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Lessons from the Crib for the Classroom: How Children Really Learn Vocabulary

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January 2010: Nine years after the enactment of No Child Left Behind, prekindergarten (PreK) through third-grade classrooms across America have become narrowly focused on reading and math outcomes. A recent report from the Alliance for Childhood (Miller & Almon, 2009) offers a portrait of kindergarten teachers in Los Angeles and New York. Thirty percent claim to have no time for student-chosen activities or play. These changes in school structure arose in an attempt to narrow the achievement gap and to raise the emergent literacy scores of disadvantaged children. Roughly 80% of the teachers interviewed suggest that they spend 20 minutes each day in test preparation. Furthermore, teachers often follow scripted learning plans designed to build language skills. Students, for example, are taught a stack of vocabulary words—along with their definitions—before they hear those same words used in a story. To further underscore the lack of developmental appropriateness, young children, using techniques developed to help high-school students memorize Scholastic Aptitude Test (SAT) words like *syzygy* and *synergy*, practice learning new words for the upcoming test.

The *motives* behind these techniques are sound. Hart and Risley (1995) report that by age 3, children from disadvantaged homes hear roughly 25% of the words that pass the ears of their more advantaged peers. And this lack of input has consequences for both quick language processing (see Fernald & Weisleder, Chapter 1, this volume) and trajectories of language and literacy acquisition (Dickinson & Freiberg, 2009; Dickinson, Golinkoff, & Hirsh-Pasek, 2010; National Institute of Child Health and Human Development [NICHD] Early Child Care Research Network, 2005) through elementary school. The *methods* used to increase the vocabularies of these young children, however, are antithetical to 40 years of research on early word learning.

This chapter merges the language and literacy literatures by examining how lessons from the crib can teach us about strategies for enhancing vocabulary in the PreK–third-grade classroom. Six well-tested principles of word learning emerge in the language domain (Dickinson, Hirsh-Pasek, & Golinkoff, under review). After discussing each, and the evidence that supports them, we suggest that vocabulary development can be enhanced not by scripted SAT-type memorization, but by classroom conversations and playful engagement. We demonstrate how playful learning flows from the language-learning principles to enhance vocabulary development for all children.

Flashback: How Vocabulary Learning Begins

Infants and toddlers learn vocabulary not from explicit instruction but in the course of their everyday interactions with parents and caregivers. By the time children arrive at preschool, they have honed some amazing processes for vocabulary learning. Capitalizing on these processes can only enhance vocabulary teaching.

Baby Steps: Finding the Sounds and Words in Language

Infants face two daunting tasks that are prerequisite to learning vocabulary (Golinkoff & Hirsh-Pasek, 1999; Saffran, Werker, & Werner, 2006): *segmentation* and *storing the sounds* that comprise words. Word learning cannot begin until babies segment or isolate words from the sound stream. Uncovering how babies do this is an active research goal (e.g., Blanchard, Heinz, & Golinkoff, 2010; Myers, Blumstein, Walsh, & Eliassen, 2009). To find the words, babies utilize a number of cues, among which are *statistical* cues (*transitional probabilities*) between syllables (Aslin, Saffran, & Newport, 1998; Saffran, Aslin, & Newport, 1996) and *highly frequent and familiar words* (e.g., their own names or "Mommy") (Bortfeld, Morgan, Golinkoff, & Rathbun, 2005). By 6 months of age, babies recognize a novel word that comes after their *own* names, but not a novel word after someone else's name. Babies also use *word stress* to help them find words. The syllables of each language follow a characteristic stress pattern, and by 9 months, infants recognize their language's dominant stress pattern. A French baby, for example, considers a syllable pattern with weak–strong stress (*iambic*) to be a two-syllable word ("guiTAR") (Polka, Sundara, & Blue, 2002), while a baby hearing English looks for strong–weak or *trochaic* stress (as in "TAble") (Jusczyk, Houston, & Newsome, 1999). By the time children are learning to read, they have segmented literally thousands of words from the speech stream, even if they do not know what all the words mean.

Infants must also store the individual sound segments that comprise words that emerge from the segmentation process. Consider the frequently heard word *Mommy*. When can babies recognize that *Tommy* sounds different than *Mommy*? Apparently, even 6-month-old babies do more than store holistic representations of frequently heard words (Bortfeld et al., 2005) because they can tell the difference between *Mommy* and *Tommy*.

These early processes continue to be useful to children in vocabulary building and reading. In the sentence "Turn on the spigot," children cannot ask what *spigot* means if they cannot segment it from the sentence. Sensitivity to common stress patterns helps children to pronounce unfamiliar words found in text correctly. Statistical capabilities come into play when children recognize which letter patterns are commonly found together in print. For example, the ability to note that the letter clusters *ch* and *ea* often appear together correlates with children's reading scores in second grade (Golinkoff & Gibson, 1974).

