Augmentative Communication News

VOL.I0#1

INSIDE THIS ISSUE . . .

UPFRONT

The amount and type of input the brain receives during critical periods of development has an important and lasting impact on how the brain develops. For example, an infant born with cataracts will see normally only if the cataracts are removed before 6 months of age. If they are removed at a later stage, the child will always be blind. Research shows that the act of "seeing" actually causes the brain to form important neural connections within the visual system. Similarly, certain aspects of acquiring language are time-dependent. When babbling infants suddenly appear to understand "everything" and begin their transformation into small sentence-generators, the input they receive is playing a crucial role. Children can easily learn one or more languages during this neurological window of opportunity. Later on, as adults know, it's a real struggle to learn a new language no matter how good the input is.[2]

What does this mean for young children who use AAC? What does it mean for AAC clinicians, educators and manufacturers who work to enable these children to communicate? What does it mean for parents and others who live with and care for these small children?

(continued on page 2)

Governmental

The intake's connected to the input

On April 17, 1997theCIintons hosted the *White House Conference on Early Childhood Development and Learning: What the Newest Research on the Brain Tells Us About Our Youngest Children.* The stated goal was to "make the latest scientific research more accessible and understandable to America's families" and to "explore how this research can be translated into everyday actions and activities involving children.[3] The morning session, chaired by President and Mrs. Clinton, was broadcast froqi the White House to 100 sites in 37 states. Following this, local panels of professionals, researchers, policy makers and parents gathered at each site to discuss issues and concerns. I attended the "virtual" conference at San Francisco State University.

While the information was not exactly new to many in attendance, shining the spotlight on our smallest children made headline news. *Newsweek* published a special issue on Early Childhood, and for almost a week, the television, print and Internet media covered the story. As I reflect on these events, some of the sound bites still resonate. For example:

- Early experience influences the structure of the brain. The infant's brain circuitry develops as a direct result of the type and amOlmt of input the child receives, as well as genetic and perinatal factors.
- Repetition results in stronger

(continued on page 2)

UPFRONT *(continued from page 1)*

The goal of this issue is to inform and challenge the field to pay more attention to the early language learning process. This issue focuses on *input* (the amount and type of language a child is exposed to over time in natural contexts) and *intake* (language the child is able to attach meaning to over time). The next issue will focus primarily on expression. Of course, there is no such dichotomy. As a field, however, we have paid an inordinate amount of attention to "output." It's time we focused on the input side of things.

This issue has been a long time in the making (for which I apologize). In researching the content, I read articles and books, had interesting discussions with colleagues in the Berkeley AAC Study Group and interviewed talented researchers and clinicians from five countries. Thanks especially to Mary Hunt Berg for her assistance. See **Resources and References** on page 8. I also attended a "virtual" White House Conference, which I briefly review in the **Governmental** section, together with the book *Meaningful Differences*. **For Consumers** introduces a useful paradigm described by Martinsen and von Tetzchner in *Augmentative Communication: European Perspectives* and shares the findings of AAC researchers Romski and Sevcik from their book *Breaking the Speech Barrier*. **Clinical News** summarizes comments by experts interviewed about *input* and *intake* issues in AAC. **University/Research** summarizes two studies focusing on comprehension of graphic symbols. Finally, the **Equipment** section describes a useful early assessment tool that can document comprehension in young children.

Within the year, ACN will acquire a new look and introduce an interactive section. If you'd like to comment or pose a question for discussion, call, fax, write, or e-mail me. See addresses below.

Sarah W. Blackstone, Ph.D.

Governmental *(cont. from page 1)*

neurocircuitry. The quantity of input a child receives dramatically shapes who that child will become.

3. **The development of certain functions/abilities is dependent upon whether the child receives important input during certain critical periods of life.** As one panelist said, "Newborn infants are citizens of the world. They are prepared to distinguish all sounds of human languages. By 6 months, the infant is already cracking the linguistic code and by 12 months the baby is well on its way to becoming a culture-bound language specialist."[2] Early in life, the critical period opens and begins to close on our phonological system. Other aspects of development reportedly have different optimal periods for learning, which occur during infancy, childhood and adolescence.[1]

4. **Parents are the first teachers; and social relations are central to development.** *Meaningful Differences in the Everyday Experience of Young American Children* describes the results of an important longitudinal study of 42 families.[5] Researchers investigated the amount and type of input three groups of children received for over two years (ages one and two). All children lived in the mid-western U.S. and were developing normally.

