 32). The idea that curiosity creates an unpleasant sensation that we seek to reduce is echoed in more contemporary views of the drive that underlies our tendency to seek out information when it is lacking or available evidence is incongruous (e.g., Litman, 2005; Loewenstein, 1994).

More recent investigations of children's interest in visual stimuli and self-guided exploration have supported many of Berlyne's proposals about curiosity. Infants seem more inclined to direct attention to visual stimuli that have just the right amount of complexity—they selectively attend to patterns that are neither too simple nor too complex (e.g., Kidd, Piantadosi, & Aslin, 2012). In other related work, Bonawitz and colleagues have shown that preschoolers were more likely to explore an object that violated their beliefs about balance relationships (Bonawitz, van Schijndel, Friel, & Schulz, 2012; Bonawitz, Bass, and Lapidow, Chap. 11). This finding suggests that a mismatch between what one believes and available evidence encourages self-guided exploration. There may be a way to create an optimal level of uncertainty so that children become curious about the meaning of a novel word. For example, presenting a novel word in a familiar context may motivate a child to try to reduce their uncertainty, but in a complex or unfamiliar context a child might be content with not understanding the novel word.

A popular contemporary theory of curiosity is Loewenstein's (1994) information gap theory (for more extensive discussions, see Jirout & Klahr, 2012; Kidd & Hayden, 2015). Loewenstein (1994) proposed that gaps between what one knows and what one would like to know engender a sense of deprivation that learners are motivated to reduce. Loewenstein (1994) argued that when an information gap in a particular knowledge network is made salient, curiosity is induced. The size of the information gap predicts how curious an individual will be about something. Under this view, larger gaps between what one knows and what one could know lead to low levels of curiosity while smaller gaps lead to high levels of curiosity. Large information-gaps do not engender curiosity because there is too much information to assimilate into what one knows. For example, a 4-year-old who hears the word "quantum" in the context of an adult conversation (about physics, presumably) may not have the same level of interest in finding out what the word means as a child who hears a parent discussing "fetlocks" in the context of a discussion of a well-known farm animal (a horse). That is, if a child hears a novel word in a context that is far removed from what they know about they may be less curious about its meaning

than if the word is presented in a context that is relevant to an area of interest. Children might determine whether a new word is relevant to an area of interest through the surrounding discourse. That is, new words that are offered in the context of known words may be more likely to engender curiosity than new words offered in the context of novel information. Additionally, in a familiar context, children may not only be more interested in learning a novel word, but they might also experience stronger feelings of deprivation.

Litman and Jimerson (2004) built on Loewenstein's information gap theory by proposing that curiosity had two dimensions that motivate exploration: deprivation and interest. The deprivation dimension is associated with feeling like there is crucial missing information and an aversive feeling of uncertainty, whereas the interest dimension is driven by the enjoyment of obtaining new information. Children who are curious about the meaning of a word could be motivated by the desire to reduce feelings of deprivation or by the pleasurable feeling that results from learning something new. For example, they might need to know the meaning of the word to understand their speaking partner or to solve a problem (deprivation-type), or they may have heard an unknown word while reading about their favorite animal (e.g., horses) and feel pleasure or satisfaction when they learn new horse-related words (interest-type). Deprivation-type curiosity is a more compelling motivator of information seeking and is easier to manipulate in an experimental context because it is not as subject to individual differences as interest-type curiosity (Jirout & Klahr, 2012). It is difficult to predict what information individual children will find interesting or pleasurable. It may be possible to use the words that children already know to predict which words individual children will be most interested in learning about.

Curiosity can be conceptualized as both a trait—some children are more curious than others, and as a state—some situations elicit more curiosity (Berlyne, 1954, 1960; Day, 1971; Jirout & Klahr, 2012). Children with higher trait levels of curiosity are more likely to explore and ask questions (Jirout, 2011). State level curiosity is dependent on the situation and could be influenced by interest in a particular topic (e.g., dinosaurs) or prior knowledge and experience with the topic. For example, mystery novels and click-bait articles are specially formulated to induce state curiosity as readers are given just enough information to be motivated to keep reading but not enough to be able to predict the resolution. Unfortunately, there are few robust measures of either state or trait level curiosity for preschool-aged children (but see Jirout & Klahr, 2011 for a promising measure). If we can determine the characteristics of and contexts in which children are curious about the meanings of words, we may be able to use this information to boost children's self-driven word learning. Lois Bloom highlighted the usefulness of focusing on children's interests and mental states to understand their motivation for word learning. This child-centered approach may be supplemented by using the construct of curiosity to predict which words children may be more curious about. Applying the information-gap theory to word learning could involve designing contexts in which the optimal level of uncertainty leads to exploratory information seeking about word meaning.

