

Closing the 30 Million Word Gap: Next Steps in Designing Research to Inform Practice

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ABSTRACT—Recent attention to the word gap has renewed public interest in the striking vocabulary disparities between children in poverty and their higher income peers during the 1st years of life. Children’s outcomes—and the nation’s well-being—could be improved by additional research into the mechanisms of vocabulary learning, as well as translational research that produces effective, feasible early-education practices in homes and schools. In this review, we first explain the nature and extent of the word gap and then briefly describe research on how children learn words during the early years. Next, we summarize limits of available interventions. Finally, we detail pressing questions that demand additional study and suggest research that could provide answers. Ultimately, we call for new research on word-learning experiences at home and in school that will support reading and academic success for children at risk.

KEYWORDS—early childhood; language development; vocabulary gap; poverty; language stimulation

Recent attention to the word gap—the differences in vocabulary knowledge between children in poverty and their middle-income peers in the 1st years of life—has ignited public interest. Indeed, by 18 months, children of higher socioeconomic status know 60% more words and are faster at comprehending words than their lower income peers (1). Because of the cumulative nature of vocabulary development, these disparities are magnified over time, resulting in a difference of a full standard deviation by

kindergarten (2). And because vocabulary is essential for both cracking the code of printed words and understanding words (3), many children from low-income households cannot take full advantage of the formal reading instruction that begins in kindergarten and first grade. By fourth grade, half of children in poverty cannot read with even basic proficiency (4). Struggling thereafter to read to learn in other content areas (5), they are at great risk for chronic academic underperformance. Findings of a word gap between socioeconomic strata have been widely replicated since the 1960s, in the United States (6) and around the world (7), evincing a pernicious and persistent phenomenon.

Many related factors drive these socioeconomic disparities in early vocabulary, including toxic environmental stress, health and nutrition, and even neurological growth. However, one primary, proximal, and malleable factor is the *language stimulation* children receive in the home and in child care or school environments in the 1st years of life. While research has revealed much about how adults can support children’s word learning (8), many effective techniques are not practiced widely. In this article, we attempt to bridge this divide between research and practice by identifying what is known about family- and classroom-focused vocabulary interventions, and highlighting questions that need to be addressed to close the word gap. Amid multimillion dollar investments in efforts to close the word gap, we must carefully summarize and apply evidence-based research, and develop strategies for studying these pressing questions.

HOW CHILDREN LEARN WORDS

The multifaceted process of learning words during the first 5 years of life (and beyond) is facilitated by both internal child-level factors and environmental input.

Child-Level Factors

Although the specific mechanisms through which words are extracted from streams of speech, interpreted, committed to memory, and later recalled remain somewhat opaque, the general process may be captured most productively by the emergentist

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coalition model of word learning (9). Broadly, this model asserts that word learning is fostered by general cognitive processes, including selective attention, object representation, sensitivity to others' intentions, categorization, and memory and retrieval. At the same time, domain-specific lexical processes (e.g., the whole-object constraint—that a label applies to the entire object, not to its parts) also support word learning. Against this backdrop, the pathway to learning each specific word proceeds from limited understanding of the label or the referent, toward a comprehensive and flexible understanding of the underlying concept, and the pragmatic and syntactic use of the referent (10). Learners use one or more of these cognitive and lexical processes to advance their understanding, often switching strategies as their expertise with the word or the broader endeavor of word learning grows (9).

Environmental Input

Regardless of the process by which young children learn words, they can only use words to which they are exposed (11). *Repeated exposure* to a word helps children learn, remember, and use it, likely because each exposure affords additional opportunities to apply the cognitive and lexical processes discussed earlier. Specific estimates of how many exposures to a particular word are needed vary widely, from 40 (12) to 200 (13).

