Core Vocabulary Lists for Young Children and Considerations for Early Language Development: A Narrative Review

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Abstract

For early symbolic communicators, acquisition of an initial vocabulary is a critically important achievement that sets the stage for future language development. Children who require augmentative and alternative communication (AAC) rely on others to select and provide these important first words for them. One resource to help guide this process includes published lists of words that may contribute to a core vocabulary for individuals who require AAC. Although some clinicians report that they consider or prioritize core words during the vocabulary selection process, it is not known whether an emphasis on core words will best meet the expressive vocabulary needs of early symbolic communicators. The purposes of this narrative review were to (a) review studies that have developed word lists to inform selection of a core vocabulary for young children who require AAC, (b) compare the words on these lists to the early words used by children with typical development, and (c) consider the implications for vocabulary selection and language development for early symbolic communicators who require AAC. Results suggest that core word lists may under-emphasize many of the types of words that predominate in early expressive vocabulary; these lists may not be the most appropriate resources to guide AAC system design and instruction for early symbolic communicators.

Key words: Augmentative and alternative communication (AAC); Core vocabulary; Language development; Vocabulary selection

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Children typically begin to produce their first words at approximately 12 months of age (Diesendruck, 2007). They slowly acquire an initial expressive vocabulary over the next several months, adding a few words per month until, by 18 months of age, they are typically able to produce 50 words or more (Diesendruck, 2007; Goodman, Dale, & Li, 2008). During this period of time, children use single words spontaneously and referentially for a range of communicative functions (e.g., requesting, commenting) but do not yet combine words to produce phrases (Nelson, 1973).

For children who are beginning to produce their first words and have not yet started to combine words, referred to in this paper as *early symbolic communicators*, acquisition of an initial expressive vocabulary is critically important. The concepts that comprise an initial 50-word lexicon allow the child to experiment with language and learn about the power of symbolic communication; they serve as the foundation for future word combinations and subsequent language development (Fenson et al., 1994). Early symbolic communicators with complex communication needs, who are unable to rely on speech, often benefit from augmentative and alternative communication (AAC) to support expressive language (e.g., Romski et al., 2010). These children must be able to access functional and developmentally appropriate vocabulary via AAC in order to build a robust initial lexicon that will support further development (Beukelman & Mirenda, 2013; Paul, 1997).

Unlike children with typical development who choose their first words based on salient experiences and interests, early symbolic communicators who require aided AAC must rely on others to select and program vocabulary for them (Light, 1997; Nelson, 1973). They may also

require aided AAC modeling to address the asymmetry between the primary channel of language input provided to them (speech) and their primary channel of expression (multimodal AAC; Allen, Schlosser, Brock, & Shane, 2017; Light, 1997; O'Neill, Light, & Pope, 2018), and to support vocabulary learning (Dada & Alant, 2009; Drager et al., 2006; Romski et al., 2010). Because communication partners are responsible for selecting, programming, modeling, and teaching vocabulary as necessary, they can play a substantial role in deciding which words early symbolic communicators with complex communication needs are able to learn and use.

Many tools have been developed to help communication partners decide which concepts to prioritize in the design and instruction of AAC systems. These include environmental inventories, communication diaries, and categorical inventories, among others (Morrow, Mirenda, Beukelman, & Yorkston, 1993). One approach sometimes used by clinicians involves a focus on core vocabulary words (Beukelman & Mirenda, 2013; Thistle & Wilkinson, 2015). Core vocabulary has been defined in various ways across different fields of study (Lee, 2001); within the field of AAC, it is typically defined as words that occur frequently or that are commonly used by many individuals (Beukelman & Mirenda, 2013; Fallon, Light, & Paige, 2001). Core words are often contrasted with fringe words, which are specific to an individual or activity (Beukelman & Mirenda, 2013; Fallon et al., 2001).

Several studies have identified lists of words to help determine the contents of a core vocabulary for individuals who require AAC (e.g., Balandin & Iacono, 1999; Banajee, DiCarlo, & Stricklin, 2003; Beukelman, Jones, & Rowan, 1989). Additionally, a Google search using the terms "core vocabulary" AND AAC reveals a variety of core word lists, core-based page sets, and core word-focused instructional activities developed for individuals who require AAC. Despite the abundance of core word resources available, no empirical research has examined the

effect of an approach that emphasizes core words during AAC system design and instruction on communication or language learning for early symbolic communicators with complex communication needs (Thistle & Wilkinson, 2015). One study (Hammond, 2017) taught five children with autism spectrum disorder (ASD) to use 26 core words expressively; however, participants were not early symbolic communicators as they all produced sentences at the start of the study. In another study (Snodgrass, Stoner, & Angell, 2013), one participant with complex communication needs and predominantly pre-symbolic communication was taught to use three core words; however, this study did not address the broader impact of instruction that emphasizes core words on language learning over time. Neither did it compare outcomes of instruction that emphasize core words to instruction that prioritizes other vocabulary concepts. Thus, evidence suggests that emerging or early symbolic communicators may be able to learn to use words from core vocabulary lists, but the impact of an approach that emphasizes these words is unclear. It is not known whether an emphasis on core words for early symbolic communicators will support early vocabulary development and provide an adequate foundation for future language learning.

The purposes of this narrative review were to (a) review studies that have developed word lists to inform selection of a core vocabulary for young children who require AAC, (b) compare the words on these core vocabulary lists to the early words used by children with typical development, and (c) consider the implications for vocabulary selection and language development for early symbolic communicators who require AAC. A narrative rather than a systematic review was chosen because of the limited number of studies in the AAC field that have focused on developing core vocabulary lists for young children who require AAC, and the lack of experimental designs in these studies. The results of this review are contrasted with what

is known about vocabulary acquisition and use by young children who are early symbolic communicators. Specifically, the review addresses the following research questions:

1. How were core vocabulary lists for young children developed? In studies that developed these lists, what were the participant characteristics and what communication contexts were represented? How were core words operationally defined?
2. Which words appear on core vocabulary lists for young children? Are these words consistent across lists?
3. How do the words on core vocabulary lists compare to the words on a validated inventory of early communication skills of young children (i.e., the MacArthur-Bates Communicative Development Inventories; Fenson, Marchman, Thal, Reznick, & Bates, 2007)?

Based on the answers to the above research questions, the implications for language development in early symbolic communicators with complex communication needs are discussed in terms of emphasizing core vocabulary in AAC system design and instruction.

