

# Quantitative data on young child language use: Implications for AAC

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Most clinicians use pragmatics and an ecological inventory as basis for selecting their vocabularies for augmentative and alternative communication systems (Gossens, Crain and Elder, 1992; Burkhart, 1993). Users of communication systems need to initiate interaction, maintain conversation by taking turns and need a way of terminating the interaction when bored or need to change the topic. This approach is important for interaction purposes and indeed has its merit, however, without the use of a sound method to support pragmatics with syntax and semantics, a communication system user would not be able to interact in a manner similar to his or her peers. Language does not merely consist of pragmatics, but needs to be supported with semantics and syntax in order to be an efficient system.

Children in the presymbolic language stage use contact and distal gestures to initiate and maintain interaction (Prutting, 1982, and Weatherby & Rodriguez, 1992). Precursors to early language development consist of words (such as "that" and "want") paired with pointing. According to Brown (1975), words such as "mine" and "it" form the first lexicon of a child's language and are included in Stage I. As mean length of

utterance (MLU) increases, these words are then paired together to form simple sentences (e.g., "want it"). This occurs by the age of 18 months and latest by the age of 27 months (or an MLU of 1.7). By the age of 21 months and latest by the age of 30 months (during Stage II or an MLU of 2.25) children start adding grammatical and morphological endings (e.g., "That's mine"). During Stage III or an MLU of 2.75 (earliest by age of 23 months and latest by 37 months), children start using questions (interrogatives), negatives and imperatives. These include sentences such as "what is that?" or "I don't know" or "Look at that". Children start embedding sentences earliest by the age of 26 months and latest by the age of 44 months (e.g., ). Finally latest by the age of 48 months (or by an MLU of 4.0), children start to coordinate sentences (e.g., "I did this and I did that"). Early language therefore does not necessarily consist of names of objects but also verbs (want), pronouns (I, mine) and demonstratives (that). In addition, early language development is also influenced by principles using syntax and semantics in addition to pragmatics.

Communication systems that use an ecological approach to vocabulary selection look at different environments and objects of interest to the child (e.g., toys, foods, art). Such vocabularies

concentrate on nouns essential for the topic or object of interest. For example, vocabulary for an activity for sand play mainly consists of words such as sand, bucket, and shovel whereas vocabulary for meal times may consist of words such as sandwich, peanut butter, jelly and bread. These words fail to maintain interaction once the communicator has made his or her need known to the communication partner. Thus, once the augmentative communication partner has asked for a shovel or bread, how does he let the communication partner know whether it is tasty or whether it is the correct type of shovel? How does he or she repair communication attempts or expand on his or her utterances if his or her vocabulary set does not have verbs, pronouns, morphological endings and adjectives?

Several researchers have reported that clinicians typically select nouns representing foods and objects as first symbols when designing augmentative communication systems (Adamson, Ronski, Deffenbach & Sevcik, 1992). Clinicians reported that nouns are chosen because they are words considered to be easiest to teach and assess, and are of considerable functional use to the communicator. They are also the easiest words to represent on a communication system. Additionally, clinicians often omitted other words (e.g., want, more,

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help) from augmentative communication systems, words that regulate interaction. These words are harder to teach and appear to have limited functional use. They are also harder to represent on communication devices. When Adamson et al. (1992) added these words (in addition to the nouns) to communication boards used by young males with moderate to severe mental retardation, the frequency of communication board use increased from 2% to 41%. The Adamson et al. study is one of several studies beginning to demonstrate that combining core vocabulary words (words that appear across different environments and activities) with fringe vocabulary words (words that are exclusive to a particular environment or an activity) increase the frequency of AAC use.

Several studies have attempted to identify a list of words that could be included in a core vocabulary for a variety of AAC users, including adults (Balandin & Iacono, 1998), adolescents (Adamson et al., 1992), and preschoolers (Beukelman et al., 1989; Fried-Oken & More, 1992.). Beukelman and his colleagues audio-recorded and transcribed the spoken communication samples of six nondisabled preschool children (3 years 10 months to 4 years 9 months) in three different classrooms. Three participants were male and three were female. Teachers nominated these children for participation in the study because they were “active verbal participants in the preschool program”. Analysis of these language samples demonstrated that the 25 most frequently occurring words accounted for 45.1% of the sample collected. Fifty of the most frequently occurring words represented 50% of the sample, and 85% of the sample included 250 of the most frequently used words. Some examples of these frequently occurring words included “want”, “eat”, and “go”. These frequently used words were verbs, demonstratives, prepositions, and adverbs. Nouns were not among the common or core words most frequently used by preschoolers within the study sample.