Information-Seeking Skills

Once children recognize that they do not know a word and have the inclination to do something about it they still need to seek out the information about the unknown word. One way to do this is to ask questions of knowledgeable adults. Research on information seeking in the toddler and preschool period has revealed that from early in development, children are proficient question askers (e.g., Chouinard, Harris, & Maratsos, 2007; Harris, 2012; Harris, Ronfard, & Bartz, 2016). In one study, it was estimated that children between the ages of 1 and 5 asked an average of 107 questions an hour (Chouinard et al., 2007). Children not only ask many questions, but they do so with the expectation that a particular answer will be received. For example, when 2- to 4-year-olds seek information about causes (Frazier, Gelman, & Wellman, 2009) or functional information about objects (Kemler Nelson, Egan, & Holt, 2004) they repeat or rephrase their questions if their speech partner does not provide a satisfactory response. Slightly older children also seem to understand when to ask questions versus when to seek information another way. In one study, for example, 4- to 6-year-olds were more likely to use questions to seek information about invisible object properties like preferences than visible object properties like hair color (Fitneva, Lam, & Dunfield, 2013).

At the same time, there are limits on preschoolers' question-asking ability. For one, both children's ability to identify the most knowledgeable or accurate informants and to ask useful questions increases across the preschool period (e.g., Mills, Legare, Bills, & Mejias, 2010; Mills, Legare, Grant, & Landrum, 2011). It is also not clear that children's rate of question asking generalizes across learning contexts. In particular, in contrast to the high rate of question asking revealed in corpus and diary studies (e.g., Chouinard et al., 2007; Frazier et al., 2009; Harris et al., 2016) spontaneously generating questions in experimental contexts sometimes presents challenges for preschoolers. For example, in Mills et al. (2011) 21 of 48 of the children tested were excluded from the analyses for failure to independently ask questions. Other studies included explicit modelling of question-answer conversations for children (Frazier et al., 2009; Kemler Nelson et al., 2004) or the researcher provided the questions for children (Fitneva et al., 2013). Spontaneous question asking may be more limited in experimental contexts because there are contextual constraints on children's spontaneous information seeking (familiar settings with well-known adults may elicit more unprompted questions) or because there are individual differences in the abilities that support the behavior. Another possibility is that children tend to ask questions after they have had some time to wonder about what they want to know. That is, the immediacy of the experimental contexts may not support spontaneous question asking because children have not had sufficient time to become interested or curious in asking about something.

Most previous studies on preschoolers' questions have focused on their attempts to elicit causal explanations of natural phenomena (e.g., Callanan & Oakes, 1992; Chouinard et al., 2007; Frazier et al., 2009) or information about functional properties of objects (e.g., Kemler Nelson et al., 2004). These types of explanatory

questions may require deeper understanding of concepts because asking "how" and "why" questions requires that children have some base of knowledge in the domain (e.g., Bloom, Merkin, & Wootten, 1982; Callanan & Oakes, 1992). Such questions may offer a window on children's reasoning about concepts and also clarify how the input children elicit may serve to grow their concepts, making them an important focus of research.

Questions about names for things have been described as a more straightforward query in which children are seeking facts. The idea being that children need a foundation of some basic information about a concept, including, for example, the names of category members, before they can ask deeper questions about unseen, causal processes (e.g., Chouinard et al., 2007). It also seems likely that in addition to label information, it would be useful for children to seek information about the definitions of unknown words, especially when the referents are not easily depicted. As one example, a child of our acquaintance recently asked what the word "grudge," meant. Grudges are not typically things that can be easily depicted. To understand the meaning of the word "grudge," and how such feelings affect social interactions, children either need to infer the meaning from context or ask a question to determine what the word means. Because word-learning questions have been classified as fact-finding questions in previous work there is little information about the quality of these kinds of questions.