Sound Patterns Turn into Words: The Earliest Vocabulary

When do babies invest frequently heard sound patterns with meaning? Tincoff and Jusczyk (1999) showed that by 6 months of age, babies already know some frequent words and their meanings—words like *Mommy* and *Daddy*. Thus, even in the first year, babies find words in the language stream and store word forms both with and without meanings. Table 4.1 indicates children's progress in early word learning (Fenson et al., 1994). Comprehension leads production dramatically in the first year of life, suggesting that it is easier to store frequently heard word forms than to produce them. The variability observed is enormous, with productive vocabularies at 24 months ranging from 56 to 520 words (Fenson et al., 1994)! Interestingly, these enormous differences in vocabulary have their roots partly in the nonverbal *gestural* interactions that take place between babies as young as 14 months of age and their mothers. More maternal gestures predict more gestures by children, which in turn predicts children's school-entry vocabulary at 54 months of age (Rowe & Goldin-Meadow, 2009; Rowe, Özçaliskan, & Goldin-Meadow, 2008). Pointing things out in the environment and honoring chil-

TABLE 4.1. Median Number of Words (and Ranges) in the Comprehension and Production Vocabularies of Children Ages 10, 12, 18, 24, and 30 Months, According to Parental Report from the MacArthur Communicative Development Inventory

	Comprehension		Production	
Age (months)	Median	Range	Median	Range
10	42	11–154	2	0–10
12	74	31–205	6	2–30
18	—	—	75	14–220
24	—	—	308	56–520
30	—	—	555	360–630

Note. Data from Fenson et al. (1994).

dren's communicative bids feed into vocabulary learning.

Yet learning the meaning of words is a lengthy process. An initial "fast mapping" (Carey & Bartlett, 1978; Golinkoff, Hirsh-Pasek, Bailey, & Wenger, 1992) must be augmented with more exposure to words in varied contexts. Discerning a word's range of application and the nuances of its meaning allows children to use the word generatively in new situations (Golinkoff, Mervis, & Hirsh-Pasek, 1994; Maguire, Hirsh-Pasek, & Golinkoff, 2006; Maguire, Hirsh-Pasek, Golinkoff, & Brandone, 2008). This is an important point: The flashcard, SAT style of vocabulary memorization often presents isolated words without context and fails to invite children to learn how a word is used in a range of linguistic and environmental contexts. Embedding words in sentences is crucial to illustrate word meaning and at the same time influences the learning of grammar. Vocabulary learning and grammatical learning are reciprocal processes.

Many Word Types Are Needed for Vocabulary, Grammar, and Narrative

While nouns make a good entry point for lexical and grammatical learning because they label many concrete and nonrelational concepts (Maguire, Hirsh-Pasek, & Golinkoff, 2006; Waxman & Lidz, 2006), other parts of speech are needed to talk about relations and events (Bloom, Tinker, & Margulis, 1993; Nelson, 1988). Verbs, for example, are the architectural centerpieces of sentences because they encode the event the sentence describes and dictate the players involved (Golinkoff & Hirsh-Pasek, 2008; Imai et al., 2008). While verbs and spatial–relational terms are more difficult than concrete nouns for children to acquire (Golinkoff & Hirsh-Pasek, 2008; Hirsh-Pasek & Golinkoff, 2006), they are necessary if children are to comprehend and produce complex sentences. Children learn verbs and spatial terms best when these are presented in sentences that are typical of their language (Imai et al., 2008) and in the context of real-world events (e.g., Tomasello & Kruger, 1992). For children to combine vocabulary into sentences and narratives, relational words (verbs, adverbs, adjectives, and spatial prepositions) need to be taught in the preschool classroom and populate children's vocabularies.

Word Learning in the Wild: How Vocabulary Learning Continues

What can we learn from the crib that transfers to teaching vocabulary in the classroom? For one thing, vocabulary learning takes place in the course of natural interaction as children indicate their interests either vocally or through gestures. When parents and caregivers build on children's interest by offering information, vocabulary comes alive. Kemler-Nelson, Egan, and Holt (2004) report that young children do not just want to hear a *name* of a new object (e.g., "It's a toaster") when they say, "What's that?" What children want is information about what the object is used for and where it is found (e.g., "It's a toaster—a kind of machine that cooks our bread"). Children insist

until they are offered more information. As Kemler-Nelson and colleagues write, "when young children ask, "What is it?" . . . they are more concerned with knowing what kind of thing it is—that is, what its intended function is—than what it is called" (p. 388). These findings indicate that from the child's perspective, vocabulary learning is not about learning words in isolation but about acquiring the *concepts* for which the words stand.

Take, for example, a case borrowed from Chase-Lansdale and Takanishi (2009, p. 4) in which they present what Hunter referred to as "three mothers and an eggplant." They write:

> The first mother wheels her shopping cart down the produce aisle, where her kindergartner spots an eggplant and asks what it is. The mother shushes her child, ignoring the question. A second mother, faced with the same question, responds curtly, "Oh, that's an eggplant, but we don't eat it." The third mother coos, "Oh, that's an eggplant. It's one of the few purple vegetables." She picks it up, hands it to her son, and encourages him to put it on the scale. "Oh, look, it's about two pounds!" she says. "And it's $1.99 a pound, so that would cost just about $4. That's a bit pricey, but you like veal parmesan, and eggplant parmesan is delicious too. You'll love it. Let's buy one, take it home, cut it open. We'll make a dish together."