No studies were found in the literature that looked at core vocabulary of toddlers (ages 24 to 36 months). However, augmentative and alternative communication (AAC) devices are increasingly being used with toddlers who exhibit communication language delays. Different reasons have been attributed to this increase. Part C of the Individuals with Disabilities Education Act (IDEA)

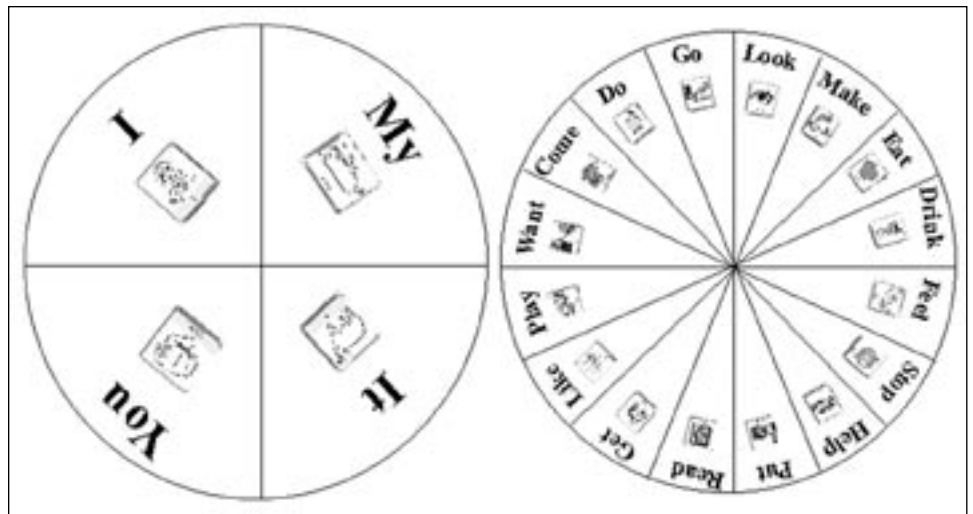


Figure 1

includes policies, procedures, and funding for assistive technology for children birth to three years of age with special needs. Recent advances in technology have simplified the use, lowered the cost, and increased the accessibility of augmentative and alternative communication systems. AAC researchers and practitioners (e.g., Kangas & Lloyd, 1988) recommend beginning implementing AAC strategies with infants (children between the ages of birth and 12 months) and toddlers (children between the ages of 12 months and 36 months) with communication delays before the child’s attainment of certain prerequisite cognitive skills. However, the increased use of AAC with younger children creates several challenges for the field, a primary challenge being the identification of appropriate vocabularies when devising age-appropriate AAC systems.

Most toddlers are unable to participate in vocabulary selection procedures needed to determine appropriate vocabularies to be included on their AAC systems. They (unlike some older adults) are also unable to generate their own unique messages using letter-by-letter spelling. Significant adults (who select vocabularies and program the child’s communication device) in the child’s life typically select vocabularies for children of this age. They then program this vocabulary on AAC devices using an appropriate representation system (e.g., pictures, icons or photographs). Therefore, a need was felt to conduct such a study to determine: Does the vocabulary used by toddlers differ across different activities? Are common words used by toddlers across different activities? What are the common words used by toddlers

across different activities? and, What kind of syntactic, and pragmatic and semantic functions do these common words serve?

Naturally occurring (i.e., unprompted) vocabulary was collected for 50 toddlers enrolled in five different preschools, during two different activities (play within interest centers and snack time) using a tape player. Fifty toddlers, between the ages of 24 and 36 months, served as participants in the study. Thirty-four participants were girls and 16 were boys. All participants were screened using the Ages and Stages Questionnaires (ASQ), a parent-completed, child-monitoring system (Bricker & Squires, 1999). The ASQ indicated that participants were functioning at age-appropriate developmental levels and used a variety of two to three word utterances, spontaneously initiated interaction, maintained interaction by taking turns, terminated interaction appropriately, and consistently followed simple one-step directives and some two-step directives without gestures.

Participants were enrolled in nursery schools and day care programs located within inner city and suburban areas. All programs shared common features: the classroom schedule included at least one free play and one snack time activity during the day, care and education was provided by at least one teacher and one teacher assistant, classroom environments were organized by interest centers (e.g., blocks, dramatic play, art), the classroom schedule provided for both small group and large group activities, and some activities were led by an adult (e.g., snack time) whereas others (e.g., center time) were child-directed.

Three voice-activated tape recorders (from Radio Shack, model no. Optimus, CTR-115) were used to record the language samples. Voice-activated tape recorders helped to record words spoken by the target toddler only. Adult and peer speech was too soft for the recorder to be activated. The toddlers wore the tape recorders in a small bag worn at the waist. A lapel microphone (from Radio Shack, model no. Optimus 33-3013) was plugged into the tape recorder and clipped to the collar of the toddler.