Method

Inclusion Criteria

Studies were included in this review if they met the following criteria: (a) were data-based and published in a peer-reviewed journal; (b) included vocabulary lists developed for the purpose of informing vocabulary selection and/or instruction for individuals who require AAC, and were proposed as resources for identifying a core vocabulary; (c) included participants who were 6-years-old or younger; and (d) included participants who spoke English. Studies were excluded if they targeted core words in written text, included bilingual participants or

participants using a language other than English (e.g., Mngomezulu, Tönsing, Dada, & Bokaba, 2019), or did not provide a list of identified core words.

Search Methods

Several databases, including PsychInfo, Educational Resources Information Center (ERIC), Linguistics and Language Behavior Abstracts (LLBA) and the Nursing and Allied Health Database, were searched using the following two sets of free-text search terms: (a) core vocabulary ("core vocabulary" OR "core words") and (b) AAC (AAC OR "Augmentative and Alternative Communication"). Ancestry searches were performed on relevant articles to identify any additional peer-reviewed studies not captured in the database search. Five studies met the inclusion criteria (Banajee et al., 2003; Beukelman et al., 1989; Fried-Oken & More, 1992; Marvin, Beukelman, & Bilyeu, 1994; Trembath, Balandin, & Togher, 2007).

The Results section begins with a summary of the following information from each of the five studies: participants (number, age range, and disability status), data collection techniques (sources and contexts), and the core vocabulary lists (operational definition of core words, number of words on the list, and organization of the list) (Table 1). This is followed by a discussion of similarities and variability across the four studies with ranked core vocabulary words and lists (Table 2; Appendix, Supplemental materials).

Results

Participants

The number of participants across the five studies ranged from six to 50. Three studies included 10 or fewer participants while two had 45 or more. Participants ranged in age from 2;0-6;3 (years; months). Four studies included solely children with typical development. One study (Fried-Oken & More, 1992) included both children with complex communication needs and

children with typical development, though it should be noted that data collection methods in that study differed for the participants with and without disabilities. None of the studies included early symbolic communicators. All participants with typical development were 24 months of age or above, at which point they would be expected to produce word combinations (Diesendruck, 2007). Fried-Oken and More included children with limited or no speech aged 3-6 years. Because formal language assessments were not conducted on these participants, their expressive language skills cannot be characterized with certainty; however, all participants were able to use pictures to communicate and all had age-appropriate receptive language abilities, suggesting overall language abilities beyond the first words stage.

Data Collection

In four of the five studies (Banajee et al., 2003; Beukelman et al., 1989; Marvin et al., 1994; Trembath et al., 2007), audio recordings were used to collect spoken-language samples from a group of children with typical development; group composite samples were analyzed to determine a list of core words and sampling contexts varied. Banajee et al., Beukelman et al., and Trembath et al., collected language samples in participants' preschool or daycare during play time, snack time, or other routine activities; while Marvin et al. collected language samples during routine activities both at preschool and at home. In the study by Fried-Oken and More (1992), parents and clinicians of children with complex communication needs were asked to list the most important words the children would use if they could talk. The authors also asked parents of preschoolers with typical development to list the words their children used most often. Finally, they collected language samples from the children with typical development during play interactions with a researcher. A total of 90 word lists collected from these sources were analyzed to develop a core vocabulary list.

Core Vocabulary Lists

Operational definition. Across the five studies, two main criteria were used to define which words would be included on the list of words to contribute to a core vocabulary: (a) frequency of use within the composite language sample from all participants; and (b) commonality of use across participants or contexts, or occurrence across source lists. In the studies that relied primarily on frequency, core words were those that occurred with a frequency of at least 0.5 in 1000 (i.e., one in every 2000 words). Trembath et al. (2007) also considered commonality, and noted that core words must occur with a frequency of at least 0.5 in 1000 and be used by at least three (50%) of the participants. Banajee et al. (2003) defined core words based only on commonality, including all words that achieved a commonality score of at least 4 out of 6, where one point was assigned for initial use and additional points assigned for each new setting or day in which a word was used. Fried-Oken and More (1992) included the words that fell within the top 10% of words appearing on at least three of the 90 source lists.

Number of words. Overall, these varied definitions of core words resulted in word lists of different lengths in each study; the shortest list (Banajee et al., 2003) had only 23 words while the longest (Marvin et al., 1994) had 332.

Organization. The majority of studies organized their core vocabulary in a most-to-least fashion (Banajee et al., 2003; Beukelman et al., 1989; Fried-Oken & More, 1992; Trembath et al., 2017). Marvin et al. (1994) was the only study in which the vocabulary was categorized as a function or content word and subsequently presented alphabetically.

Insert Table 1 About Here

Core Vocabulary Lists: Similarities and Variability

Although each of the studies reviewed here presented a list of words to assist in the

development of a core vocabulary for individuals who require AAC, none of the authors suggested that their list alone was intended to serve as an exhaustive vocabulary, and all cautioned against generalizing their results to populations and contexts not represented in their study. To understand which words were identified in these studies as potential contributors to a core vocabulary, similarities across word lists as well as variability across lists and individual participants warrant consideration.

Similarities across word lists. Table 2 lists all of the words that appear in the top 10 on each vocabulary list of the four studies that ranked words from most-to-least core (Banajee et al., 2003; Beukelman et al., 1989; Fried-Oken & More, 1992; Trembath et al., 2007). If a word appeared in the top 10 on one list and also appeared on one or more of the other lists, its ranking on each list on which it was included is provided. Words have been classified as function words or content words according to definitions by Ambridge and Lieven (2011); when words could potentially be classified either way depending on context, they were classified based on the category assigned to them by Fenson et al. (1994; pp. 142-157).

There are a total of 24 words in the table, two of which (yes, no) could not be readily classified and were not assigned a category. The majority of the words (15 out of 24; 63%) can be classified as function words, or words that perform a grammatical function, including pronouns (e.g., I, you, it, my, mine), determiners (e.g., the, a), and auxiliary verbs (e.g., is), among others. A smaller proportion of words (seven out of 24; 29%) can be classified as content words, or words that belong to lexical categories (e.g., nouns, verbs, adjectives, adverbs, and prepositions). Of these, two words (8% of the words on the total list) were nouns, three (13% of the total list) were verbs, one (4% of the total list) was an adjective, and one (4% of the total list) was a preposition. Content words may be less likely to appear frequently or commonly because

they are more heavily influenced by context and individual interests, helping to explain why they are not prominent at the top of ranked core word lists.

Table 2 also includes the age at which 50% of children with typical development are able to produce each word according to Fenson et al. (1994). Only three of the 24 most frequent/common core words in Table 2 (13%) are produced before the age of 18 months (i.e., while children are still in the first words stage of development). The vast majority of the words (21 out of 24; 88%) are typically produced after the age of 18 months, at which point most children have acquired an expressive vocabulary of 50 words or more and are beginning to combine words into short phrases (Fenson et al, 1994). Thus, the majority of the most frequent/commonly occurring words on the ranked core vocabulary lists reviewed here are not typically produced by early symbolic communicators.