The first mother ignores the child, as well as the question. The second mother at least shares the child's eye gaze, then offers the name of the new food. The third mother not only engages the child in a conversation but also comments on the eggplant, explains that it is a kind of vegetable, and builds on the child's query. When parents talk about their children's focus of attention, they offer vocabulary *and* rich information (e.g., Callanan, Siegel, & Luce, 2007; Gelman, Coley, Rosengren, Hartman, & Pappas, 1998).

Analogously, similar patterns characterize storybook reading. Reading builds vocabulary most when it is *dialogic* (e.g., Zevenbergen, Whitehurst, & Zevenbergen, 2003). Dialogic reading occurs when adults prompt children with questions, evaluate and expand upon children's verbalizations, and reward children's efforts to tell the story and label objects in the book. Numerous intervention studies with diverse populations have found that engaging with an adult in dialogic reading causes children to use more words, to speak in longer sentences, to score higher on vocabulary tests, and to demonstrate overall improvement in expressive language skills (Doyle & Bramwell, 2006; Hargrave & Sénéchal, 2000; Huebner, 2000a, 2000b; Huebner & Meltzoff, 2005). Consistent with these findings, a comprehensive meta-analysis revealed that shared dialogic reading is especially beneficial to the expressive language of young preschoolers (Mol, Bus, de Jong, & Smeets, 2008).

The third mother's treatment of her child's eggplant query and episodes of dialogic reading have features in common that nurture vocabulary. Notably they motivate children to want to learn new words by capitalizing on children's focus of attention. These episodes in the wild serve as a model for how to foster vocabulary learning in the classroom. Six principles of word learning (see Table 4.2) emerge from the study of word learning in the crib, as well as from the vocabulary instruction seen in preschool and kindergarten. First, children learn the words that they hear most; frequency matters. Second, they learn words for things and events that interest them. Third, they learn best in interactive and responsive rather than in passive contexts. Fourth, they learn words in meaningful contexts that exemplify the meanings of the words. Fifth, they are able to learn words from definitions when those definitions are presented in a "child-friendly" way that takes into account children's prior knowledge. And finally, vocabulary learn-

TABLE 4.2. Six Principles of Word Learning

1. Frequency matters: Children learn the words that they hear the most.
2. Make it interesting: Children learn words for things and events that interest them.
3. Make it responsive: Interactive and responsive contexts rather than passive contexts favor vocabulary learning.
4. Focus on meaning: Children learn words best in meaningful contexts.
5. Be clear: Children need clear information about word meaning.
6. Beyond the word: Vocabulary learning and grammatical development are reciprocal processes.

Note. Data from Dickinson, Hirsh-Pasek, and Golinkoff (under review).

ing and grammatical learning are reciprocal processes. Offering definitions or using words in sentences during interaction always includes a surrounding linguistic context.

The rest of this chapter reviews the empirical support for these principles. There is little disembodied SAT-type "direct instruction" that takes place between parents and children; that is, parents typically do not offer children words to memorize without context. Instead, vocabulary is offered in a natural way as part of the conversation, or specifically, prompted by children's queries (e.g., "What's that?"). The principles of vocabulary learning offered below invite their transfer to the preschool classroom.

Six Principles of Vocabulary Learning

As Neuman and Dywer (2009) concluded after conducting a review of the limited literature on vocabulary instruction in preschool, "pedagogical principles for teaching vocabulary to young children are sorely needed. There appears little consensus on developmentally effective strategies for teaching vocabulary" (p. 391). Perhaps by examining the literature on early vocabulary learning in toddlers and preschool environments, the principles suggested below can fill that gap.

Children Learn the Words That They Hear Most

As Neuman and Dwyer (2009) suggest, "Talk may be cheap but it is priceless for young developing minds" (p. 384). The fact that children learn words that are used in their ambient environment has long been known. The classic study by Hart and Risley (1995) found that a key variable distinguishing more and less educated parents is the sheer *amount* of vocabulary addressed to children. This is best exemplified in the differences in the amount of speech that the third mother used relative to the others in the eggplant encounter (Chase-Lansdale & Takanishi, 2009). These findings on language frequency have been echoed in a number of correlational studies (Hoff, 2006a; Hoff & Naigles, 2002; Hoff-Ginsberg, 1991; Tamis-LeMonda & Bornstein, 2002) and seem to have long-range consequences for later language and reading levels (Walker, Greenwood, Hart, & Carta, 1994; Weizman & Snow, 2001; Fernald & Weisleder, Chapter 1, this volume).