Data was collected using the procedure outlined in Buekelman et al. (1989). This procedure involved collecting data by audio taping interactions among the target children, the classroom staff, and other classroom children during two different activities on three separate days. One activity was child-directed (play within interest centers) and one activity was adult-directed (snack time). Each activity lasted approximately 20 minutes. During play within interest centers, children were allowed to play freely within any of the interest centers. Audiotapes were reviewed for the first 150 utterances within interest centers and snack time activities across all three days. The first 25 words were taken from each activity.

The language sample collected during both activities on all three days from all 50 children was recorded and analyzed. Students enrolled in a communication disorders Master's level program developed a written transcription of all the language samples. Analyses were conducted to examine commonality among the words across activities and users. Each new word was given a score of 1. If the same child used a particular word in both activities, it was given a score of 2. A word used in both activities on all three days was given a score of 6. In addition, words with the same commonality score were ranked according to frequency of use.

Reliability was calculated on 20% of all word lists across both activities (free play and snack time). The first author reviewed the language samples collected from one interest center activity and one snack time activity of at least 10 children. The language samples were compared for reliability of the recording. A reliability score of 91% was obtained by comparing the scores from both clinicians. This score was obtained by dividing the number of correct responses by the total number of words multiplied by 100%.

Results revealed all 50 children used nine common words across both routines. This list of nine common words contained pronouns, verbs, prepositions and demonstratives. Words representing different pragmatic functions, including initiation, termination, turn taking (which included requesting for action and objects, and commenting) and recurrence, were also noted. Nouns were absent from the list. These data are consistent with similar studies investigating the core vocabularies of adults, adolescents, and preschoolers.

Further analysis of this data on vocabularies used by 50 toddlers demonstrates that contemporary language of toddlers is very unlike the hypothetical sentences favored by clinicians owing to their perceived high motivational qualities. A child is just as likely to say upon seeing bacon "It's too hot" as "I love bacon in the morning." In fact, such predictable sentences, because of their predictability, are not motivating for children or adults.

Pre-stored sentences do not give children the experience of manipulating their own language codes. To progress through the Brown Stages features, children cannot be just passive listeners, but need to actively experience using simple obligatory morphemes such as -ing, in, on, and the present copula. In addition, to progress to Brown's third stage (30 months +), children need to master subject verb inversions following "wh" words. How are they going to have active experience if they are not given ready control of modals and auxiliaries in verb transpositions?

### **The importance of using core vocabulary during AAC implementation in young children**

Core vocabulary consists of the most frequently occurring words in studies of spoken language. The words included in core vocabulary are often surprising, as core vocabulary includes a paucity of nouns. Yet, if one plans a vocabulary for an augmentative device based strongly on core vocabulary, one can meet a wide range of communication needs.

The detailed review of literature on core vocabulary draws a clear conclusion. Core vocabulary is remarkably consistent across place, activity, topic, age, and even cognitive

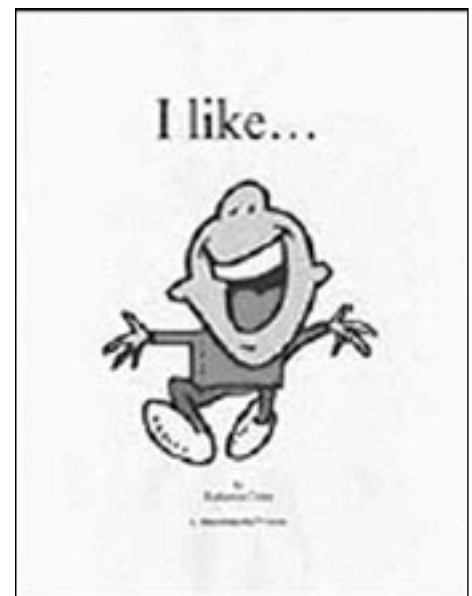


Figure 2

ability. For individuals who are responsible for implementation of augmentative communication, the pertinence of core vocabulary cannot be over-emphasized. Knowing that core vocabulary is so consistent, it is not very logical to begin with a pre-stored vocabulary of core words.

The following statistics regarding the core vocabulary of preschool children are from Beukelman et al, 1989:

Number of core words	Percent of total sample
50	60%
100	73%
250	85%

This means if one provides the first 50 core words, 60% of the vocabulary needs of preschool children have been met. By the time the provided core vocabulary is expanded to 250 words, 85% of the vocabulary needs have been met. The remaining 15% is composed of "fringe" or "extended" vocabulary, which is much less predictable and more specific to the individual communicator.

