Autism Spectrum Disorders and Augmentative and Alternative Communication: From Research to Practice

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Autism spectrum disorder (ASD) and augmentative and alternative communication (AAC) are subjects that have generated and continue to generate great discussion and controversy. There is hardly an AAC practitioner who has not been challenged by the communication needs of an individual with ASD. And the numbers of these mystifying individuals continues to increase, with the Centers for Disease Control and Prevention stating that the current prevalence of ASD is 1 in every 150 8-year olds in multiple areas of the United States (2007). Practitioners must deal with the exciting, but still emerging, research to practice models for AAC. At the same time, practitioners are limited by the knowledge gap concerning the precise nature of the language disability in ASD and how to address it. Fortunately, Congress passed the Combating Autism Act in 2006. This Act represents a 50% increase in funding for research in understanding, preventing and treating ASD.

What is known to be true about ASD is often eclipsed by misinformation and over-generalization of symptoms across individuals and folklore. Compelling "cures" and autism "recovery programs" continue to appear on the Internet and in the media further complicating the process. Fortunately, there are a growing number of rigorous empirical studies that are clarifying the nature of this baffling disability. It is known that 50% of individuals with ASD are functionally non-verbal; they cannot communi-

cate through speech or writing (Light, Roberts, DeMarco, & Greiner, 1998). In addition, the developmental sequence of language development in ASD does not always follow the sequence of typical language development, thereby compounding the challenge for the AAC practitioner.

Autism and Mental Retardation

It has been accepted by much of the special education community that the majority of children with ASD are also mentally retarded. The assumption of severely diminished cognitive and communication potential has been based on non-empirical data. A study of the evidence for this claim reviewed 213 documents published from 1937 to 2003 and concluded that more evidence is needed before "mental retardation" can be linked with ASD (Edelson, 2006). In the meantime, the assumption of "mental retardation" has colored special education and AAC practice in terms of expectations, assessments, and interventions. As a first step, the AAC practitioner can change the mental labels used for the most challenging individuals with ASD from "student who is low functioning" to a "student with complex needs." Basic principles of AAC practice are inclusive in nature; for example, there are no prerequisite skills for AAC. This ensures that, regardless of assessment, behaviors, affect, or prior history, an individual with ASD has the right to an AAC assessment and intervention.

Research-Based Practice in ASD and AAC

The research-to-practice models in AAC and ASD have evolved considerably over the past 40 years. Before AAC was a formal entity, visual supports were a common part of practice in ASD, such as visual schedules, structures, and the use of pictures to support language. Special Education practice in ASD has progressed from a time of using aversives and implementing discrete trial applied behavior analysis (ABA; cycles of stimulus, response and reinforcement) to more naturalistic strategies. Empirical data has shown that language taught in a discrete trial format did not easily generalize to other environments. Best practices in ASD are data based and data driven interventions with observable, measurable objectives addressed in a variety of naturalistic, small group, and one-on-one formats. Hybrid ABA or Contemporary ABA are such data driven, naturalistic methodologies. These research-based best practices in ASD are extremely compatible with AAC interventions. Incidental teaching, a hybrid ABA methodology uses adult-child interactions to facilitate language (Hart & Risely, 1975). In Pivotal Response Treatment (Koegel, O'Dell, & Koegel, 1987; Koegel & Koegel, 2006) child preferences, task variation, shared control, reinforcement of communicative attempts, and intrinsic motivators are used to elicit engagement and language. This model facilitates functional communication and generalization to other environments. Pivotal Response Treatment targets skills that will positively impact the emergence of a cascade of other skills, such as functional communication and selfmanagement. Pre-linguistic Milieu Teaching (Yoder & Stone, 2006) is an empirically validated teaching technique that utilizes the tenets of a good AAC intervention: expectant delay, creative sabotage, and engineered environments. These autism best practices are in concord with good language interventions in that they emphasize the relationship and connection between communication part-

ASD and AAC: Evidence-Based Practice

How does the AAC professional engage in evidence-based practice? First, the practitioner must be aware of recent, empirically validated methodologies in AAC and ASD. These methodologies should be applied thoughtfully and integrated with the practitioner's best professional judgment and expertise. The driving factor in any intervention of course is the well being of the client or student. Observable, measurable communication objectives should be defined, addressed, measured, and regularly assessed so that decisions concerning the course of the intervention are made based on quantitative informa-

AAC and the Development of Speech

A common fear among parents and caregivers of children with autism is that AAC will inhibit the development of speech. Millar, Light, and Schlosser (2006) conducted a meta-analysis of the scientific literature on the effect of AAC (both aided and unaided) on speech production in children and adults with developmental disabilities. Reviewing studies published between 1975 and 2003, they found that none of the subjects experienced a decrease in speech production, 11% had no change, and, in

fact, 89% showed an increase in speech.