The relationship between adult input and child output appears not only in home environments but also in studies of child care and early schooling (Hoff, 2006a; Hoff & Naigles, 2002; Hoff-Ginsberg, 1991; McCartney, 1984; NICHD Early Child Care Research Network, 2000, 2002, 2005). In a beautifully designed study by Huttenlocher, Vasilyeva, Cymerman, and Levine (2002), the relation between a teacher's input and children's language growth was evaluated by examining the average growth of that class over the school year, controlling for parental language, child's starting language, and socioeconomic status (SES). Results suggest that the complexity and variety of the teacher's language relate to the children's language levels, above and beyond the language accounted for by parent language or SES. Given that prior research strongly suggest that young children are very sensitive to statistical patterns in the language input, this finding is not surprising (Saffran et al., 1996). When children hear varied and complex language, they have more opportunities to discover the grammatical patterns. In fact, research finds that children learn not only language that is directed to them but also profit from overheard speech (Akhtar, 2005; Weizman & Snow, 2001).

Increased levels of exposure to vocabulary are particularly likely to have beneficial effects when the input includes a relatively high density of novel words relative to total words (i.e., type:token ratio) because the density of novel words children hear is a better predictor of vocabulary growth than is a simple count of word types (Hoff, 2003; Hoff & Naigles, 2002; Huttenlocher, Haight, Bryk, Seltzer, & Lyons, 1991; Pan, Rowe, Singer, & Snow, 2005). But even more critical than a good ratio of novel relative to repeated words may be the inclusion of sophisticated words that children are less likely to know (Dickinson, Flushman, & Freiberg, 2009; Malvern, Richards, Chipere, & Durán, 2004).

Frequency of exposure to vocabulary also has been found to be an important determiner of word learning in experimental studies in classrooms using book reading to build vocabulary knowledge. While book-

reading researchers have found learning that is associated with a single reading, most intervention studies employ between two and four rereadings. Some evidence suggests that younger children (i.e., kindergartners) benefit more from additional exposure, but the number of words children are *taught* may be an even more potent predictor of total learning gains (Biemiller & Boothe, 2006). Thus, book reading provides repeated exposure to words that children are not likely to know, a second reason why book experiences have been linked to stronger vocabulary (Dickinson & Tabors, 2001; Weizman & Snow, 2001).

Children Learn Words for Things and Events That Interest Them

The classic work here comes from vocabulary learning in young children acquiring their first words. In what Lois Bloom (2000) dubbed the "principle of relevance," she wrote, "Language learning is enhanced when the words a child hears bear upon and are pertinent to the objects of engagement, interest and feelings" (p. 19). A significant body of research in the joint attention literature attests to the fact that children of parents who talk about what their children are looking at have more advanced vocabularies (Akhtar, Dunham, & Dunham, 1991; Masur, 1982; Tomasello & Farrar, 1986). A corollary finding is that children of parents who try to redirect children's attention and label objects not of interest learn fewer words (e.g., Dunham, Dunham, & Curwin, 1993; Golinkoff, 1981; Hollich, Hirsh-Pasek, Tucker, & Golinkoff, 2000). In the eggplant story, one would expect the third child to learn and remember the word *eggplant* because the mother capitalized on the child's interest.

In addition to the role of parents and teachers, playful peer interactions feed into vocabulary development. Dickinson (2001a) noted that the amount of time 3-year-olds spend talking with peers while pretending is positively associated with the size of their vocabularies 2 years later, when they begin kindergarten. Bergen and Mauer (2000) found that 4-year-olds' play, in the form of making shopping lists and "reading" storybooks to stuffed animals, predicted both language and reading readiness after the children entered kindergarten. Nicolopoulou, McDowell, and Brockmeyer (2006) also found that children who engage in sociodramatic play build the language skills required for literacy. As in other areas of pedagogy, piquing a child's interest in language through playful activities increases attention, motivation, and real learning (Hirsh-Pasek & Golinkoff, 2003; Hirsh-Pasek, Golinkoff, Berk, & Singer, 2009; Singer, Golinkoff, & Hirsh-Pasek, 2006). These are ripe contexts for children to pick up new vocabulary from their peers.

The effect of free play among peers on language appears to have a universal quality. An analysis of early education settings across 10 countries found that small-group free play at age 4 was positively associated with multiple measures of oral language ability at age 7 (Montie, Xiang, & Schweinhart, 2006). The unique demands of communicating meaning during sociodramatic play is likely one of the reasons for vocabulary growth associated with such episodes. Children work at duplicating the talk associated with particular roles (e.g., talking like a doctor). They also use language to negotiate the play itself, covering topics such as how the play will progress, what roles each child will take, and what is allowable for those roles (i.e., what is acceptable behavior for a doctor) (Vedeler, 1997). Pellegrini and Galda (1990) and Pellegrini, Galda, Dresden, and Cox (1991) also reported that preschoolers participate in much commentary *about* language when creating make-believe scenes, even using complex mental state verbs such as *say, talk, tell, write*, and *explain*.