In the most comprehensive study of children's question asking to date, Chouinard et al. (2007) reported a descriptive analysis of children's questions using the CHILDES database (Study 1) and a diary study of children between the ages of 1 and 5 years (Study 2). Children across both studies tended to ask more fact-based questions than explanatory questions (though the percentage of explanatory questions increased slightly with age). The most frequent types of questions included questions about labels (described as "the name for an object, or to what a name applies"), activities of people and things, and locations of things. The proportion of questions that were classified as being about labels decreased with age, but still accounted for 12 (Study 1) to 24 (Study 2) percent of the questions children asked as they approached their fifth birthday (i.e., in the 4;6–4;11 age bracket).

The label questions category in Chouinard et al. (2007) included both questions about labels (e.g., "What's that?") and questions about "to what a name applies" (e.g., "What's a jack-o-lantern?"). Because parents' responses to specific question types were not reported (given the scope of the Chouinard et al. monograph, this is not surprising) it is unclear whether children were seeking definitions (what the word means or a description of the referent) or more straightforward referent identification (pointing or indicating a visually available referent) with their queries about what a name applied to. Regardless, these data do suggest that children's label relevant questions are common during the preschool period.

To gain a better understanding of children's questions about word meanings, we used the CHILDES database (MacWhinney & Snow, 1985) to extract questions about word meaning from 6 corpora: Adam, Abe, Ross, Naomi, Sarah, and Laura using the following sentence frames: "What is X? What's X? What does X mean? What's that called? What's X called? What it mean? What it means?" One clear

Table 5.1 Six children included in analysis from CHILDES database

Child	Corpus	Questions	Age range	Definition questions	Label questions	Questions answered	Questions repeated
Abe	Kuczaj	325	3;0–5;0	65	231	223	64
Adam	Brown	3212	2;3–5;2	29	366	275	111
Naomi	Sachs	919	1;2–4;9	5	229	155	77
Sarah	Brown	837	2;3–5;1	1	66	59	6
Ross	MacWhinney	1356	1;4–7;5	21	38	47	7
Laura	Braunwald	481	1;2–7;0	2	34	29	6

result is that there was striking variability in children's tendency to ask questions about word meanings (see Table 5.1). We focused, in particular, on questions about definitions, rather than on questions about labels (because this information is already available in previous work). Below we offer a descriptive analysis of questions asked.

Since Abe, Adam, and Ross were the children who primarily asked questions about word meaning, we focused our analysis on their questions. We coded instances in which Abe, Adam, and Ross asked about a label and then asked for the meaning of a word in the same exchange. The words that children wanted to know the meaning of were recorded and we determined if their use was abstract from the context. Finally, we recorded parents' response to children's questions about word meaning.

Questions aimed at obtaining labels were more common than those eliciting definitions, but in rare instances (accounting for 5% of word meaning questions), they occurred together in the same exchange. In the example below, Abe seeks information about a toothpick using a repeated question strategy:

> Abe (2;10): What you got in your mouth? Huh?
> Father: It's a toothpick.
> Abe: A toothpinc?
> Mother: Toothpick, can you say toothpick?
> Abe: No, I don't know how to say a toothpick. Why that's a toothpick?
> Father: It's just something that's good to chew on for a minute or two.

Abe continued to ask questions until his father provided additional information about the toothpick. In this example, his first questions suggest he was requesting a label for an unknown object. After receiving the label information, he continued to ask questions about the object until his father provided functional information about the toothpick. Adam also used this repeated question technique:

> Adam (4;4): What's dis?
> Ursula: That's not a letter. That's a sign for dividing.
> Adam: What dividing means?
> Ursula: When you have lots of things and you share them with your brother you're dividing them.

However, when children asked about the meaning of the word they usually did not ask for a label beforehand. This suggests that most of the words that children asked about were words that they heard someone say before; either in the immediate conversation context or at some other time-point. Children asked about words that were

directed at them, but they also occasionally asked about words that were overheard. For example, Abe asked about a word that he heard when his mother and father were speaking:

Mother: They had an incubator.
Father: Oh.
Abe(4;6): (Ex)cept what is a incubator? Mother, what is a incubator?
Mother: it's a warm container to keep eggs in.

The words that the children asked about also changed with age. In particular, they started to ask proportionally more questions about abstract words as they got older. Of the words they asked about, the percent that were in reference to abstract versus concrete entities changed dramatically: from 5% at age 2, to 26% at age 3, to 48% at age 4, to 80% at age 5 (see Table 5.2).