Currently, there is debate concerning the efficacy of manual signs (unaided AAC) over graphic symbols (aided AAC) to increase verbal language in children with ASD. Applied Verbal Behavior (Partington & Sundberg, 1998) uses manual signs within a traditional Skinner approach to language. In this method, verbal imitation is increased through reinforcement in child preferred environments and activities. Mirenda (2006) presented a review of the literature concerning graphic symbols and manual signs for individuals with ASD. She found that manual signs were more portable and available and had unlimited vocabulary. Graphic symbols on the other hand were more intelligible to unfamiliar partners, required fewer fine motor skills, and easier for communication partners to learn and use. Mirenda found no strong evidence in favor of aided over unaided AAC. The Millar et al. (2006) review, mentioned above, did a similar, but more systematic, comparison of aided versus unaided AAC with the same results. Wendt, Schlosser, and Lloyd (2005) also conducted a meta-analysis of AAC interventions. They found that aided AAC with 37 subjects in 15 different welldesigned studies was a highly effective communication modality. In the same review, unaided AAC implemented in 10 studies with 37 subjects was also shown to be a highly effective means of communication. The conclusion was the same in all three reviews of the literature: There is no strong evidence in favor of one form of AAC (aided or unaided) over the other.

Speech generating devices (SGDs) have also proven to be effective for individuals with autism (Schepis, Reid, Behrmann, & Sutton, 1998). Romski, Sevcik, Adamson and Cheslock conducted an AAC study using SGDs. It compared the impact of three different language intervention approaches specifically implemented by parents. Twenty children

were randomly assigned to one of three groups. In Group 1, there was no aided AAC; the focus was only on the child's spoken interactions. In Group 2, a SGD was used to provide input to the child with a focus on the child's comprehension. In Group 3, an SGD was used with an emphasis on both receptive and expressive language. The results of this study indicate that in Group 1 there was a 25% increase in speech over baseline. In Group 2 there was a 45% increase in the use of speech. In the 3rd group, there was a 60% increase in the use of speech that was maintained at a 12week probe (2006, Romski, Sevcik, Adamson, & Cheslock). Although this study does not specifically identify children with ASD, it is worth examination. In general, much more research is needed to study the effects of both unaided and aided AAC on the development and production of spoken language.

School-Based Autism Programs

Preschool children diagnosed with ASD require intensive educational services of at least 25 hours per week (NAP, 2001). Essential to this intensive program are speech and language services including AAC. Autism programs with the best outcomes are integrating research-based best practices from the special education, speech, language, and AAC literature base. In these programs communication opportunities are created by the practitioners. Instruction can occur within small group or one-onone instruction. These programs are implemented into natural and meaningful activities and environments.

Aided AAC and Individuals With ASD

Although AAC includes both aided and unaided AAC, the focus of the remainder of this article will be AAC with graphic symbols, (icons and words). The use of visual supports has been well documented as an effective technique for enhancing

comprehension, which leads to expression for children with ASD. Hodgdon (1995) explains that visual supports for children with ASD might be a tool to compensate for inattention, auditory processing, sequencing, and organizing information as well as curbing behavioral problems. Some communication modes such as speech, sign language, and gestures are transient and difficult to process by children with ASD (Hodgdon, 1995). Children with ASD tend to have strength in nontransient stimulus such as visual presentation. According to the National Research Council Committee on Educating Children with Autism (2001), visual information is static and predictable and it enables children to rely on recognition rather than recall for communicating needs.

Visual Supports

The use of pictures with children with autism was the focus of an investigation by Pierce and Schreibman (1994). The researchers wanted to study the effectiveness of pictures for developing self-management during daily living skills (doing laundry, making lunch, and getting dressed) for three boys with autism. Baseline data were taken with verbal prompts only to complete tasks. The children demonstrated off-task and inappropriate behavior during these daily living activities. Color prints depicting the chores were then introduced and the children were taught to identify the pictures and complete the tasks shown. Results showed that the use of pictures helped the boys complete the tasks correctly, and were effective in managing inappropriate behaviors.