Interactive and Responsive Rather Than Passive Contexts Favor Vocabulary Learning

Adults who take turns, share periods of joint focus, and express positive affect when interacting with young children provide children with the scaffolding needed to facilitate language and cognitive growth (Bradley et al., 1989; Bronfenbrenner & Morris, 1998; Clarke-Stewart, 1973; Howes, 2000; Katz, 2001; Tomasello & Farrar, 1986). The third mother in the eggplant vignette clearly built on the child's interest and encouraged more conversation rather than shutting it down. Stimulating and responsive parenting in early childhood are among the strongest predic-

tors of children's later language, cognitive, and social skills (Bronfenbrenner & Morris, 1998; Sameroff, 1983; Shonkoff & Phillips, 2000). Children's language skills are strongly related to proximal measures of quality in parent–child interaction such as sensitivity, cooperation, acceptance, and responsiveness (Hirsh-Pasek & Burchinal, 2006; Landry, Smith, Swank, Assel, & Vellet, 2001; Tamis-LeMonda & Bornstein, 2002; Wakschlag & Hans, 1999). Parental warmth, demonstrated as open displays of affection, physical or verbal reinforcement, and sensitivity to children's requests and feelings, are also significantly associated with academic achievement and cognitive growth (Bornstein & Tamis-LeMonda, 1989; Burchinal, Campbell, Bryant, Wasik, & Ramey, 1997; Clark, 2003; Cunningham & Stanovich, 1997; Howes, Phillips, & Whitebook, 1992; Howes & Smith, 1995; Landry et al., 2001; Landry, Smith, & Swank, 2006; Landry, Swank, Smith, Assel, & Gunnewig, 2006; Morrison & Cooney, 2002).

While the role of sensitive input has been more extensively explored in the parenting literature, responsive and stimulating behavior by caregivers also relates independently to child outcomes (Burchinal, Roberts, Nabors, & Bryant, 1996; Burchinal et al., 2000; Hirsh-Pasek & Burchinal, 2006; Howes et al., 1992; Love et al., 2003; NICHD Early Child Care Research Network, 2000; NICHD Early Child Care Research Network & Duncan, 2003; Peisner-Feinberg & Burchinal, 1997; Zill, Resnick, & McKey, 1999). Even smaller studies (Burchinal et al., 1996, 2000; Dunn, 1993; Kontos, 1991; McCartney, 1984; Schliecker, White, & Jacobs, 1991) find a direct relationship between environmental sensitivity and cognitive and language outcomes. This link has been observed in child-care homes and relative care, as well as center care (Clarke-Stewart, Vandell, Burchinal, O'Brien, & McCartney, 2002; Kontos, Howes, Shinn, & Galinsky, 1997).

Sensitive interactions are especially beneficial when accompanied by rich lexical input. In a longitudinal study researchers examined teacher–child conversations when children were 4, controlling at age 3 for children's language ability (i.e., the mean length of their utterances), parental income, education, and home support for literacy (e.g., reading), and found that higher-quality conversations and richer vocabulary exposure during free play and group book reading were related to children's language, comprehension, and print skills at the end of kindergarten (Dickinson, 2001b; Tabors, Snow, & Dickinson, 2001) and fourth grade (Dickinson, 2001b; Dickinson & Porche, under review; Tabors et al., 2001).

Finally, three studies examined this relationship over time. Two held that parental sensitivity across time relates to changes in child outcomes (see Bornstein & Tamis-LeMonda, 1989; Landry, Smith, Swank, & Miller-Loncar, 2000; Landry et al., 2001; NICHD Early Child Care Research & Duncan, 2003; Tamis-LeMonda & Bornstein, 2002). Landry and colleagues (2001), for example, found that children with highly sensitive parents in the first 3 years of life, followed by lower sensitivity, did not perform as well as children who had consistently highly sensitive parents across early childhood. Hirsh-Pasek and Burchinal (2006) noted similar relationships with children in child-care settings. To the best of our knowledge, this dimension of language learning has not been directly explored in intervention studies within the preschool or early elementary school setting. However, the frequency of warmth and sensitivity in teacher–child conversations in preschool classrooms was found to be correlated with the same teachers' tendency to engage in cognitively and linguistically enriching conversations with children (Densmore, Dickinson, & Smith, 1995).

Children Learn Words Best in Meaningful Contexts

After their review of how vocabulary is taught in preschool, Neuman and Dwyer (2009) concluded: "Strategies that introduce young children to new words and entice them to engage in meaningful contexts through semantically related activities are much needed" (p. 384). This insight is completely in line with research on memory: People learn best when information is presented in integrated contexts rather than as a set of isolated facts (Bartlett, 1932/1967; Bransford & Johnson, 1972; Bruner, 1972; Neisser, 1967; Tulving, 1968). The same is true for children. A set of words connected in a grocery list

is better remembered than the same list of words without context. Meaningful connections between words are also fostered in studies that use thematic play as a prop for language development. Christie and Roskos (2006), for example, find that children who learn connected vocabulary for categories of objects such as hammers, hard hats, screwdrivers, and tool belts (the category of building) better remember and use these words than do children who do not learn in this more integrative way. Additional support for children learning vocabulary in meaningful contexts comes from the work of Neuman and Roskos (1992), who found that enriching play centers with literacy-related objects increased the frequency, duration, and complexity of peer verbal exchanges around literacy objects and literacy themes.