Variability across lists and individual participants. The Appendix (Supplemental Materials) lists the top 100 words on each of the core vocabulary lists that ranked entries from most to least frequent and/or common. Core words are often said to be used consistently across environments and individuals (Yorkston, Dowden, Honsinger, Marriner, & Smith, 1988). As the appendix illustrates, however, there is substantial variability in the top 100 words across the core vocabulary lists identified in these studies: of the 165 total words, only 18 (11%) appear on all of the lists. Even excluding the list developed by Banajee et al. (2003), which was much shorter than the others, there were still only 53 words (32%) that appeared within the top 100 on all lists. Approximately half of the words (81 or 49%) appeared on only one list.

The words that appeared on each list were influenced by the context and methods of the specific study. For example, the words *mom* and *dad* were ranked first and fourth, respectively, on the list by Fried-Oken and More (1992) but did not appear in the top 100 on any other ranked

lists. This may have been related to the fact that this study was the only one to elicit input regarding important words from parents and other informants. In another example, the word *spiderman* appeared on the list from Trembath et al. (2007) but none of the other lists. The authors explained that this was because the Spiderman movie had recently been released and was a frequent topic of conversation among the children in the study. Lists are also influenced by the researchers' definition of what constitutes a word (Lee, 2001). For example, the study by Fried-Oken and More specified that word roots and bound morphemes would be separated and included as individual entries on the core vocabulary list, while other studies either did not address this issue or chose to include every different word form that occurred in the language samples. This may explain why words such as *N't* and *plural-s* appeared on the list by Fried-Oken and More (1992) but not on others.

Variability across contexts. In addition to variability across core word lists, there is also variation across contexts or source lists within the individual studies. For instance, Marvin et al. (1994) compared language samples of preschoolers in both home and school environments across multiple days and found that only about one third of the words in the composite sample were used in both environments. Another third were used only at home, and the last third were used only at school. Furthermore, words were more likely to be used in both settings when samples from each context were collected on the same day, suggesting that frequency of word use is influenced by point-in-time as well as location. Trembath et al. (2007) report that more than half (55%) of the different words in their composite sample were used only once (i.e., by only one participant in only one context). Finally, in Fried-Oken and More (1992), not a single word in the composite sample was common to all of the lists collected and almost half of all words appeared on only one of the 90 source lists. Moreover, the top 10% of words were only

common to 18 of the 90 source lists.

Insert Table 2 about here

Comparison of Core Vocabulary and Typical First Words

It has been argued that AAC systems for early symbolic communicators should include concepts that are developmentally appropriate and functional for the individual with complex communication needs (Beukelman, McGinnis, & Morrow, 1991). To determine whether the words on the core lists fit these criteria, they were compared to the words on a validated list of vocabulary used by early symbolic communicators (i.e., The MacArthur-Bates Communicative Development Inventories (CDI; Fenson et al., 2007).

The CDI provides an inventory of early communication skills that lists words commonly understood and produced by children with typical development between 8-18 months (the CDI words and gestures form), and words commonly produced by children between 16-30 months (words and sentences form). Normative studies involving over 1000 infants (words and gestures form) and over 1400 toddlers (words and Sentences form) have been conducted to establish developmental trends in acquisition of the skills included on the CDI (Fenson et al., 2007). The CDI has been found in multiple studies to be a reliable and valid tool for characterizing the early language skills of children both with and without disabilities (Dale, 1991; Dale, Bates, Reznick, & Morisset, 1989; Fenson et al., 1994; Miller, Sedey, & Miolo, 1995; Thal, O'Hanlon, Clemmons, & Fralin, 1999).

To determine whether the words on the CDI are similar to core words, Table 3 outlines the contents of the CDI and lists the total number of words within each word-type category that are found in the top 100 on at least one of the ranked core vocabulary lists for young children. Only 79 (20%) out of the 396 total words on the words and gestures form, and only 122 (18%)

out of 680 words on the words and sentences form appear within the top 100 on at least one ranked core vocabulary list for young children. In other words, the vast majority (approximately 80%) of words commonly understood and produced in early language development, according to the CDI, are not captured within the top 100 on the ranked core word lists reviewed here. These differences may be attributable to the fact that the CDI contains a large number of nouns and other content words (e.g., words referring to toys, foods, and people), as well as animal sounds (e.g., woof), sound effects (e.g., choo choo), and social/routine words (e.g., bye bye, peekaboo), and contains fewer function words. In contrast, core vocabulary lists emphasize function words that tend to be later-emerging (see above). Although content words are certainly found on core vocabulary lists, they may be relatively sparse unless the core word list is quite long; an exception is the list provided by Marvin et al. (1994), which separated function and content words into two separate lists organized alphabetically rather than by frequency of occurrence. Core vocabulary lists also lack animal sounds (e.g., woof), sound effects (e.g., choo choo), and social/routine words (e.g., bye bye, peekaboo). These words are quite common in early language development (Fenson et al., 1994).

Insert Table 3 about here

Discussion

The previous analysis reveals a mismatch between words on core vocabulary lists and the words that early symbolic communicators typically produce. In the studies that derived core vocabulary lists for young children, all participants had language abilities equivalent to or above those of a 24-month-old child with typical development (though, as previously noted, some of the participants in the study by Fried-Oken and More (1992) were individuals with limited speech whose expressive language was not formally assessed and thus cannot be characterized

with certainty). They would all be expected to produce word combinations, at a minimum, and most would be expected to produce more grammatically advanced phrases and sentences; in other words, the core word lists identified in this review do not reflect the language of early symbolic communicators. Moreover, the most frequent/commonly occurring core words identified in these studies differ quite substantially from words on the CDI, which has been well-established as a reliable and valid tool for characterizing the language of early symbolic communicators (e.g., Fenson et al., 1994). There is no basis to assume that the words on these core vocabulary lists are more important than any other words for early symbolic communicators.

Even for more advanced communicators, the term *core* may suggest a level of importance that is not justified. Variability across core word lists, individual participants, and sampling contexts in the analysis suggests that core words vary depending on a number of factors. In fact, out of the top 100 words on all ranked core vocabulary lists for young children, approximately half appeared on only one list. Relatively small sample sizes (6-50 participants) also make it difficult to generalize to populations and contexts not directly represented in these studies. Moreover, in Beukelman et al. (1989), Marvin et al. (1994), and Trembath et al. (2007), words did not need to be particularly frequent (one in 2000) to be considered core. Additionally, core words were not always common; in fact, when core words were defined as those used by at least 50% of participants, as in Trembath et al., up to half of the children studied may not have used these words at all. Concepts that were used once in every 2000 words or were never used at all by half of the participants in a sample may not be as important as the term core implies.