Dettmer, Simpson, Myles, Smith, and Ganz (2000) completed an investigation of the use of visual supports to aid in transitions of two boys with autism, ages 5 and 7 years. During the baseline condition, the boys were prompted physically and verbally to cue a transition and begin the new activity. During the intervention phase a visual support in the form of

a line drawing of the next activity was added. The boys were then timed regarding when they began the new activity. Results indicated that with visual supports the boys began the next activity more rapidly than without the line drawing.

A study by Johnston, Nelson, Evans, and Palazolo (2003) on the use of visual supports to teach three preschool children with ASD how to appropriately enter a play group revealed that children could be taught to request entrance into a playgroup by handing another child a picture representing, "Can I play?" These authors were interested in the use of verbal language along with the picture support. Results showed that two of the participants entered a playgroup and the graphic and verbally more often than verbal alone. One of the participants entered verbally the most, supporting the need to allow children to use a multi-modal approach to meet wants and needs (Johnston et al., 2003).

Picture Exchange Communication System

The Picture Exchange Communication System (PECS) was developed for use with preschool children with autism or other communicative disorders who displayed no functional speech, or who did not speak at all, or children who avoided interaction with others (Frost & Bondy, 2002). PECS program moves students through six phases beginning with what motivates the child and finding a picture or photograph of that item and physically helping the child to exchange the representation of the item for the object. The Distance and Persistence phase requires children to move to a communication partner. The next phase teaches children to discriminate between pictures, put together a sentence with "I want" paired with picture symbols, approach a communication partner, and wait for the exchange. The last two phases teach responding to questions and making comments (Frost & Bondy, 1994). Prompts are used and eventually faded.

Schwartz, Garfinkle, and Bauer (1998) conducted a PECS program evaluation study including 31 preschool children with severe social, communication, and cognitive delays. The authors set out to examine the effects of the PECS on overall communication abilities of children enrolled in a preschool program that embedded the PECS into their everyday schedule. The children stayed in this program for more than a year and had consistent and strict use of the protocol in the stages of basic exchange, distance and persistence, discrimination, and sentence building (Frost & Bondy, 1994). Results showed that 44% of the children acquired spoken language and all of the children were able to have many successful communicative interactions across functions and settings.

A subsequent study by Kravits, Kamps, Kemmerer, and Potucek (2002) involving a 6-year-old child diagnosed with autism found that the use of the PECS increased spontaneous initiations during play activities within a kindergarten classroom. Even though this child was verbal, the PECS supported this student's effort to initiate and produce communication with peers.

System for Augmenting Language

Romski and Sevcik (1996) designed an instructional approach called System for Augmenting Language (SAL) for school-age children with moderate to severe mental retardation and who were unsuccessful in communication learning. The SAL consisted of five components including use of speech generated devices, lexigrams or geometric symbols that represented referential objects, teaching through natural and routine communication exchanges, the use of speech generated devices by communication partners, and systematic monitoring of SAL.

After completing the 2-year study, results showed that the participants were able to correctly identify symbols and that comprehension outweighed production. Also, some of the participants increased speech intelligibility as well as sight word vocabulary. The researchers concluded that language learning occurred with augmented input in a natural teaching environment and that augmented language promoted speech production. The authors pointed out that attention must be paid to language comprehension for individual with difficulties in communication to become more competent (Romski & Sevcik, 1996).

Aided Language Stimulation

Aided Language Stimulation (ALS; Goossens', 1989) is a teaching technique in which the facilitator highlights picture symbols on a communication display while interacting verbally with a child or group of children. Goossens', Crain, and Elder (1992) gave the example in their book, Engineering the Preschool Environment for Interactive Symbolic Communication, of pointing to the word "open" when saying, "We've got to open it." This technique is essentially comprehension training in a meaningful context promoting language development (Goossens' et al., 1992). These authors suggested that when the facilitator is modeling the language and pointing to a visual symbol of the word, directly "teaching" picture symbols is not needed. Goossens' also pointed out that when an adult is using this approach, the vocabulary is sure to be relevant to the activity and will result in effective displays with which to communicate interactively. In her study of a 7-year-old child with cerebral palsy, Goossens' found that through the use of ALS in an interactional format, the child who was new to English and communication, made substantial progress in communication. The professionals used an eye gaze frame with picture symbols on it and a vest with the symbols worn by the facilitator. The facilitator pointed to the pictures and looked at the pictures to model how this system could be used for the child, all the while talking and providing language stimulation. The child went from non-speaking and no reliable response to using an eye gaze-based AAC system and eventually to becoming a speaker with 80% intelligibility.