New research by Han, Moore, Vukelich, and Buell (in press) finds that children given an opportunity to use vocabulary in a playful context learn it better than those who learn only under explicit instruction. By way of example, low-income children in the explicit instruction group heard a reading of *Warthogs in the Kitchen*. Following the reading, they heard the word *bake* while being shown a picture of the word in the storybook. They were then offered a "child-friendly" definition of the word *bake* and asked to repeat it and point to an instance of the concept. This group spent a full 30 minutes on the book and on receiving the explicit vocabulary instruction. The playgroup spent 20 minutes on the book and the associated definitions, and so forth, but had 10 minutes to engage in guided play with props. Subsequent vocabulary tests revealed that the group that played remembered the target vocabulary better and included more children who reached vocabulary benchmark levels on the standardized Peabody Picture Vocabulary Test (PPVT).

As Neuman and Dwyer (2009) pointed out, experimental research comparing vocabulary learning in meaningful versus less meaningful contexts is scant. Yet correlational studies in language, play, and memory research converge to suggest that teaching vocabulary in integrated and meaningful contexts enriches and deepens children's background knowledge and, hence, their mental lexicons (Hirsh-Pasek et al., 2009). Since parents and teachers provide the input that makes vocabulary learning possible, it is crucial to understand the guided play contexts that support parents and teachers in the production of new words for children (Christie & Roskos, 2006; Fisher, Hirsh-Pasek, Golinkoff, Singer, & Berk, in press).

Educational theory and research suggest that guided play approaches promote superior learning, retention, and academic achievement compared to direct instruction (Burts, Hart, Charlesworth, & Kirk, 1990; Burts et al., 1992; Hirsh-Pasek, 1991; Lillard & Else-Quest, 2006; Love, Ryer, & Faddis, 1992; Marcon, 1993, 2002; Roskos, Tabors, & Lenhart, 2004, 2009; Schweinhart & Weikart, 1988; Schweinhart, Weikart, & Larner, 1986). In guided play contexts, educators structure an environment around a general curricular goal by encouraging children's natural curiosity, exploration, and play with learning-oriented objects/materials (Fein & Rivkin, 1986; Hirsh-Pasek et al., 2009; Marcon, 2002; Schweinhart, 2004). Conversations that take place between adults and children in the context of a playful activity, and that build on children's interests, offer children new lexical concepts that are more likely to be retained than unbidden verbal explanations (e.g., Golinkoff, 1986).

In a study in which children and parents were asked to build block structures together (Ferrara, Shallcross, Hirsh-Pasek, Golinkoff, & Newcombe, in preparation), the nature of the task influenced the quantity and richness of the spatial language parents offered. For example, when the task was structured, with the goal of reproducing a figure from a picture, parental spatial language was richer (e.g., "Put the big one on the little one") than when the task was more open-ended and dyads built without a model. Play is the ideal context for word learning because the child is actively engaged in a meaningful and pleasurable activity, eager to participate with an interested adult, and the language used often has instrumental purposes the child wants to achieve. Of course, children can also learn vocabulary from didactic instruction (e.g., Biemiller, 2006). In the Han and colleagues (in press) study, the didactic group and the playgroup did not differ significantly in the *particular* words upon which they were trained. However, the performance of children in the playgroup, who had experienced guided pretend-play vocabulary-learning ep-

isodes, exceeded that of the didactic group on the PPVT months later.

Children Need Clear Information about Word Meaning

Words can be understood in different ways and to different degrees. For many words, a *fast mapping* (Carey & Bartlett, 1978) comes first. This is when the child might be offered the meaning of a word ostensively or infer that the novel, unnamed object or action is the one to which the new label should be attached (Golinkoff et al., 1992, 1994; Golinkoff, Jacquet, Hirsh-Pasek, & Nandakumar, 1996). Fast mapping, however, yields a relatively cursory understanding of word meaning; repeated exposures to a new word in varied contexts, or the provision of definitions to which children can relate (Booth, 2009), lead to a deeper, more nuanced understanding of word meaning. The field knows a great deal about factors that influence fast mapping, such as perceptual factors or what a child finds attractive (Hollich et al., 2000; Pruden, Hirsh-Pasek, Golinkoff, & Hennon, 2006), grammatical contexts in which a word is embedded (Gleitman, 1990; Hirsh-Pasek & Golinkoff, 1996), and social cues speakers offer about what they are discussing (Hollich et al., 2000; Tomasello, 1999). Observation of parent–child conversations revealed that children benefited when parents provided quick explanations about the meanings of words, and suggested that young children may not require elaborated, decontextualized word definitions to gain some understanding of the meaning of a word (Weizman & Snow, 2001). Weizman and Snow (2001) also found that adults are often sensitive to those words a child might not understand and can therefore support understanding by providing additional hints as to word meaning. Such was the case with the third mother's explanation of the eggplant; the word was couched in familiar routines, such as eating veal parmesan.