Implications for Language Development

When designing AAC systems for early symbolic communicators, emphasizing words

from core vocabulary lists based on frequency and/or commonality of use by relatively small samples of individuals who are beyond the early symbolic stage has potential implications for both early expressive language and later grammatical development.

Early expressive language. When children with typical development begin to talk, parents often respond by affirming, repeating, and expanding upon their child's utterances (Tamis-LeMonda, Bornstein, & Baumwell, 2001). In doing so, they model important new content words along with function words and invite the child to continue to engage, thereby opening up new practice opportunities (Masur & Olson, 2008; Tamis-LeMonda et al., 2001). Thus, first words enable children to not only express themselves but also elicit feedback from communication partners that supports further language development. It is important for children with complex communication needs to be able to access developmentally appropriate vocabulary words that will support participation in these types of interactions.

There is a great deal of individual variation in early language development. Young children differ with respect to their rate of word learning as well as the specific words that they produce (Fenson et al., 1994). Despite these individual differences, there are some consistent patterns that characterize early expressive vocabulary (Fenson et al., 1994). Initial English language expressive vocabularies tend to be dominated by nouns (e.g., important people, animals, foods), and by object names in particular (Bloom, 2000). These words most often refer to items with particular salience to the child, including those that move, make noise, or can be directly acted upon (Nelson, 1973). Animal sounds and sound effects, as well as words used during social routines (e.g., bye bye, uh oh), also play a prominent role (Fenson et al., 1994; Nelson, 1973). In fact, Fenson et al. found that sound effects and animal sounds represented the most frequent semantic group among the first 50 words to be produced by 50% of children in

their sample, followed by games and routines, animal names, food and drink, people, and toys. Young children use these words for a variety of pragmatic purposes, including requesting (e.g., objects; assistance; and, later, information), rejecting, commenting, and participating in routines, even before they are able to produce phrases and sentences (Chapman, 1981).

Function words, though frequent in adult speech and critical for later use of complex syntax, are not common in children's early expressive vocabularies (Goodman et al., 2008). Quick, Erickson, and Mccright (2019) studied the words used by mothers interacting with their children (ages 9-15 months); unsurprisingly, the list of words they most frequently used were function words. A great deal of overlap was found between function words used frequently by the mothers and those used most frequently by the older children in the core vocabulary studies by Banajee et al. (2003), Beukelman et al. (1989), and Marvin et al. (1994). These words, however, are not the words that are acquired first by young children with typical development; rather, early semantic development is defined by an emphasis on content words. Unlike typical first words, the words that rank at the top of core vocabulary lists are more likely to be function rather than content words. Many of these words tend to emerge after children have achieved an initial 50-word lexicon and are demonstrating emerging grammatical skills (see Table 2). Furthermore, as previously noted, many early emerging words are not captured within the top 100 on lists that rank core words from most-to-least frequent/common. An emphasis on the most frequent and/or commonly occurring core words may lead to a focus on many concepts that early symbolic communicators are not yet developmentally ready to produce. At the same time, this approach may de-emphasize many of the personally relevant nouns, social and routine words, sound effects, and other early emerging concepts that allow children to connect with others and convey rich meaning before they are able to produce more grammatically complex utterances.

Evidence suggests that early words produced by children with disabilities, including children with autism spectrum disorder (Davidoff, 2018) and Down syndrome (Tager-Flusberg et al., 1990), are similar to those produced by children with typical development. Thus, there seems to be no reason to believe that teaching words from these core lists would offer greater benefit for children with complex communication needs than teaching words that more closely match those in typical early expressive vocabularies.

Unlike typical first words, core words do not reflect individual experiences and interests. First words used by children with typical development reflect the unique interests and experiences of the learner; they are selected for use by that learner out of the thousands of words heard each day because they represent concepts that are salient and important to that individual (Light, 1997; Nelson, 1973). Core vocabulary lists are based on composite language samples involving input from many participants; they do not capture the personalized nature of early vocabularies. Furthermore, these lists are based largely on frequency and commonality of use in grammatical speech, even though children do not choose their first words based solely on those that are used most frequently by adults (Nelson, 1973). In fact, Goodman et al. (2008) found that the words used most frequently by parents in child-directed speech were actually the last to be produced by young children. Nouns, which were produced least frequently by the parents, were learned earliest by the children. If core words are emphasized for early symbolic communicators who require AAC, there is a risk that these children will not be able to access a large and diverse range of developmentally appropriate words; as a result, valuable opportunities to engage in early social interactions and to learn about the power of symbolic communication may be lost.

Grammatical development. If early symbolic communicators are provided with an initial vocabulary that is lacking in nouns and other content words, it may be difficult for these

individuals to progress from the first words stage to use of word combinations. This in turn may have cascading effects on future syntactic development. As discussed by Fenson et al. (1994), the ability to produce word combinations relies heavily on the acquisition of a robust base of individual content words. Specifically, early word combinations typically contain a high proportion of nouns and action words (e.g., *mommy sock*, *doggy eat*), with fewer adjectives and adverbs and generally do not contain prepositions, conjunctions, articles, or auxiliary verbs (Brown, 1973). A large base of content words allows children to experiment with word combinations and start to understand how concepts relate to each other. As Fenson et al. state:

> By their very nature, inflections and function words are relational, that is, logically dependent on the nouns, verbs, and adjectives that bear them. It may be the case that children cannot understand the purpose of grammatical markers until they have a good-sized vocabulary of content words and have had ample opportunity to observe the changes in meaning that these content words undergo depending on the markers that they bear (pp. 69-70).

To ensure that early symbolic communicators with complex communication needs are able to develop a robust base of content words to support word combinations, sources other than core vocabulary lists may need to be consulted when designing AAC systems and planning vocabulary instruction.

Alternatives to Core Vocabulary

Many approaches to vocabulary selection have been discussed in prior AAC research, including use of environmental inventories, communication diaries, categorical inventories, and published word lists, among others (Beukelman et al., 1991; Morrow et al., 1993). In fact, it has

been suggested that multiple approaches be employed because each approach yields different but equally important information (Fallon et al., 2001).