Dexter (1998) investigated the exposure of ALS techniques (highlighting pictures on a communication display) with children with Pervasive Developmental Disorders during joint storybook reading. The author was interested in exploring if ALS had an effect on increasing imitative communication behaviors such as imitative verbal output and imitative pointing to pictures as well as increased mean length of imitative utterance. Spontaneous communication behavior was also a focus of this research. Results indicated that the use of aided language during storybook reading improved imitative verbal output and that ALS techniques supported longer spontaneous verbal utterances by the participants.

Natural Aided Language Stimulation

Natural Aided Language Stimulation (NALS) is the introduction of a visual language system into daily activities in the natural environment (Cafiero, 1998). Expanding Goossens' (1989) idea of ALS, Cafiero (1998), explains that NALS is not just a tool, but a second language where professionals and parents can create language boards with picture symbols and use them freely and naturally with children with ASD. NALS uses picture symbols that are highlighted (pointed out) while the communication facilitator speaks the message. With this method, the child with ASD learns to understand and generate language (Cafiero, 2005).

Cafiero (1995) completed a research study using NALS, training parents of children with autism to use

communication displays or language boards during routines at home to decrease stress in the family and increase child and family communication. The researcher and the four families involved in the study created child-preferred, environmentally specific language boards and used them to interact with their child with ASD. Results showed that using picture symbol language boards increased child communicative interactions in all four families and parent communication interaction in three out of the four families. The children decreased inappropriate, non-verbal communication and the families viewed their children with autism in a more normalized and typical fashion.

Acheson (2006) investigated the effect of NALS on requesting objects and actions with three preschool children with ASD within their classroom routines. Communication displays or choice boards were made on an individual basis for work, art and free choice routines. During the baseline phase, the teacher named the choices without picture support and asked the students, "What would you like to choose?" During intervention and follow-up phases, the teacher highlighted the picture symbols while naming the choices. The teacher prompted the children if needed using a prompt hierarchy from least intrusive to most intrusive. Spontaneous communication data was also collected in this study.

Results indicated that the participants showed an increase in appropriate responses from baseline with behavior consisting of tantrums, screaming, leading adults to objects or no response to the intervention and follow-up phases with appropriate responses of pointing to the pictures, verbalizing a choice or pointing to and verbalizing a choice. Data also showed a decrease in the number of prompts needed. All three boys engaged in some spontaneous communication during the intervention and follow-up phases. The language boards were easily accessible in the

classroom and the teacher was able to remind or prompt the boys to get the boards so they could clearly communicate a request.

The primary goal of educators is to help children with ASD improve social functioning, increase control over their environment and have their needs and wants met (Prizant, 1996; Rogers, 2000). All people are entitled to tools and strategies that will lead to functional, meaningful communication (Cafiero, 2005). Through the use of visual supports, PECS, ALS and NALS children with autism could have their requests, comments, and questions understood leading to complete and natural communication exchanges.

Summary

Functional spontaneous communication is the single most important and life enhancing skill for individuals with ASD. AAC interventions provide the supports for the development and realization of this skill. Although the empirical basis for AAC with individuals with ASD is still small, it is growing. Communication technology, from SGDs to online communication modalities, is mounting rapidly and impacting connection among people of all abilities. The AAC practitioner is at the cusp of an exciting and challenging time. It is the role of the practitioner to keep up with research and implement best practices in "person first" interventions.

References

- Acheson, M. J. (2006). The effect of natural aided language stimulation on requesting desired objects or actions in children with autism spectrum disorder. (Doctoral dissertation, University of Cincinnati, 2006). Dissertation Abstracts International, 67, 04.
- Cafiero, J. (1995). Teaching parents of children with autism picture communication symbols as a natural language to decrease levels of family stress. (Doctoral dissertation, University of Toledo, 1995). *Dissertation Abstracts International*, 21, 213.