Results are striking and confirm brain development research. The quantity of linguistic input these children received between the ages of one and three years had a significant and lasting impact on their development. Specifically, children whose parents talked to them the most (amount of talk per hour) developed vocabulary at a faster rate. In addition, the rate of early vocabulary growth predicted their cognitive and language performance at age three years on standardized tests. These results suggest that "more is definitely better. "[6]

The study also addressed the obvious question, "More of what?" Children with parents whose interactive style was described as "responsive" and "encouraging" progressed faster than those whose parents were "directive" and "discouraging." In fact, what parents said and did with their children in the first three years of life had an enormous impact on how much language the children learned and used, and predicted their test performance at age 3 and again at ages 9-10 years. The quality of early language input had a significant and lasting effect on development. .[7]

What does this mean for children who use AAC?

Table I on page 3 lists seven reasons why children who are unable to talk are likely to be significantly environmentally disadvantaged when learning language, well beyond their physical and cognitive disabilities. Both brain research and language acquisition studies underscore the importance of addressing the language needs of young children who use AAC sooner rather than later, and mindfully rather than haphazardly. Caution is needed, of course, because predictors of language development are not the same across cultures. Nevertheless, reflection on this research, coupled with knowledge of normal human development, make it clear that as a field we need to attend to the language learning environments and language learning processes of children who use AAC. Researchers in several countries are working to achieve a better understanding and are beginning to provide direction to the field. Stay tuned. tC

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Tahle I. Why AAC users may he disad\'antaj.:ed lanj.:uaj.:e learners[H]
1. A child's responsiveness ; inflnences the amount ofinpnt he/she receives. Children who do not talk receive less input than other children in the same environment.
2. Children who have caregivers ; with "responsive" interaction styles progress more quickly. AAC interactions tend to be adult directed.
3. Nonverbal attempts to communicate underlie language acquisition. Adults may not recognize signals as communicative from children with motor and speechllanguage impairments.
4. Children learn language through repeated exposure in natural contexts. AAC users get minimal exposure to others usin2 lan2ua2e forms they can access *(e.g.,* 2raphics. sign, speech output devices).
5. The optimal time for learning language is early in life. Service delivery systems don't refer infants and toddlers for AAC intervention. Parents (and even colleagues) continue to think an AAC referral means "we're giving up on speech," rather than "we're taking advantage of every option available."
6. Intervention with young children needs to be family-centered. Parents of young children with disabilities have many concerns-language, and communication may not be a priority during optimal periods of development, *i.e.,* "critical periods."
7. The effectiveness of intervention strategies needs to be demonstrated. The AAC community does not yet have a "how to" map to facilitate the language learning process for young AAC users.

For Consumers

Language-based paradigms for AAC

Two paradigms currently influence AAC intervention practices-the Participation model[9] and the Communicative Competence model..[10] Both serve us very well. The goals of AAC are to develop communicative competence and increase participation in family, school, work and community interactions and activities. Communication is the end; language is the means. AAC devices, symbols and techniqueS provide access to communication and participation through language. Given the importance of early experience in language development, and the importance of language in achieving the goals of AAC, we need a framework that explicitly accounts for the language learning problems of children who use AAC.

Language groups

In *Augmentative and Alternative Communication: European Perspectives,* [11] Martinsen and von Tetzchner propose such a paradigm. They identify three groups of children who use AAC:

- 1. Alternative language group. Children in this group use little or no speech to communicate and have difficulty understanding spoken language. AAC techniques often provide (a) an alternative form of language expression and (b) a way to augment comprehension of spoken language. Autistic and severely intellectuallyimpaired children belong to this group, as well as children with auditory agnosia (problems interpretiDg sounds as meaningful linguistic elements.) These children may not depend on AAC permanently because, as language develops, they often begin to use speech. AAC intervention seeks to identify modalities that help children learn to understand and use language, *e.g.,* manual signs, text, graphic symbols. These children seem to benefit from having an environment where alternative language forms are used regularly by communication partners.
- 2. Expressive language group. Because of severe motor impairment, children in this group experience a widening gap between what they can understand and what they are able to express using speech. Children with athetoid cerebral palsy and severe dysarthria (paralysis of the speech musculature) are examples. This group was once the focus of AAC intervention. Today, however, the incidence of children in the expressive language group has decreased in countries with improved perinatal medical practices. Children in this group often rely on graphic language forms because their ability to vocalize, speak, gesture and sign is limited. AAC may ultimately serve as an alternative rather than an augmentative form of communication. Intervention seeks to help children relate the spoken language they hear and understand to the AAC forms they require to express language.
- 3. Supportive language group. These children often have problems with language, as well as speech. Speech remains poorly articulated throughout the preschool period, although many children eventually do develop intelligible speech. Members of the group include children with Down syndrome, developmental dyspraxia and severe articulation problems. Intervention strategies focus on providing (a) a scaffold to speech and language, and (b) a means to enhance participation and increase communicative competence. AAC professionals teach these children to use augmentative strategies to solve social problems and to develop an awareness of times when communication partners have difficulty understanding their speech. Some continue to augment their speech as adults whenever unfamiliar partners, or familiar partners under non-optimal conditions (noise, unknown topic), do not understand them.

The paradigm, which is summarized in Table II on page 4, encourages a more organized and analytical discussion of the use of AAC with children.[11] It also challenges the field to approach intervention more systematically, and to make better decisions about devices, symbols, AAC modalities and intervention strategies. The authors suggest, for example, that many children in the expressive and supportive language groups may benefit from explicit teaching, whereas children in the alternative language group may progress more quickly when AAC professionals use implicit teaching approaches.[12]

Language learning patterns

A second framework for considering the language learning process of AAC users is described in *Breaking the Speech Barrier.*[13] Over two years, Romski and Sevcik taught 13 youths ages 7 to 19 years, with mental *(continued on page 4)*

Table II. Children who use AAC: A language-based paradigm (Martinsen and von Tetzchner, 1996)[11]

Characteristics	Alternative Language Group	Expressive language Group	Supportive Language Group
Description & Diagnostic categories	Little or no speech. Difficulty comprehending spoken language. Severe mental retardation, autism.	Severe speech motor dysfunction. Large gap between comprehension of spoken language and speech. Cerebral palsy.	Speech motor dysfunction (moderate). Language delayed. Down syndrome, language impairment, dyspraxia, severe articulation.
Length of time	May rely on AAC techniques for comprehension and expression throughout life.	AAC seen as permanent means of expression.	Expected to develop functional speech at some point with use of AAC in some contexts.
Role of gesture	Often primary way child understands meaning. May remain as the primary/ preferred expressive mode	Limited because of motor impairment. Important to develop as much as possible.	Important. Child often relies on gestures to make him/herself understood.
Role of speech	Unclear if/when speech will emerge especially for those with difficulty with language across modalities.	Limited because of severe dysarthria. Vocalizations can be very useful.	**Essential to work on speech development.**
Role of manual signs	Key form of input. Often assists child to understand meaning.	Minimal because of upper extremity paralysis. May use modified signs with familiar partners.	Mode of language expression that young children often prefer.
Role of graphics	For some, may be most accessible form of input. Provides speech output.	Critical. Often only way to access language. When used with electronic devices, allows for speech output.	Context dependent. Speech output may facilitate language development and comunication.
Goals of AAC intervention	Providing input. Using AAC forms. Developing language understanding and interaction.	Teaching relationship between spoken language and alternative language form and developing lit~Facy skills.	Learning to use appropriate augmentative techniques and strategies in specific situations to solve social problems.