The field knows less about how to foster conceptual understanding and decontextualized word meanings. Most efforts have used book reading as the instructional context, and one suggested way is to offer explicit definitions. Work with kindergarten and early primary grade children has revealed that while children learn some words simply from hearing them in a story (De Jong & Bus, 2002; Elley, 1989; Elley & Mangubhai, 1983), telling children the definitions of words consistently increases word learning substantially (Biemiller, 2006; Biemiller & Boote, 2006; Brabham & Lynch-Brown, 2002; Elley, 1989; Penno, Wilkinson, & Moore, 2002). Children with weaker language skills seem to be especially likely to benefit from such explicit information (Penno et al., 2002), perhaps because they have more difficulty making inferences about word meaning. However, there is evidence that older children benefit more than younger children from explicit language-based information (Dickinson, 1984), possibly reflecting the greater metalinguistic abilities of older children. If book reading devolves into an extended vocabulary lesson, the highly explicit teaching that results in the greatest gains in short-term interventions with older children could paradoxically have a negative long-term impact on children's enjoyment of books and teacher's use of books to deepen comprehension.

Research by Booth (2009) represents an attempt to uncover those factors in explicit definitions that foster retention and extension of newly learned word meanings. Booth reports that providing definitions to 3-year-olds about what one can *do* with an object or action promotes better vocabulary learning than providing static, noncausal definitions. These findings dovetail with the prior principle that word learning takes place best in a meaningful context. Seeing objects and actions embedded in a causal sequence appears to be a powerful impetus to word learning. Even acting out the meanings of words with props in pretend play (Han et al., in press) contributes to children's understanding of word meaning.

Vocabulary Learning and Grammatical Development Are Reciprocal Processes

The amount and diversity of verbal stimulation fosters earlier and richer language outcomes in terms of both vocabulary and grammar (Beebe, Jaffee, & Lachman, 1992; Hart & Risley, 1995, 1999; Huttenlocher et al., 1991; Snow, 1986; Tamis-LeMonda, Bornstein, & Baumwell, 2001). Importantly, in these and many more recent studies, vocabulary and grammar are not divorced.

They feed one another. Dixon and Marchman (2007), for example, based on a large sample of children ages 16–30 months (N = 1,461), argue that words and grammar are "developing in synchrony across the first few years of life" (p. 209). This relationship between grammar and vocabulary learning is also celebrated in research with bilingual children. Conboy and Thal (2006) found that toddlers' English vocabulary predicted their English grammar and the reverse, and their Spanish vocabulary predicted their Spanish grammar.

Children learn vocabulary through grammar and grammar through vocabulary in two ways: By noting the linguistic context in which words appear, children gain information about a word's part of speech (Imai et al., 2008) and, once a word is known, children detect nuances in word meaning by observing the diverse linguistic contexts in which words are used (Gillette, Gleitman, Gleitman, & Lederer, 1999; Naigles, 1990). Furthermore, oral language measured as *both* vocabulary and grammar (NICHD Early Child Care Research Network, 2005) is crucial for early literacy. Building vocabulary is not a matter of learning words in isolation but one of hearing words in sentences. Research shows that exposure to complex language throughout a school year can improve the syntactic comprehension of 4-year-old children (Huttenlocher et al., 2002), a finding supported by an experimental study that employed books to foster syntactic development (Vasilyeva, Huttenlocher, & Waterfall, 2006).

An important extension of this language-learning principle is that children's current language abilities condition their ability to learn new words. This premise is central to the *emergent coalitionist perspective* (Golinkoff & Hirsh-Pasek, 2006; Hirsh-Pasek & Golinkoff, 1996; Hollich et al., 2000), which posits that children use multiple available cues when learning words, and that employed cues shift as children become more competent language learners. The impact of current language status on word learning has been seen in studies in which children are taught new words by reading stories. Children with stronger language skills are more apt to gain more from the stories, unless there are special efforts to provide redundant and explicit information about word meanings (Elley, 1989; Penno et al., 2002; Robbins & Ehri, 1994).

To summarize, word learning requires that children learn the sounds of the word, the word's part of speech, and the word's meaning. However, memorization of these facts is not enough. To claim that children *really* know a word, we must show that they have not only acquired a minimal grasp of the word but can also *transfer* the word to new contexts, and *retain* the word and its meaning over time. Too few studies hold word learning to these high standards. However, the literature does permit us to extract six principles about vocabulary learning that can guide our research in the future.

Unfortunately, children who are at risk for reading problems are likely to have limitations in the language skills on which reading draws. For example, children from lower-SES backgrounds are at risk due to a substantially decreased vocabulary size (see Hoff, 2006a, 2006b, 2009). Therefore, to the extent that we understand the processes that contribute to vocabulary learning, the more effective will be our interventions for children who lag behind. Ironically, while the research shows that word learning takes place best in meaningful and playful contexts where child engagement is high, the educational system appears to be moving in the opposite direction, increasing the amount of definition memorization required of children.