When using published words lists as one tool to support vocabulary selection, it is important to choose an appropriate list. As previously discussed, the CDI provides a reliable and valid list of words that are commonly produced by young children. Although neither the CDI nor core vocabulary lists are likely to capture all of the words that an early symbolic communicator may need or want to produce (Marvin et al., 1994; Mayor & Plunkett, 2011), the CDI may offer several advantages over core word lists when attempting to characterize early expressive vocabulary. First, it is based on a large sample of children in contrast to the studies reviewed above, which included relatively small samples. Second, it has been found in multiple studies to be a reliable and valid tool for characterizing the early language skills of children both with and without disabilities (Dale, 1991; Dale, Bates, Reznick, & Morisset, 1989; Fenson et al., 1994; Miller et al., 1995; Thal et al., 1999). In contrast, we found no studies establishing the reliability and validity of core vocabulary lists as tools for characterizing language at any stage. Third, the CDI was developed through parent report whereas core vocabulary lists, with the exception of the Fried-Oken and More (1992) list, are based primarily on language samples collected directly from participants with typical development in specific contexts. Parent report may offer some advantages over language sampling when assessing early symbolic communicators. Words may be used quite infrequently by young children when they first emerge and are likely to be missed in language samples; parent report may be a more effective method for identifying these important words (Hollich, Hirsch-Pasek, & Golinkoff, 2000; Mayor & Plunkett, 2011). Additionally, because words vary across communication contexts, parent report may be able to capture vocabulary skills and needs more broadly than language samples (which reflect only the

language used in the sampling context) when expressive vocabularies are still relatively small (Fenson et al., 1994).

Even use of an appropriate published list in combination with other vocabulary selection techniques has limitations. Pre-programming of vocabulary for AAC systems requires a communication partner to attempt to anticipate what a child might want to say in advance of an interaction. This may be difficult for even familiar communication partners (Dark & Balandin, 2007), thus, when vocabulary is pre-selected, there is a risk of leaving out important and contextually relevant words while filling valuable space with concepts that the individual does not want or need to use (Light, 1997). To address the problems with pre-selection, some researchers have proposed a just-in-time approach to AAC programming and instruction (e.g., Light & McNaughton, 2012; Schlosser et al., 2016). Using this approach, vocabulary is introduced in the moment that it is needed, just in time to take advantage of the communication opportunity. Studies have demonstrated that professionals are able to learn just-in-time AAC programming with relative ease (Caron, Light, & Drager, 2016); that children remain engaged as new vocabulary is added to their systems on the spot (Light & McNaughton, 2012); and that children as young as 10 months are able to participate in just-in-time programming, allowing for a more interactive approach to language learning (Holyfield, Drager, Light, & Caron, 2017). Future research may continue to explore the use of just-in-time principles to support child-centered vocabulary selection as well as the potential impact of this approach on language learning for early symbolic communicators.

Limitations and Future Directions

Several limitations with respect to this review of core vocabulary lists should be noted. First, it is important to restate that a narrative rather than a systematic review was conducted

because of the small number of studies and the lack of experimental design; it is possible that there are additional studies that developed core vocabulary lists for young children who require AAC that were not included in this review. Furthermore, this narrative review describes the results of studies to determine core vocabulary lists for children who require AAC and considers implications for expressive communication and language development; future experimental research is needed to investigate the impact of such an approach on language learning (Thistle & Wilkinson, 2015).

Another limitation is that only beginning communicators and early language development were considered in this analysis. Many core words are structure words that become important as morphosyntactic skills emerge. Further examination is required to determine how and when core vocabulary lists are appropriate and useful tools to support advanced communicators in expressing more complex language. The structure words on core vocabulary lists are especially important for those who are developing literacy skills; these individuals may benefit from core word lists based on text sources. Furthermore, only core word lists developed for English-speaking children were examined; conclusions about core vocabulary in other languages cannot be drawn (e.g., Mngomezulu et al., 2019). Additionally, this discussion considered only core vocabulary lists published in the peer-reviewed AAC research literature. Lists developed by clinicians, manufacturers, and researchers in other fields may have used different methods and different criteria for determining core words and may have yielded different results.

This paper draws on typical language development as a model for understanding the vocabulary needs of individuals with complex communication needs. This approach has been previously used within the field of AAC to support vocabulary selection (Beukelman et al., 1991). All of the studies reviewed in this paper relied on speech samples of children with typical

development to derive the lists of core words. There is certainly evidence of similarities between the early vocabulary of children with and without disabilities (e.g., Davidoff, 2018) but there are also differences in the language learning process for these two groups; use of a typical development model may have limitations (Gerber & Kraat, 1992).

This paper primarily considers the nature of the words included on core vocabulary lists and the implications for language development for early symbolic communicators. Specific instructional techniques that may be used together with an emphasis on core words within a broader treatment approach were not considered. Such instructional approaches may have benefits not recognized here and require a separate analysis; however, it should be noted that instructional approaches are not tied specifically to core vocabulary and may be used with any vocabulary set.

Finally, this analysis does not consider the potential role of core vocabulary in aided AAC input provided by communication partners. Aided AAC input can support both comprehension and expression for children who require aided AAC (O'Neill et al., 2018) and thus may be an important component of intervention to promote language development for these individuals. Given that children's first words are influenced by the concepts they hear in child-directed speech (Harris, Barrett, Jones, & Brookes, 1988), it seems logical to assume that the words modeled through aided AAC input matter with respect to supporting early language learning. It is not clear, however, if core words alone are the most important words for communication partners to model. Children who require AAC may benefit from developmentally appropriate input (via speech and AAC) that responds to their interests and includes relevant content and function words. Future research should consider how communication partner input (via speech and AAC) impacts both comprehension and expression for early symbolic

communicators.

Conclusion

Many existing core vocabulary lists in AAC are based on frequency and commonality of use in the speech of individuals with relatively advanced language skills. These lists do not reflect the language of early symbolic communicators and they do not fully capture the types of words that tend to predominate in early expressive language. The effect of emphasizing core words in AAC system design and instruction for early symbolic communicators is unknown; however, caution may be warranted when referring to core word lists in order to avoid over-emphasizing function words that are not yet needed expressively and neglecting the personally relevant content and social words that are so important in early expressive language and in setting the stage for further development. Additional research is needed to determine what approaches to vocabulary selection and instruction are most facilitative of language learning for early symbolic communicators who require AAC.

References

Allen, A., Schlosser, R. W., Brock, K., & Shane, H. C. (2017). The effectiveness of aided augmented input techniques for persons with developmental disabilities: A systematic review. *Augmentative and Alternative Communication, 33*, 149-159. https://doi.org/10.1080/07434618.2017.1338752

Ambridge, B., & Lieven, E. V. M. (2011). *Child language acquisition: Contrasting theoretical approaches*. Cambridge, UK: Cambridge University Press.