For Consumers (cont. from page 3)

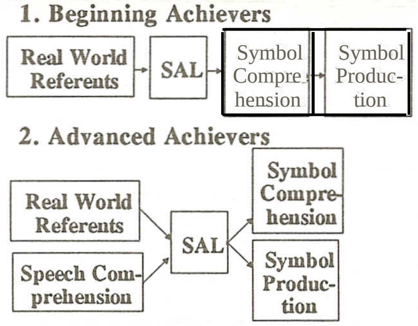
retardation and limited language to understand and use graphic symbols displayed on a speech-output device. Subjects had little or no functional speech and unsuccessful language-learning histories. To teach language, they used the SAL-System for Augmenting Language. This approach introduces the child to a speech-output communication device with pertinent vocabulary (PCS symbols) and teaches communication partners (family members, teachers) to use it in natural contexts. Results revealed that:

> "the unique blend of technology (Super WOLF) and natural language-learning experiences, coupled with the participants' existing skills, permitted all participants to learn and use augmented language without relying on repeated drill and practice." 14

During the study, researchers observed two patterns of augmented language learning, which are depicted in Table III and in the summary that follows.

- 1. At the onset of the study, Beginning Achievers had little [illegible] process it and comprehend speech comprehension with which to link visual symbols, *i.e.*, they had not clearly established a relationship between spoken words and their referents. They seemed to rely on cues in their environment to establish the meaning of spoken words and visual symbols, and then build a lexicon with which they could communicate. The authors postulated that these students may have used less sophisticated learning strategies, *i.e.*, learning by association rather than rule-governed learning.

Table III. Two Patterns of Augmented Language Learning[14]



From Romski, M.A. & Sevcik, R. (1996). *Breaking the Speech Barrier*, p. 177.

- 2. Advanced Achievers readily comprehended spoken language. They appeared to be able "to extract critical visual information, pair it with their knowledge of spoken language and produce symbolic communications" almost simultaneously. 14 They used a "generalized rule that each symbol represents a real-world referent in order to pair the symbol with the spoken word produced when the symbol was activated on the display." 15

In a longitudinal study currently underway, Romski and Sevcik are using SAL with young children and their parents to observe the early language learning patterns of children who use AAC.[16]

Summary

These language-based frameworks may help to facilitate discussion among service providers and researchers, as well as assist families to understand and appreciate the language learning process that children who use *AAC* must take on. One also wonders whether Martinsen and von Tetzchner's Alternative Language group and Romski and Sevcik's Beginning Achievers might share common elements. Time will tell. Most importantly, these paradigms spotlight an *AAC* reality. "One size does not fit all!"

Clinical News

language *input* and *intake* in AAC

Iinterviewed experts about *input* and *intake*. (See list of Resources on page 8.) *Input* refers to the amount and type of language a child is exposed to over time in natural contexts. *Intake* refers to language the child is able to attach meaning to, and reflects the actual learning that occurs over time. Obviously both are related to comprehension in important ways.

Input (The context)

All concur. AAC stakeholders should pay more attention to the amount and kind of input children who use AAC receive. Input is significantly related to comprehension and use of AAC symbols, techniques and devices. Input includes consideration of the learner's socio-cultural context and linguistic context..

Socio-cultural context. Learning ~anguage necessarily involves a famIly system that operates within a social and cultural context.. Currently, most language intervention prowams, even those grounded solIdly In research on parent-child interaction, reflect the underlying values and beliefs of white, middle-class (English speaking) families. Not all cultural groups feel the same way about: (a) the value of talk, (b) aspects of social organization related to interaction, (c) how status is handled during interactions, (d) when and how children show intentionality and (e) teaching language to children.! 7 Any AAC intervention with children must account for the dynamics of their family system and cultural context.. Within that important context, children develop the world knowledge and experience that underlie their language development; and they participate in the interactive routines, events and play-with-objects that enable them to "crack the code," *i.e.*, figure out the linguistic context..

Linguistic context refers to the language forms (spoken language, speech ~utput, graphic symbols, manual signs) children are exposed to every day. As discussed earlier children who use AAC may be at significant risk because they may receive limited, adult-directed language input across modalities.