However, we understand more about four interrelated features of incidental or planned exposures that facilitate children's use of these key cognitive or lexical word-learning processes. First, children benefit from opportunities to hear or accurately infer the *definitions* of words (14), especially when those opportunities include clear representations (e.g., pictures, props; 15). Second, consistent with research on memory, children learn more new words when the words are presented in a *meaningful context* or theme rather than in isolation (16). Third, on a related point, children also benefit from connecting words' meanings to their own *background knowledge* and personal experience, grafting new ideas onto a familiar foundation (16). For example, studying insects over several weeks allows children to compare and contrast insects and learn more background information than if they were presented with the same information in isolation, repeatedly, over the same time. Fourth, children benefit from *language exchanges* with adults who—particularly as children's expressive language grows—ask open-ended questions that include or prompt children's use of target words, and repeat and elaborate on children's remarks (17). In summary, word learning occurs at the intersection between cognition and social interaction, as children attend to and then make meaning of the implicit and explicit language they hear.

UNDERSTANDING THE LANGUAGE STIMULATION GAP

With few exceptions, all children are exposed to language in their homes and communities, and they extract foundational language and vocabulary skills from this input.

However, this input differs among children, including along socioeconomic lines. In high-poverty households, children typically are exposed to fewer total words in their early years (i.e., the estimated 30 million word gap) than their peers in middle-income households, but also to fewer different words (8). In particular, children in poverty hear less vocabulary beyond common parlance (e.g., they are less likely to hear “gaze” or “observe” than “look”); such uncommon vocabulary is variously referred to as rare words (18), tier 2 or 3 words (19), or academic vocabulary (20). Families in poverty also read books—a potential source of uncommon vocabulary—less often than middle-income families (21). Moreover, when low-income families offer their children exposures to uncommon vocabulary, these exposures have fewer of the high-quality features that align with the vocabulary-promoting cognitive and lexical process noted earlier. For example, even when families in poverty read books with their children, they are less likely to define new words for children (22). Similarly, give-and-take conversation, which allows children to practice using vocabulary and receive feedback, is less frequent (18).

This language stimulation gap is apparent in classroom settings, as well. In particular, the overall quality of early childhood classrooms' conceptual and language stimulation is low to moderate (23). Teachers also provide about half of the talk in the classroom, focusing on management and direction, and with inconsistent invitations for children to talk about vocabulary or other content (24). They provide even fewer opportunities to talk about uncommon words (18): In fact, vocabulary instruction accounts for an average of just 5 min of the classroom day in early childhood (25). And even when teachers read books to their students, they vary enormously in the frequency with which they provide information or definitions of new (including uncommon) vocabulary words (26). Although these trends are apparent in classrooms serving middle-income children, they are more pronounced in lower income settings (23), where their impact is often compounded by language stimulation gaps at home.

Thus, the socioeconomic language stimulation gap is a multifaceted phenomenon characterizing both home and care environments. In mapping this terrain, our intention is not to emphasize deficits, but rather to objectively describe nuanced inequities in children's experiences that represent possible levers for change. Indeed, a key implication of this complex area is that effective solutions must also be multidimensional and must consider many contexts.

ALIGNING HOME AND SCHOOL INTERVENTIONS WITH THE SCIENCE OF WORD LEARNING

The Effectiveness of Current Interventions

The success of interventions that aim to close the language stimulation gap rests largely on the degree to which they ultimately help families and educators talk more, using words that children will encounter in texts, in ways likely to help children learn. Of

the widely disseminated family-focused interventions (e.g., Healthy Families America, Home Instruction for Parents of Preschool Youngsters, Nurse–Family Partnerships, and Parents as Teachers), only one (Play and Learning Strategies [PALS]; 27) improves children’s vocabulary on standardized measures ($d = .36$ on the Peabody Picture Vocabulary Test [PPVT]). Others are promising (e.g., posttest-only data; 28) and all effectively improve one or more other family or child outcomes (e.g., parents’ responsiveness, children’s engagement in reading books). Similarly, just six interventions that target educators (15, 29–32) increase children’s vocabulary on standardized measures, though many programs build other important skills (e.g., letter knowledge, phonological sensitivity). However, even among these promising projects, the small to moderate effect sizes on standardized measures such as the PPVT (e.g., .09 to .45) are modest relative to the size of the achievement gap. Moreover, all target just one or two school years, which means that effects can fade. Thus, these and other interventions need to be developed further.