In our sample of questions about labels and definitions, parents answered their children's questions about words at a high rate (72% of the time). Here is one humorous example of definition being offered to Abe:

Abe(4;2): What did Mike get?
Father: Tenure.
Abe: What does tenure mean?
Father: It means he got a good job

Sometimes they deflected the question back to their child:

Mother: It's so peculiar.
Adam(5;2): Peculiar! It's so peculiar?
Mother: Yes.
Adam: What is peculiar? I don't know what peculiar is.
Mother: You don't? What d(o) you think it is?

Other times children made attempts to answer their own question:

Mother: In my knowledge I don't know.
Ross(5;0): What does knowledge mean? It means… it means ...
Father: What does knowledge mean Ross?
Ross: I don't know.
Father: You were about to tell us. Don't stop now.
Ross: Not in my mind.
Father: Not in your mind? In your mind. Knowledge means whether it's in your mind. If it's not in your mind. Then it's not in your knowledge.

Questions aimed at obtaining labels were more common than those eliciting definitions, but in rare instances, they occurred together in the same exchange. Children asked about a variety of words. They asked about proportionally more abstract words as they grew older. Overall, parents were very responsive to their child's questions, but when children did not receive adequate responses they often repeated their question until they did. When parents did not respond to their child's questions they sometimes prompted the child to try and answer their own question, possibly encouraging even deeper thinking about word meaning. One remaining question is what factors predict children's tendency to ask questions about word meanings.

Table 5.2 A list of the words that were asked about by Abe, Adam, and Ross by age

Age	2;0–2;6	2;6–3;0	3;0–3;6	3;6–4;0	4;0–4;6	4;6–5;0	>5
Abe		Bayberry Carve Dressing Huge taco Mary Pickle Al(restaurant) Square taco Toothpick	Bladder **Boring** **Infected** Joker Recess Rubber band Tornado	Burial grounds Calvary Cauliflower Cub scouts Engineer **Exhausted** Golf Goosebumps Growth spurt **Hardly** Holiday Home Moth Oiled pastels **Order (command)** **Order (purchase)** Testicles **Something being "on"**	Barbecue Bologna Flood Minute hand Rice **Tenure** Trash	Butchwax **Do** **Field trip** **Form** Gouge Incubator **Invisible** Muscles **Shit**	
Adam	Porcupine Shower	Basketball Block for animal performing Football Salad dressing	Dairy	Arrow Brace Dotted line Gears dragon flies Lizard Molar Othello Skinned	Creepy Willy **Divide** Yoyo	**Brave** **Expression** **Marvelous** **Peace time**	Café **Peculiar**

Ross		**Exercise** Washington	**Both** Gray	**Pensive**		**Misunderstand** Avalanche	**Knowledge** Ark **Final** **As** **Monopolize** **Thirsty** **Sex** **Gesundheit (health)**

Bolded words are abstract

Unpublished work from our lab conducted with Rebecca Jacobson, a former undergraduate, explored the factors that influence preschool children's questions about novel words in the context of a storybook. Forty-eight 3-to 5-year-olds were read two books by their parent or a researcher that included the mention of a novel word on every page (the referent was a *modem* in one book and a *basin* in another). The premise of the stories was that a child received an object and then took it to different places (e.g., "First, he took his *modem* to the park. Then, he took the *modem* to school."). Importantly, the novel item was mentioned, but not depicted in an illustration, so asking what the word meant was the only way for children to learn what the word meant. The words were chosen based on a questionnaire (given to parents of other, same age children) that asked parents to select words that they knew the meanings of, but that their children did not. Our measure was whether children asked about the novel word in the book (e.g., by saying "What's a basin?").

For one group of children their parent read one book and a researcher read another and for another group of children their parent read both books. Parents were asked to read the book as they would normally and both parents and the researcher answered any questions children asked. Children varied in language background (i.e., they were either monolingual or bilingual) and in vocabulary size as measured by the Peabody Picture Vocabulary Test 4 (PPVT-4).

We found that a little over one-third (37.5%) of children asked about the novel words. Fourteen children asked in one story and four children asked in both stories. The person reading the book did not seem to affect children's question asking: 11 children asked in the parent-researcher condition and 7 children asked in the parent-only condition. In the parent-researcher condition, children were not more likely to ask a parent (8 children) versus a researcher (5 children, note that these numbers include 2 children who asked both the parent and the researcher). The number of questions asked across the two conditions did not differ (t (46) = 1.19, p = 0.24). Eleven bilingual children asked about the novel word and 7 monolingual children asked about the meaning of the novel word; language background was not related to requesting information about novel words (X^2 (1, N = 48) = 2.01, p = 0.16). A logistic regression also revealed that age did not influence question asking (β = 0.03, z = 0.79, p = 0.38).