Balandin, S., & Iacono, T. (1999). Crews, wusses, and whoppas: Core and fringe vocabularies of Australian meal-break conversations in the workplace. *Augmentative and Alternative Communication, 15*, 95-109. http://dx.doi.org/10.1080/07434619912331278605

Banajee, M., DiCarlo, C., & Stricklin, S. B. (2003). Core vocabulary determination for toddlers. *Augmentative and Alternative Communication, 19*, 67–73. http://dx.doi.org/10.1080/0743461031000112034

Beukelman, D., Jones, R. S., & Rowan, M. (1989). Frequency of word usage by nondisabled peers in integrated preschool classrooms. *Augmentative and Alternative Communication, 5*, 243-248. https://doi.org/10.1080/07434618912331275296

Beukelman, D. R., McGinnis, J., & Morrow, D. (1991). Vocabulary selection in augmentative and alternative communication. *Augmentative and Alternative Communication, 7*, 171-185. https://doi.org/10.1080/07434619112331275883

Beukelman, D. & Mirenda, P. (2013). *Augmentative and alternative communication: Supporting children and adults with complex communication needs (4th ed.)*. Baltimore, MD: Paul H. Brookes Publishing Company.

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

Brown, R. (1973). *A first language: The early stages*. Cambridge, MA: Harvard University Press.

Caron, J., Light, J., & Drager, D. (2016). Operational demands of AAC mobile technology applications on programming vocabulary and engagement during professional and child interactions. *Augmentative and Alternative Communication, 32,* 12–24. http://dx.doi.org/10.3109/07434618.2015.1126636

Chapman, R. S. (1981). Exploring childrens' communicative intents. In J. F. Miller (Ed.), *Assessing language production in children: Experimental procedures* (pp. 111-136). Needham Heights, MA: Pearson.

Dada, S., & Alant, E. (2009). The effect of aided language stimulation on vocabulary acquisition in children with little or no functional speech. *American Journal of Speech-Language Pathology, 18,* 15-64. https://doi.org/10.1044/1058-0360(2008/07-0018)

Dale, P. S. (1991). The validity of a parent report measure on vocabulary and syntax at 24 months. *Journal of Speech and Hearing Research, 34,* 565-571. https://doi.org/10.1044/jshr.3403.565

Dale, P. S., Bates, E., Reznick, J. S., & Morisset, C. (1989). The validity of a parent report instrument of child language at twenty months. *Journal of Child Language, 16,* 239-249. https://doi.org/10.1017/S0305000900010394

Dark, L. & Balandin, S. (2007). Prediction and selection of vocabulary for two leisure activities. *Augmentative and Alternative Communication, 23,* 288-299. https://doi.org/10.1080/07434610601152140

Davidoff, B. (2018). *Characteristics of spoken language interactions of young beginning communicators with autism spectrum disorder and their mothers: A preliminary*

investigation (Doctoral dissertation). https://etda.libraries.psu.edu/catalog/14591beb210

Diesendruck, G. (2007). Mechanisms of word learning. In E. Hoff & M. Shatz (Eds.), *Blackwell handbook of language development* (pp. 257-276). Malden, MA: Blackwell Publishing.

Drager, K. D., Postal, V. J., Carrolus, L., Castellano, M., Gagliano, C., & Glynn, J. (2006). The effect of aided language modeling on symbol comprehension and production in 2 preschoolers with autism. *American Journal of Speech-Language Pathology, 15*, 112–125. https://doi.org/10.1044/1058-0360(2006/012)

Fallon, K. A., Light, J. C., & Paige, T. K. (2001). Enhancing vocabulary selection for preschoolers who require augmentative and alternative communication (AAC). *American Journal of Speech-Language Pathology, 10*, 81-94. https://doi.org/10.1044/1058-0360(2001/010)

Fenson, L., Dale, P. S., Reznick, J. S., Bates, E., Thal, D. J., Pethick, S. J., … Stiles, J. (1994). Variability in early communicative development. *Monographs of the Society for Research in Child Development, 59*, 1-185. https://www.jstor.org/stable/1166093

Fenson, L., Marchman, V., Thal, D., Reznick S., & Bates, E. (2007). *MacArthur-Bates Communicative Development Inventories: User's guide and technical manual* (2nd ed.). Baltimore, MD: Paul H. Brookes Publishing.

Fried-Oken, M., & More, L. (1992). An initial vocabulary for nonspeaking preschool children based on developmental and environmental language sources. *Augmentative and Alternative Communication, 8*, 41-54. https://doi.org/10.1080/07434619212331276033

Gerber, S., & Kraat, A. (1992). Use of a developmental model of language acquisition: Applications to children using AAC systems. *Augmentative and Alternative Communication, 8*, 19-32. https://doi.org/10.1080/07434619212331276013

Goodman, J., Dale, P. S., & Li, P. (2008). Does frequency count? Parental input and the acquisition of vocabulary. *Journal of Child Language, 35,* 515–531. https://doi.org/10.1017/S0305000907008641

Hammond, N. (2017). *Generalization of core vocabulary taught to children diagnosed with autism spectrum disorder using an augmentative communication device* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses A&I. (Order No. 10288058).

Harris, M., Barrett, M., Jones, D., & Brookes, S. (1988). Linguistic input and early word meaning. *Journal of Child Language, 15,* 77-94. https://doi.org/10.1017/S030500090001206X

Hollich, G. J., Hirsh-Pasek, K., & Golinkoff, R. M. (2000). Breaking the language barrier: An emergentist coalition model for the origins of word learning. *Monographs of the Society for Research in Child Development, 65,* 1-135. https://www.jstor.org/stable/3181533

Holyfield, C., Drager, K., Light, J., & Caron, J. G. (2017). Typical toddlers' participation in "just-in-time" programming of vocabulary for visual scene display augmentative and alternative communication apps on mobile technology: a descriptive study. *American Journal of Speech-Language Pathology, 26,* 737-749. https://doi.org/10.1044/2017_AJSLP-15-0197

Lee, D. (2001). Defining core vocabulary and tracking its distribution across spoken and written genres: Evidence of a gradience of variation from the British National Corpus. *Journal of English Linguistics, 29,* 250-278. https://doi.org/10.1177/00754240122005369

Light, J. (1997). "Let's go star fishing": Reflections on the contexts of language learning for children who use aided AAC. *Augmentative and Alternative Communication, 13,* 158–

171. https://doi.org/10.1080/07434619712331277978

Light, J., & McNaughton, D. (2012). Supporting the communication, language and literacy development of children with complex communication needs: State of the science and future research priorities. *Assistive Technology, 24*, 34-44. http://dx.doi.org/10.1080/10400435.2011.648717

Marvin, C., Beukelman, D., & Bilyeu, D. (1994). Vocabulary use patterns in preschool children: Effects of context and time sampling. *Augmentative and Alternative Communication, 10,* 224-236. https://doi.org/10.1080/07434619412331276930