Enhancing the Effectiveness of Interventions

What does the science of word learning suggest might expand effective programs and further enhance the effectiveness of those with a promising evidence base? First, adults may need guidance not just on how to talk with children but on how to effectively and efficiently teach them more uncommon words that are important for reading. Caregivers, especially those who are disenfranchised from the school system and its expectations, may need substantial, explicit support in this area. However, rather than targeting language and vocabulary specifically (28), most home-based interventions for children in poverty target aspects of children’s and families’ functioning (e.g., children’s language, literacy, and health; caregivers’ responsiveness and well-being; see 33), or target a proximal predictor of vocabulary such as frequency of reading a book. In contrast, PALS focuses on responsive language interactions.

In the classroom, all widely used curricula focus on many outcomes (e.g., vocabulary, decoding, math, social competence; 30), but most ultimately provide little guidance regarding vocabulary instruction (34). In contrast, all of the promising models mentioned earlier emphasize vocabulary learning in their aims or practices, although how and how much is offered vary substantially. *Therefore, the field needs more interventions that support families and educators on how, and how often, to teach words.*

Second, attrition from intervention programs is often as high as 50% over an academic year, particularly among intensive programs (35). Even among educators, whose participation can be encouraged or required by employers, the intended practices are often implemented ineffectively (36). Patterns of discourse between adults and children are often automated and culturally embedded, making them difficult for adults to alter, and children may need time to adjust to these opportunities to talk (37).

Consequently, participation in an intervention over an extended time may be essential. All of the promising models mentioned earlier offer at least 1 year of support to adults and children; however, all face the challenge of attrition. *Therefore, interventions need to identify appealing, practical, and feasible strategies to retain families and educators over time.*

Third, many interventions—including the promising projects mentioned earlier—do not coordinate children’s exposure to vocabulary across home and care contexts (e.g., child care, preschool, kindergarten), either in a given year or across sequential grades (38). Alignment between home and school may be necessary, given that children often benefit from many exposures to words, and that home and school afford different and potentially complementary interactions around words. For example, school offers children access to explicit and implicit vocabulary instruction involving trained educators, high-quality materials, and same-age peers, while the home offers greater opportunity for extended, one-on-one interaction with highly invested caregivers. Numerous programs acknowledge the need to bridge the home-school gap (e.g., Even Start, Head Start), but do not offer families and educators specific guidance for coordinated exposures to a particular set of words at home and school during the school year, or from year to year. *Therefore, educators and families need help coordinating vocabulary-building efforts between home and school.*

RESEARCH ISSUES FOR CLOSING THE VOCABULARY GAP

In light of the gaps in scientific understanding of word learning and its translation into effective interventions for high-poverty classrooms and households, we suggest several areas for research and program development.

How Many Words Should Families and Educators Expect Young Children to Learn?

Although science has provided evidence about how children learn small sets of words in laboratories, little is known about how children learn words over an average day, week, or month at home and in the classroom. These settings place many demands on children’s attention, with the introduction of new words just one of them. How *many* words can children learn, and how many words should families and educators attempt to teach over a given period? Research offers no clear guidelines and programs that take varied approaches. For example, in a recent meta-analysis on vocabulary learning during book reading (39), some projects taught as few as 3–6 words for each book read, while others taught as many as 20 words per book read. In one study (14), different children learned different words from the same book reading, implying that a varied selection of target words helps. However, in another study (40), children learned more words when the book reading focused on a smaller number of words per session. Overall, teachers and parents need

precise, ecologically valid guidance on the ideal number (or more likely, range) of target words so they can balance the breadth and depth of children's exposure to vocabulary. Estimates regarding how often schools *and* families should target any particular word, apportioning the total number of exposures across these dual contexts, might be particularly beneficial.