Tahle IV. Lati~ua~c input i(; ~I~ild~~n; Bcnchmark for AAC'!lll

		Over 1 year	Professional Family	Working-class Family	Welfare Family
Quantity	number of wds		11 million words	6 million words	3 million words
Quality	encouragements		166,000 utterances	62,000 utterances	26,000 utterances
	discouragements		26,000 utterances	36,000 utterances	57,000 utterances
	ratio of enc/dis		6.4 to 1	1.7 to 1	.46 to 1

We s~ill ~o n?t know, for example, what ISa typical," never mind what is an "optimal" linguistic context for children, including those who use AAC. We do know, however, from the study described in *Meaningful Differences*, that children who received the most input and input that was "iesponsive" and "encouraging" performed significantly better at age 3 years and at ages 9 to 10 years. Hart and Risley estimated the cumula?ve words (quantity of input) and raho of parent affirmatives and prohibitions (quality of input) over one year. Table IV displays these data.!8 In a way, this study provides a benchmark against which to consider the quantity and quality of a child's linguistic context, including those who use AAC.

Respondents explicitly stated that children who use AAC face a very complicated language learning task. All felt strongly that adults should use the language forms they expect ~hildren to use. For example, adults In many cultures instinctively use "mod~ling," a form of linguistic mappIng, to teach spoken language and manual signs to children. To teach children to communicate with graphic symbols, AAC professionals us.e another form of linguistic mappmg called augmented input[13] or aided language stimulation. 19 It involves pointing to graphic symbols on a d~splay.while speaking naturally (or With vOice output) during social ~teractions. The pointing behavior IS thought to serve as a visual cue to guide learning. Augmented input is helpful because it:

- confirms that the device, manual signs, board, book IS valued.
- Qrovides opportunities for chilaren t9 observe functional uses of their system.
- proviqes language models for the child to emulate.
- p,rovides accountability. CliniclanS !,hot4d teach ways of commUlllcahng that they. are able/willing. to do themselves.
- ~ensitizes adults to difficulties inherent in using visual language (gr~phic/manual) forms of expressIOn.

Intake (Comprehension)

The process of attaching meaning to spoken language is far better understood than the process of attaching meaning to visual forms of language-graphic or manual. Most, but not all, hearing children who use AAC seem to attach meaning to spoken language first and subsequently "learn" the matching sign or graphic symbol.. Those interviewed raised some important issues for consideration:

The importance of joint attention. Joint attention between adults and children is known to increase children's ability to learn the meaning of spoken words. It is achieved when both child and adult simultaneously atten.d to the same thing. Ad~lts an.d ~hildren use strategies to achlevl? Jomt att~ntion and try to determme (and mfluence) their partner's point of reference. The ability to engage in joint attention gradually emerges developmentally between ages 9 and 15 months. Strategies for achieving joint attention are different for spoken language. learnmg: and for sign language learnmg, a visual language form. SUl?po~ti~e.pointing is often used to mamtam JOInt attention and facilitate sign l~guage learning. Pointing and other Visual cues may also facilitate graphic symbol learning. 20

Linguistic mapping, attaching the meaning of referents/events/concept~ to words/signs/graphics, is esser:tlal to language learning. Young children. use .aspects of the linguistic and nonlingUlsnc context in an effort to acquire *(continued on page 6)*

Clinical News (con!.from page 5)

information about a "word's" meaning, even after hearing it for the first time. Fast mapping is a word learning strategy that allows children to learn at least the partial meaning of a word after only minimal exposure. It may be an important skill for children who use graphic symbols.[20]

Use of encoding approaches. Many devices can be (or already are) programmed so that language is accessed through picture/iconic codes. Many interviewed expressed, ~~mcern because language acqUisItion research shows that, for both spoken and sign language development, it is important that a child understands that one symbol = one concept.. Experts feel AAC intervention should focus on developing a lexicon of graphic symbols or signs and then helping children learn to combine "words" to express meaning, rather than learning codes. When the goal is language development, all agreed a child's language system should be well developed before codes are used to access language.

Speech output devices. Many feel that AAC devices with speech output may assist young ,children to at~ch meaning to graphIc symbols. VOIce output helps make it explicit that graphic symbols represent language. (See next issue of A,.CN.)

Comprehension of grammatical forms. Experts feel that we've been ignoring syntax and are doing so at the peril of literacy skill devel?pment and successful school expenences. (See next issue of A,.CN.)