In contrast, vocabulary size did seem to matter. Children's standard scores on the PPVT were significantly related to asking behavior (β = 0.11, z = 9.1, p = 0.003). The odds ratio was 1.118 with a 95% confidence interval of [1.04, 0.1.20]—meaning that for every point increase of the standard PPVT score, children were 11.8% more likely to ask about the meaning of a novel word. The average standard PPVT score of those who asked about the meanings of words was 121.33 (SD = 10.46, range = 110–140), which was significantly higher than the average standard score of those who did not ask, 106.67 (SD = 13.32, range = 76–130), independent samples t(46) = 3.99, $p < 0.001$.

Because the study was correlational it is not clear why children with larger vocabularies asked more questions about word meanings. It could be that children have larger vocabulary sizes because they ask more questions. Alternatively, children with larger vocabulary sizes might have been more equipped to ask about the

words that they did not know because of more robust metacognitive skills. That is, they may also be better at recognizing their lexical ignorance. This proposal gains support from previous studies that have found that metalinguistic abilities are positively correlated with vocabulary size in preschoolers (Doherty & Perner, 1998; Smith & Tager-Flusberg, 1982). It may be that as children's vocabulary grows, their ability to reason about language and meaning becomes more concrete, which enables active word learning techniques like questions about definitions.

Another possibility is that children with larger vocabularies are more curious about words that they do not know. According to the information-gap theory of curiosity, small information gaps elicit more curiosity. Preschoolers with larger vocabularies may be more likely to ask for word meanings because the gap between the words they know and the unknown words used in the study is smaller than in preschoolers with smaller vocabularies. The information-gap theory would predict that preschoolers that judge the novel words to be far outside their lexicon would not be as curious about the word meaning and would be less likely to ask a question.

We were surprised that the reader did not influence children's question asking. We expected that children would ask more questions from a reader with whom they are more familiar with. Children were equally likely to ask questions about word meaning of the parent and the researcher. One factor that might have influenced this was their expectation of receiving an answer to their questions. While researchers consistently provided an age-appropriate definition of the novel word when asked by the children (i.e., "A basin is a place to put water."), parents were instructed to read the story how they normally would. As a result, they did not always respond when their children asked questions. Thus, it is possible that the experimenter's willingness to provide definitions leads to children's increased motivation to ask questions from an unfamiliar reader. Children asked their parents about the meanings of unfamiliar words 18 times (one question was a repeat). Of these instances, just over one-third (7 of 18) received a definition in response, 6 received a response that was not a definition ("What do you think?" or "I don't see it") and in 5 cases parents simply did not respond. The types of definitions offered varied: One parent provided just a synonym definition ("It's like a bowl or a sink."), three parents provided functional definitions ("A modem is used with computers."), and two provided a combination of the two definition types ("A basin is something you can put water into. It's kind of like a bowl.") There was also one instance in which a parent provided a partial definition of the word—providing a detail about the object but no direct definition ("It's on the side of the computer at home.").

One interesting possibility is that the relatively low rates of question asking when parents read the book could have been the result of children's prior experiences having questions about word meaning answered. If children had prior experiences in which they did not receive satisfying definitions when they asked what a word meant, they might have been less likely to ask. Of course, we do not know if the parents who did not define words in this study also did not define words regularly at home. A study that carefully manipulates the quality and frequency of responses to questions about word meanings to examine the impact on children's question asking would be an important next step especially since we already know that children are more likely to ask questions at home than they are in other settings, like school (Tizard & Hughes, 1984).

Conclusion

Preschool children can be active participants in word learning. Children who know what they do not know, who have skills for seeking the missing information, and who are also interested in doing so will be the most likely to seek information about unknown word meanings. Preliminary data supports the view that children ask questions about word meaning and that their knowledge of gaps in their lexicon may be related to word learning potential. Just as children have varying levels of curiosity, they also differ in their tendency to ask questions about word meaning. Children who spontaneously ask for the meanings of words have larger vocabulary sizes than children who do not, suggesting there are benefits incurred when children have the skills for seeking word learning information. Preschoolers' questions about word meaning may facilitate vocabulary growth, especially in domains that they are very curious about.

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