Masur, E. F., & Olson, J. (2008). Mothers' and infants' responses to their partners' spontaneous action and vocal/verbal imitation. *Infant Behavior and Development, 31,* 704-715. https://doi.org/10.1016/j.infbeh.2008.04.005

Mayor, J., & Plunkett, K. (2011). A statistical analysis of infant and toddler vocabulary size from CDI analysis. *Developmental Science, 14,* 769-785. https://doi.org/10.1111/j.1467-7687.2010.01024.x

Miller, J. F., & Sedey, A. L., & Miolo, G. (1995). Validity of a parent report measure of vocabulary development for children with Down syndrome. *Journal of Speech and Hearing Research, 38,* 1037-1044. https://doi.org/10.1044/jshr.3805.1037

Mngomezulu, J., Tönsing, K. M., Dada, S., & Bokaba, N. B. (2019). Determining a Zulu core vocabulary for children who use augmentative and alternative communication. *Augmentative and Alternative Communication*, 35, 274-284. https://doi.org/10.1080/07434618.2019.1692902

Morrow, D. R., Mirenda, P., Beukelman, D. R., & Yorkston, K. M. (1993). Vocabulary selection for augmentative communication systems: A comparison of three techniques. *American*

Journal of Speech and Language Pathology, 2, 19-30. https://doi.org/10.1044/1058-0360.0202.19

Nelson, K. (1973). Structure and strategy in learning to talk. *Monographs of the Society for Research in Child Development, 38*, 1-135. https://www.jstor.org/stable/1165788

O'Neill, T., Light, J., & Pope, L. (2018). Effects of interventions that include aided augmentative and alternative communication input on the communication of individuals with complex communication needs: a meta-analysis. *Journal of Speech, Language and Hearing Research, 61*, 1743-1765. https://doi.org/10.1044/2018_JSLHR-L-17-0132

Paul, R. (1997). Facilitating transitions in language development for children using AAC. *Augmentative and Alternative Communication, 13*, 141-148. https://doi.org/10.1080/07434619712331277958

Quick, N., Erickson, K., & Mccright, J. (2019). The most frequently used words: comparing child-directed speech and young children's speech to inform vocabulary selection for aided input. *Augmentative and Alternative Communication, 35*, 120-131. https://doi.org/10.1080/07434618.2019.1576225

Romski, M. Sevcik, R. A., Adamson, L. B., Cheslock, M., Smith, A., Barker, R. M., & Bakeman, R. (2010). Randomized comparison of augmented and nonaugmented language interventions for toddlers with developmental delays and their parents. *Journal of Speech, Language, and Hearing Research, 53*, 350-364. https://doi.org/10.1044/1092-4388(2009/08-0156)

Schlosser, R. W., Shane, H. C., Allen, A. A., Abramson, J., Laubscher, E., & Dimery, K. (2016). Just-in-time supports in augmentative and alternative communication. *Journal of Developmental and Physical Disabilities, 28*, 177-193. https://doi.org/10.1007/s10882-

015-9452-2

Snodgrass, M. R., Stoner, J. B., & Angell, M. E. (2013). Teaching conceptually referenced core vocabulary for initial augmentative and alternative communication. *Augmentative and Alternative Communication, 24*, 322-333. http://dx.doi.org/10.3109/07434618.2013.848932

Tager-Flusberg, H., Calkins, S., Nolin, T., Baumberger, T., Anderson, M., & Chadwick- Dias, A. (1990). A longitudinal study of language acquisition in autistic and Down syndrome children. *Journal of Autism and Developmental Disorders, 20,* 1-21. https://doi.org/10.1007/BF02206853

Tamis-LeMonda, C. S., Bornstein, M. H., & Baumwell, L. (2001). Maternal responsiveness and children's achievement of language milestones. *Child Development, 72,* 748-767. https://www.jstor.org/stable/1132453

Thal, D. J., O'Hanlon, L., Clemmons, M., & Fralin, L. (1999). Validity of a parent report measure of vocabulary and syntax for preschool children with language impairment. *Journal of Speech, Language, and Hearing Research, 42*, 482-496. https://doi.org/10.1044/jslhr.4202.482

Thistle, J., & Wilkinson, K. M. (2015). Building evidence-based practice in AAC display design for young children: Current practices and future directions. *Augmentative and Alternative Communication, 31*, 124-136. https://doi.org/10.3109/07434618.2015.1035798

Trembath, D., Balandin, S., & Togher, L. (2007). Vocabulary selection for Australian children who use augmentative and alternative communication. *Journal of Intellectual and Developmental Disability, 32,* 291–301. https://doi.org/10.1080/13668250701689298

Yorkston, K. M., Dowden, P. A., Honsinger, M. J., Marriner, N., & Smith, K. (1988). A

comparison of standard and user vocabulary lists. *Augmentative and Alternative Communication, 4*, 189-210. https://doi.org/10.1080/07434618812331274807

Table 1

Demographics, Data Collection, and Core-Word Lists Across the Five Studies

	Participants			Data collection		Core word list		
Study	*N*	Age[a]	Profile	Source	Context (location; activities)	Operational definition of core	Number of words	Organization
Banajee, DiCarlo, and Stricklin (2003)	50	2;0 - 3;0	TD	LS	School or daycare; play and snack	Words used across 6, 5, or 4 different days or activities	23	Most to least core
Beukelman, Jones, and Rowan (1989)	6	3;8 - 4;9	TD	LS	Preschool; not specified	Words occurring with a frequency of at least 0.5 in 1000[b]	250	Most to least core
Fried-Oken and More (1992)	30[c] 15	3;0 - 6;3	TD, CCN	LS IR IR	Not specified; play	Top 10% of words appearing on at least 3 of 90 source lists	211	Most to least core
Marvin, Beukelman, and Bilyeu (1994)	10	4;0 - 5;2	TD	LS	Home and preschool; routine activities	Words occurring with a frequency of at least 0.5 in 1000[d]	332	Categorized[e] then alphabetized
Trembath, Balandin, and Togher (2007)	6	3;0-5;0	TD	LS	Preschool; routine activities	Words occurring with a frequency of at least 0.5 in 1000[b] and used by at least 50% of participants	263	Most to least core

Note. TD = typical development; CCN = complex communication needs; LS = language sample; IR = informant report. [a]Expressed as years;months. [b]Frequency calculated from composite sample. [c]In addition to 30 children with typical development and 15 children with complex communication needs, a total of 60 informants (15 parents of children with CCN, 15 clinicians of children with CCN, and 30 parents of children with typical development) provided word lists during data collection. [d]Frequency calculated from composite lists across both settings. [e]Categorized as function word or content word.