Tips for AAC providers

- Be sure to get nonlinguistic communication going first. Then there will be a framework to build on.
- Follow the child's lead and atten~ to the child's preferences.
- Help increase caregiver awareness of a child's subtle communication acts.
- Raise the alarm to a level where parents, policy makers and colleagues in your area begin to pay attention to language learning issues.
- Connect with people who are involved with infants and toddlers so you can influence what they do.
- Convince people. The quality and quantity of input matters.

University & Research

Comprehending graphic symbols

Role of graphic signs in the language acquisition of AAC users

Martina Smith[21] studied the structural development of language in two children with cerebral palsy and normal cognition (measured by standard psychometric testing) over a 24 month period. The children, who were 4 years old when the study began, used Picture Communication Symbols (PCS) as their primary way to express language. Both had communication displays, which they pointed to, with approximately 350 symbols representing single words. The children were enrolled in a mainstream educational program throughout the study and had irregular contact with speech and language therapists.

Over the two year period, Smith videotaped the children interact~g with one or two parents, and admmistered standardized measures. The children showed age-appropriate gains in understanding of spoken language, which remained above age level.. However, they did not demonstrate similar gains in expressive language and continued to rely on single term (word) PCS utter-/ances. One child whose speech was somewhat intelligible to familiar partners began to combine spoken words. Smith noted small but significant changes in the structural organization of the multi-term utterances these children produced using PCS. These findings are consistent with other studies, which describe a preponderance of single word utterances when children use pic to-graphic symbol sets.

In a second study, Smith taught five typically developing children (ages 3 years 5 months to 4 years 7 months) to use 60 PCS symbols during a ten-week intervention program. At the end of the program, she assessed each child's ability to complete three language tasks: (1) identify stimulus pictures based on a spoken description; (2) identify stimulus pictures based on a PCS description; (3) describe a picture using the PCS graphic display. All children scored higher when the researcher described the picture using speech than they did when the researcher used PCS. In addition, all but one child did better on the PCS comprehension task than they did when asked to describe a picture using the PCS display.

Using the same assessment protocol (identifying and describing pictures), Smith assessed the performance of another group of PCS users (children, ages 10 - 13 years, with cerebral palsy, "good" receptive language, five years or more experience using communication boards, 300+ PCS signs) and the two AAC users from her first study. These children, like the five "typical" children, identified pictures more easily when the researcher used a spoken description than they did when PCS displays were used. However, unlike the typical children, AAC users did better on the PCS expressive task than they did on the PCS comprehension task. In concluding, Smith makes the following observations:[22]

- Clinicians need to be aware that there could be asymmetries across the modalities children use.
- Many children perform in ways that suggest comprehension of spoken language is closely associated with PCS comprehension (most of the speaking children and one AAC user). However, this was not always the case.
- Children who comprehend spoken language do not necessarily "transfer" that understanding to PCS.
- Expressive use of PCS does not necessarily imply comprehenslOn of the PCS graphic.
- All children who use PCS tended to rely on single term (word) utterances.
- When children combine PCS in their expressive utterances, they did not necessarily do so in ways that conform to spoken language. Smith noted word order changes and a tendency to simultaneously select two PCS signs, rather than selecting them in sequence.

Smith concluded that learning PCS to express language is not a transparent task for (a) typical children with good language comprehension abilities, (b) young children with cerebral palsy and good language comprehension or (c) older children

with more than five years of experience using PCS displays. Noticeable improvement does occur with age.

Learning graphic symbols: The role of pointing cues

Mary Hunt Berg[23] investigated how children who are learning language with AAC used pointing cues to learn the meaning of unfamiliar "nonsense" spoken words and graphic symbols. The children were three to ten years old and had severe speech and communication disorders secondary to a range of medical diagnoses. Their cognitive and language abilities and experience with graphic symbols also varied.

In both experimental conditions, each child was shown unfamiliar toys. Each toy was labeled with an (a) unfamiliar spoken wGrd, *e.g.*, "gazzer" and (b) unfamiliar graphic symbol, to rule out prior knowledge of the words or symbols. The experimenter verbally labeled each toy as soon as the child spontaneously focused on it. The experimenter's pointing cue differed in each condition, as follows:

- In condition 1, the experimenter pointed only to the graphic symbol.
- In condition 2, she pointed first to the toy and then to the graphic symbol.