Back to Basics: Natural Interaction and Playful Learning as the Platform for Vocabulary Learning

Taken collectively, the six principles of vocabulary development derived from the crib and the classroom in effect dictate the kind of pedagogical approach that will yield optimal vocabulary development. Although children can learn definitions, relatively passive memorization will not yield the depth and long-term retention needed to allow children to recognize the appropriateness of a word for a range of situations. The six principles of vocabulary learning encourage a combination of pedagogical approaches that offer clear and easily digestible definitions and that allow children to explore the meaning of words via playful interaction.

Thus, research suggests that vocabulary acquisition occurs most effectively in preschool classrooms that mimic the way vocabulary learning takes place in the home—through events that spark children's motivation to learn new words and heighten their engagement. Often, though not always, these interactions occur in a playful context—between children and adults or between peers (Hirsh-Pasek et al., 2009). In fact, many of these principles point in the direction of playful learning—both free play and guided play—as they describe how presenting words in meaningful contexts, in which children are engaged, enhances vocabulary development. Representing a broad array of activities, including object play, pretend and sociodramatic play, and rough-and-tumble play, free play has been notoriously difficult to define (see Hirsh-Pasek et al., 2009). Contemporary play researchers generally agree that free-play activities are fun, voluntary, flexible, have no extrinsic goals, involve active engagement of the child, and often contain an element of make-believe (Johnson, Christie, & Yawkey, 1999; Pellegrini, 2009; Sutton-Smith, 2001). Guided play, on the other hand, is seen when teachers (1) provide materials in the classroom to spur children's engagement and discovery, and (2) comment or query children about their play by providing the words to describe it. Thus, adults who interact with children use the vocabulary demanded by the children's situation. There is no disembodied memorization of vocabulary words under a guided play approach. Play that is adult-supported leads to more conversation (Levy, 1992) and, when combined with book reading, helps to direct children's attention to specific vocabulary words. Wasik and Bond (2001) embedded concrete vocabulary-related objects into story reading and subsequent play. This combination allowed the adults to subtly shape the children's play to support the mastery of specific, important vocabulary words. Wasik and Bond attribute the positive impact of this vocabulary intervention to the meanings children understood as a function of the play context they created.

Note what these playful contexts do, whether in the context of storybook reading, conversation between parents or teachers and children, guided play with adults, or free play between children or children and adults: They instantiate the six principles of vocabulary learning. Take the case of a pair of children pretending to play doctor and baby. When children are at play they not only hear words for topics that interest them (e.g., *stethoscope*) (Principle 2) but they also frame *sentences* to convey meanings and comprehension of the sentences of others (e.g., when the stethoscope is brought to the baby's chest) (Principle 6). They are involved as active, constructive participants (Principle 3), making the meaning of words clear by them acting out and using their bodies to reflect their understanding (Principle 4) or to infer meaning of words they might not know by watching how their co-players bring those meanings to life (Principle 5). Crucially, and perhaps most important of all, they are deeply engaged in the co-constructed narrative, learning words for things and events they are keenly interested in representing (Principle 2). And when children repeatedly engage in such make-believe play, they hear some of the same words over again, heightening their opportunity to learn them (Principle 1). Play heightens engagement and enjoyment, increasing the likelihood that new learning will occur. This situation is very different from an adult offering words in a way that does not explicitly link to children's experiences. Various learning theories (e.g., information processing, constructivism, Vygotskian scaffolding) suggest that new learning occurs best when it builds on and expands what children (or adults) already know.

Conclusions

Early language development—including both vocabulary and syntax—is crucial for children's school success and acquisition of literacy. There is no doubt that the new focus on language and vocabulary is important and has serious implications for later communication skills and literacy outcomes throughout a child's school years. As we move to more academically rich curricula, however, we must be mindful that *how* one learns is as important as *what* one learns. A considerable bank of scientific data exists to guide us in knowing how children learn words and master their native tongue. Indeed, the literature here is sizable enough

to formulate principles for how to optimize vocabulary and language learning. It is time that we use what we know in evidence-based practice.

Although additional research is sorely needed, research points us in the direction of natural interactions as the source of vocabulary learning. Whether through free play between peers arguing about who plays what role in sociodramatic play or an adult introducing literacy terms (e.g., *sentence, word*), as children engage in play with literacy tools, the likelihood that vocabulary will "stick" is heightened when children's engagement and motivation for learning new words is high. Embedding new words in activities that children want to do recreates the conditions by which vocabulary learning takes place in the crib.

Given the data, we strongly suggest that didactic SAT learning formats will not produce good speakers or good readers. Just as we quickly forgot the meaning of *syzygy* after the test, children who memorize meaningless words and definitions will not retain these words or be able to use them in new contexts. When words are presented frequently in contexts meaningful to children, and with clear information about their meaning, children really learn—even complex words like *eggplant*. As we translate the lessons of vocabulary learning in the crib to the classroom, we create more playful and conversational contexts for learning. While children may outgrow their cribs, the principles that govern vocabulary learning in young children, based on playful interaction and capitalizing on children's interests and proclivities, remain useful.

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