Table 2

Top 10 Words Across the Four Studies with Ranked Core Vocabulary Lists

Word	Banajee et al. (2003)	Trembath et al. (2007)	Beukelman et al. (1989)	Fried-Oken and More (1992)	Content word	Function word	Age produced[c]
Dad[a]		170	135	4	+		12
Mom[a]		149	146	1	+		12
No	2	6	16	7			15
Yes	3	68	10	9			19
Go	19	18	32	2	+		19
Mine	10	78	70	148		+	19
More	9	121	45	27	+		20
I	1	2	1	6		+	22
-S (pl)				3		+	22
That	6	9	11	37		+	22
You	8	1	4	5		+	23
My	7	10	12	22		+	23
Play		72	79	8	+		23
Want[b]	4	75	21	11	+		23
This		13	8	44		+	25
It	5	4	7	30		+	26
The	11	3	5	53		+	26
To		15	2	31		+	26
A	18	5	6	68		+	27
And		7	15	57		+	27
Can		8	25	28		+	27
Not		34	9	60		+	27
Is	12	27	3	33		+	29
On	13	19	23	10	+		30

Note. Numbers under each study represent each word's rank on the list derived in that study. Words are identified as content or function words based on the definitions laid out by Ambridge and Lieven (2011). TD = typical development; pl = plural.

[a]Includes other forms (e.g., mummy). [b]Included by Fenson et al. (1994) as "wanna." [c]Age (in months) at which 50% of children with typical development were reported to produce the word. Ages are those reported by Fenson et al.

Table 3

Number of Total and Core Words on the Communicative Development Inventories (CDI)

CDI category	Example words	Words and gestures form		Words and sentences form	
		Total	Core	Total	Core
Sound effects and animal sounds	Baa, choo choo	12	0	12	0
Animal names	Dog, lion	36	1	43	1
Vehicles	Bus, train	9	1	14	1
Toys	Ball, bubbles	8	1	18	1
Food and drink	Egg, peas	30	2	68	2
Clothing	Pants, shoe	19	1	28	1
Body parts	Ear, leg	20	0	27	0
Furniture and rooms	Chair, potty	24	4	33	4
Small household items	Cup, lamp, soap	36	1	50	2
Outside things and places to go	Park, sun, zoo	27	4		
Outside things	Hose, lawn mower, Sandbox			31	0
Places to go	Circus, playground			22	4
People	Baby, man, sister	20	5	29	6
Games and routines	Patty cake, shh, bye bye	19	7	25	5
Action words	Drink, hug	55	15	103	20
Words about time	Morning, night	8	1	12	2
Descriptive words	Hungry, yucky	37	8	63	8
Pronouns	This, that, it	11	10	25	19
Question words	How, what, where	6	6	7	6
Prepositions and locations	In, there, under	11	8	26	15
Quantifiers	More, none, same	8	4		
Quantifiers and articles	A, none, the			17	7
Helping verbs	Am, do, is			21	14
Connecting words	Because, if, so			6	4
Total		396	79	680	122

Note. Core word counts include all words that appear within the top 100 on at least one of the four core vocabulary lists for young children that ranked words from most to least core.

Appendix

Top 100 words and their rank on core vocabulary lists for young children

Word	Banajee, DiCarlo, and Stricklin (2003)	Trembath, Balandin, and Togher (2007)	Beukelman, Jones, and Rowan (1989)	Fried-Oken and More (1992)
I	1	2	1	6
You	8	1	4	5
No	2	6	16	7
It	5	4	7	30
My	7	10	12	22
That	6	9	11	37
On	13	19	23	10
In	14	12	22	20
Go	19	18	32	2
Is	12	27	3	33
What	20	22	26	14
Yes	3	68	10	9
Here	15	31	14	36
A	18	5	6	68
The	11	3	5	53
Want	4	75	21	11
Out	16	50	55	24
Off	17	74	76	70
To		15	2	31
Do		17	19	13
Can		8	25	28
Me		14	33	16
This		13	8	44
One		16	17	42
And		7	15	57
More	9		45	27
Get		21	29	39
Up		41	36	15
There		25	20	47
Not		34	9	60
Have		20	24	40
We		26	28	58
Look		23	46	43
Are		38	31	49
Like		56	50	18
Some	21	80	30	
He		32	39	63
Down		53	60	26

Come		77	44	25
Put		40	34	74
Now		49	38	64
Where		57	72	23
Mine	10	78	70	
Play		72	79	8
Okay		64	47	54
See		60	63	48
Big		51	68	77
All		71	42	84
Know		63	61	75
Little		87	64	50
For		67	54	89
Need		79	35	100
With		76	59	80
Them		65	74	88
They		90	66	87
Over		70	77	96
Help	22			45
Your		28	43	
Got		37	37	
Hey		35	40	
Eat			67	19
Oh		39	56	
Of		54	41	
Done	23[a]		81	
Be		59	52	
Home			78	38
Dog			83	34
Did		52	69	
Chair			87	35
Just		42	82	
At		66	71	
Make		89	49	
Two		83	57	
House			89	51
Let		91	51	
Good			88	56
How			84	69
Because		62	93	
She			65	95
Sit			100	61
Who			85	92
But		82	97	
Back		97		90
Too		94	95	

Mom			1
-S (plural)			3
Dad			4
I'm	11		
Car			12
Am		13	
Bed			17
Going		18	
N't			21
Yeah	24		
Will		27	
Don't	29		
Book			29
Let's	30		
TV			32
Gonna	33		
It's	36		
Drink			41
Can't	43		
Well	44		
I'll	45		
That's	46		
Outside			46
C'mon	47		
Take		48	
Um	48		
Why			52
These		53	
Were	55		
Sleep			55
Us		58	
Ah	58		
'm			59
Wanna	61		
Thank-you			62
Right		62	
Cold			65
Hungry			66
's			67
I've	69		
When			71
Read			72
Hot			73
There's	73		
Paint		73	
Katie		75	

Table			76
School			78
Tired			79
So		80	
Time			81
Spiderman	81		
Grandma			82
Hi			83
Him	84		
Shoe			85
Turn	85		
You're	86		
Watch			86
Name		86	
He's	88		
Three		90	
Boy			91
Please		91	
His	92		
Those		92	
Juice			93
Spider	93		
Love			94
Does		94	
Mum	95		
Boo		96	
Where's	96		
Girl			97
Friend			98
Tell	98		
Has		98	
Show		99	
They're	99		
Happy			99
Didn't	100		

Note. Includes all words within the top 100 on core vocabulary lists for young children that ranked words in order from most to least core. Numbers under each study represent each word's rank on the list derived in that study. Words included in the top 100 on all four lists are presented first, followed by words included in the top 100 on three lists, two lists, and one list.

[a]All done/finished