Which Words Should Families and Educators Teach?

Researchers have elucidated much about the similarities and disparities in how children learn different grammatical categories of words (e.g., nouns, verbs, modifiers; open- or closed-class words), but caregivers have no guidance for deciding which words from these categories they should highlight at home or in school. Several frameworks have been proposed to help teachers (and to a lesser extent, families) know which words to teach, including Beck and McKeown's tiers (19), academic vocabulary (20), root words (41), and categories of words (42). Still other cognitive research suggests that choice of words should depend on the odds that words will be reinforced over time, preventing forgetting (43). These frameworks and principles are essential beginnings for developing more effective ways to teach words, but the field needs systematic evaluations of the relative effectiveness (measured by children's word learning) of these approaches, as well as their feasibility in actual households and classrooms. Moreover, given the fundamentally social nature of language, cultural values and expectations need to be considered in identifying focal words that would help prepare young children to learn to read.

How Can We Untangle Key Moderators of Word Learning?

The same vocabulary-learning experiences do not always yield the same benefits for all children. One key moderator is children's prior knowledge of vocabulary words. Children who know more words benefit from instruction on more sophisticated words (e.g., tiers 2–3), whereas children with less vocabulary knowledge might benefit from learning more basic words (e.g., tiers 1–2), perhaps with more explicit instruction (44). However, the opposite pattern can also hold true: Young children with small vocabularies (but typical cognitive function) learn new words rapidly when they enter vocabulary-rich settings (31). We need extensive analysis of the moderating role of this and other individual differences in prior vocabulary, as well as of factors such as children's engagement, children's working memory, and the quality of adult-child relationships.

How Should Families and Educators Be Trained to Use Effective Techniques?

Whatever practices are determined to be effective, educators and families need to be trained to implement these practices with fidelity to achieve vocabulary gains for children. Even with effective teacher or family interventions, questions persist about content, dosage, duration, and other training issues (45). Investigators should determine ideal levels of support for caregivers

(e.g., how many trainings or home visits), what information should be addressed in each, and how to adjust the intensity of support over time. Common characteristics of the few effective interventions for families (27) and educators (29, 39) suggest the value of intensive, ongoing, in situ support.

However, intensity of training must be balanced with potential feasibility at scale, especially in underresourced communities. Differentiating parent and teacher training to match caregivers' individual skills and challenges, and exploring thresholds for caregiver competence with language stimulation (beyond which additional change offers reduced benefits for children's outcomes), might inform the development of streamlined interventions. Finally, interventions must be congruent with both scientific evidence and participants' cultural beliefs and expectations (e.g., relative roles of fathers and mothers, cultural expectations regarding the frequency of child-directed talk). Individuals who will take part in the interventions should have input during development and evaluation of programs.

How Can We Elucidate Vocabulary Building From Birth Through the Transition to School?

Most researchers have targeted children ages 2 years and older, primarily because assessing infants' and young toddlers' vocabulary knowledge is challenging. Yet, because the vocabulary gap emerges long before age 2, the field would benefit from examination of how, which, and how many words to teach, as well as how to support caregivers in this process, throughout the early years. Only with deeper understanding of word learning and teaching across the first 5 years can we carefully align systems of long-term support for educators, families, and children.

CONCLUSIONS

In general, young children are astute and motivated word learners who begin to gather the building blocks of their lexicon shortly after birth. Yet children in poverty are systematically disadvantaged in vocabulary by their 2nd year. New attention to the word gap between low-income children and their higher income peers must be accompanied by a thorough examination of the underlying science of learning, as well as strategic research initiatives to inform the field. In addition, efforts to translate research on word learning into practice at home and in school are needed. If carefully harnessed, the heightened interest in the word gap may offer unparalleled opportunities to move the field of vocabulary development forward and change the odds for children at risk.

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