This research utilized a fast mapping paradigm in which comprehension of newly learned words and graphic symbols was measured after very minimal exposure. Children were exposed to each word and graphic symbol only nine times over several minutes. All sessions were videotaped to record the children's eye gaze behavior during the tasks. Results indicated that:

- This group of children learned the spoken labels for the toys regardless of the type of pointing cue provided.
- As a group, children learned graphic symbols more easily in the presence of a sequential pointing cue (condition 2) than they did when the experimenter pointed only to the graphic symbol (condition 1).
- Not all children in the study were able to learn graphic symbols in either condition. Analysis showed that reasons were not related to their receptive vocabulary level or to their previous experience using graphic symbols for communication.
- Analysis of the children's eye gaze in response to the pointing cues revealed interesting differences in the attentional focus of these children in conditions 1 and 2. When the experimenter pointed only to the graphic symbol (condition 1), children looked at the graphic symbol and then at the experimenter and showed less evidence of graphic symbol learning. Hunt-Berg said:

"The pointing cue only to the graphic symbol did not correspond with the child's current attentional focus, and the additional looking behaviors suggest that children were actively searching for cues to establish joint reference with the adult. When children must determine the adults' attentional focus during interaction, the child may be left with fewer attentional resources for graphic symbol learning. "24

When the experimenter pointed sequentially to the toy and then to the graphic symbol (condition 2), the children's eye gaze remained focused primarily on the toy. This condition was associated with higher levels of graphic symbol learning and more focused exploration of the toy.

"Sequential pointing may decrease a child's need to search for cues to joint reference and better facilitate graphic symbol learning. It may assist some children to coordinate visual attention between both the referent object/event and the graphic symbols on a display. "24

These results suggest that adults must consider the visual system when providing augmented input as a technique for teaching graphic symbol meanings. Because not all children were able to learn the graphic symbols quickly with either pointing cue condition, these findings also suggest that additional factors are involved in learning graphic symbols during interaction. Hunt Berg concludes that we need to consider how we point to graphic symbols during interactions with young AAC language learners, because it may impact on visual attention, a child's ability to maintain joint reference and therefore, learning.[24]

Equipment

A tool for assessing comprehension

Comprehension is extremely difficult to measure in young children. Yet, it is important to know what a child who doesn't talk understands about various aspects of language. Most assessment tools are administered by trained personnel and require children to pay attention, follow instructions and participate in tasks such as pointing to pictures or selecting objects. None include AAC users in their standardization sample. In addition, most young child-ren have a difficult time cooperating with these behavioral methods. Parental report is now considered one of the best ways to obtain a global estimate of early language abilities.[25]

The MacArthur Communicative Development Inventory (MCD!) is a carefully designed and well-researched assessment tool that relies on parental report. It offers a valid, efficient and cost-effective way of measuring early child language abilities. The authors report that in order to be valid, parental report measures must (a) ask only about current behaviors; (b) ask about behaviors that are new or changing, and (c) use a recognition format such as a checklist rather than retrospective or "free form" reporting. The MCDI focuses on current and emerging behaviors and relies on recognition vs. recall memory. It is divided into two JIlStruments:

- Words and Gestures measures vocabulary comprehension, vocabulary production and use of gestures by children at the 8 to 16 month level.
- Words and Sentences measures vocabulary production and aspects of grammatical development, *e.g.*, sentence complexity and sentence length at the 16 to 30 month level.

The results reveal patterns of strengths and weaknesses in different aspects of communication development. For example, it is possible to note whether a child is high or low in comprehension of gestural abilities in comparison to spoken language expression.

Marianne Kennedy at the University of Southern Connecticut and Paul Yoder and Steve Warren at Vanderbilt University are currently evaluating the use of the MCDI with young children with developmental disabilties.

The MacArthur Communicative Development Inventories (1993). Singular Publishing Group, 4284 41st Street, San Diego, CA 92105. (800) 521-8545. $21 US for each.

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