Because of the research being conducted by the first author, the information on the core vocabulary of toddlers, age 24 to 36 month, is now available. The findings of this study are remarkably consistent with existing information on core vocabulary, including the significant absence of nouns in the core vocabulary.

The ecological or topical approach to selection and organization of vocabulary for augmentative communication tends to place emphasis on noun vocabulary, which generally results in the provision of extensive fringe vocabulary, while neglecting the core vocabulary that is responsible for 85% of our total spoken words. It is critical that strong core vocabulary be available, as it is the matrix that makes the vocabulary work. Implementers who use the ecological approach are frequently focused on the selection and programming of vocabulary rather than the teaching of language for communication.

There are two divergent approaches to the implementation of augmentative communication with young children. One approach relies on prestored messages and topical vocabulary in attempt to predict what the child might want to say. This approach typically sidesteps the issue of language development. Children who experience this approach have limited opportunities to actively experience generative language.

The second approach provides the child with a strong core vocabulary of single words that is systematically organized, enhanced by customized fringe vocabulary. When this approach is used, the clinician has the opportunity to use our knowledge of normal language development, using a resource such as the work of Roger Brown, as a basis for communication intervention. The child who experiences this approach has the opportunity to actively experience words and morphemes as the building blocks to generative communication.

When this second approach is used, the goals and objectives would be virtually identical to the goals and objectives of a speaking child who has similar language needs. In fact, when the emphasis of intervention in augmentative communication becomes language based, it facilitates flow into the natural environment, maximizing the benefit of general language stimulation and intervention.

Based on information on utterance development, we know there are some predictable forms that emerge as the young child progresses from single word utterances to two word utterances. Children typically progress from single words to two word to three word utterances consisting of these forms: Agent + Action, Action + Object, and Agent +

Object and finally Agent + Action + Object. For a child approaching this point in their language development, whether the child speaks or uses augmentative communication, similar language objectives could be used.

Suggested intervention goals and objectives based on semantic and syntax of language could include some of the following:

**Goals:**

1. Develop age appropriate receptive language skills
2. Develop age appropriate expressive language skills
3. Increase mean length of utterance to at least 3.4 (44 months)
4. Develop automaticity while accessing vocabulary by developing a motor relationship between vocabulary location and the physical actions required to access the vocabulary (decrease in visual search time).

**Objectives:**

1. During daily routines and play activities, student will use Agent + Action, Agent + Object, Action + Object while interacting with a communication partner.
2. During daily routines and play activities, student will use at least three different sentence types (e.g., declarative, interrogative and imperative).
3. During daily routines and play activities, student will use a variety of subject, object and possessive pronouns while interacting with a communication partner.
4. During daily routines and play activities, student will use comparative and superlative forms of adjectives (e.g., good, better and best).

Strategies used to implement these objectives are very similar to those used by most speech language pathologists while implementing language therapy. These might include:

1. A language rich environment that provides the stimulation, modeling, and intervention beneficial to the speaking child would be equally beneficial to the augmented communicator.
2. Early language communicators can be taught the use of verbs such as “come”, “go” and “stop” by using infrared toys to be activated using scanned icons on a voice output communication device (Anderson, 2002).
3. “Noun” and “verb” wheels can be used to form simple sentences by picking a word from each wheel using a spinner. (figure 1)

4. Interrogative sentences can be taught using interactive board games such as “Go Fish” and “Guess Who”.

5. Declarative and interrogative sentences can be taught using flip books “SortStacks: Simple Books for Emergent Readers” developed by Katherine Crites (1991). (figure 2)

Strict laws regarding reimbursement for AAC systems and speech therapy with AAC systems have prompted the need for outcome based measures. The Language Activity Monitor, or LAM, provides clinicians with a powerful tool for measuring the language generated by the augmented communicator. The LAM collects data from the communication device, which in turn can be analyzed for language structure and content. This data can be used to set IEP goals, to satisfy IDEA 97 outcomes measurement requirements, in the assessment process to compare selection technique speeds, and in the intervention process to identify training needs, to identify new vocabulary, and to monitor therapy progress. It is being used to satisfy funding agency reporting requirements. (Hill & Romich, 1999).

It is therefore, of utmost importance to consider the role of pragmatics, semantics, and syntax of language while engaging in vocabulary selection and AAC intervention. A good vocabulary set should consist not only of nouns that are activity specific but also paired with core vocabulary that allows a child with an AAC system to be a more efficient language user. Intervention goals and objectives should not only focus on pragmatics but on semantics and syntax; again encouraging the child to communicate more efficiently with his peers and adults.

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