- Cafiero, J. (1998). Communication power for individuals with autism. Focus on Autism and Other Developmental Disabilities, 13, 113-121.
- Cafiero, J. (2005). Meaningful exchanges for people with autism: An introduction to augmentative and alternative communication. Bethesda, MD: Woodbine House.
- Centers for Disease Control and Prevention. (2007). Autism spectrum overview: Who is affected? Retrieved January 30, 2007, from http://ww.cdc.gov/ncbddd/autism/overview.
- The White House. (2006). Fact Sheet: Combating Autism Act of 2006. Retrieved January 30, 2007, from http://www.whitehouse.gov/news/releases/2006/12/20061219-3.html
- Dettmer, S., Simpson, R., Myles, B., & Ganz, J. (2000). The use of visual supports to facilitate transitions of students with autism. *Focus on Autism and Other Developmental Disabilities*, 15, 163-170.
- Dexter, M. E. (1998). The effects of aided language stimulation upon verbal output and augmentative communication during story-book reading for children with pervasive developmental disabilities. (Doctoral dissertation, Johns Hopkins University, 1998). Dissertation Abstracts International, UMI No. 9832861.
- Edelson, M. G. (2006). Are the majority of children with autism mentally retarded? A systematic evaluation of the data. Focus on Autism and Other Developmental Disabilities, 21(2), 66-83
- Frost, L. A., & Bondy, A. S. (1994). *The* picture exchange communication system: Training manual. Cherry Hill, NJ: Pyramid Educational Consultants.
- Frost, L. A., & Bondy, A. S. (2002). *The picture exchange communication system: training manual.* Cherry Hill, NJ: Pyramid Educational Consultants.

- Goossens', C. (1989). Aided communication intervention before assessment: A case study of a child with cerebral palsy. AAC Augmentative and Alternative Communication, 5, 14-26.
- Goossens', C., Crain, S. S., & Elder, P. (1992). Engineering the preschool environment for interactive, symbolic communication. Birmingham, AL: Southeast Augmentative Communication Conference Press—Clinician Series.
- Hart, B., & Risely, T. R. (1975). Incidental teaching of language in the preschool. *Journal of Applied Behavior Analysis*, 8(4), 411-420.
- Hodgdon, L. Q. (1995). Solving social-behavioral problems through the use of visually supported communication. In K. A. Quill (Ed.), *Teaching children with autism: Strategies to enhance communication and socialization.* Albany, NY: Delmar.
- Johnston, S., Nelson, C., Evans, J., & Palazolo, K. (2003). The use of visual supports in teaching young children with autism spectrum disorder to initiate interactions. *Augmentative and Alternative Communication*, 19, 86-103.
- Kravits, T. R., Kamps, D. M., Kem-merer, K., & Potucek, J. (2002). Brief report: Increasing communication skills for an elementary-aged student with autism using the picture exchange communication system. *Journal of Autism and Developmental Disorders*, 32, 225-230.
- Koegel, R. L., & Koegel, L. K. (2006).

 Pivotal response treatments for autism communication, social and academic development. Baltimore: Paul H. Brookes.
- Koegel, R. L., O'Dell, M. D., & Koegel, L. K. (1987). A naturalistic language teaching paradigm for non-verbal autistic children. *Journal of Autism and Developmental Disorders*, 17(2), 187-200.
- Light, J., Roberts, B., De Marco, R., & Greiner, N. (1998). Augmentative and alternative communication to support receptive and expressive communication for people with autism. *Journal of Communication Disorders*, 31, 153-180.

- Millar, D., Light, J., & Schlosser, R. (2006). The impact of augmentative and alternative communication intervention on the speech production of individuals with disabilities: A research review. *Journal of Speech Language and Hearing Research*, 49, 248-264.
- Mirenda, P. (2006, November). *Autism, AAC and EBP.* Paper presented at ASHA annual Convention, San Diego, CA.
- National Research Council, Committee on Educational Interventions for Children with Autism, Division of Behavioral and Social Sciences and Education. (2001). Educating children with autism. Washington, DC: National Academy Press.
- Partington, J. W., & Sundberg, M. L. (1998). The assessment of basic language and learning skills: an assessment, curriculum guide, and tracking system for children with autism or other developmental disabilities. Danville, CA: Behavior Analysts.
- Pierce, K., L., & Schreibman, L. (1994). Teaching daily living skills to children with autism in unsupervised settings through pictorial self-management. *Journal of Applied Behavior Analysis*, 27, 471-481.
- Prizant, B. M. (1996). Brief report: Communication, language, social, and emotional development. *Journal of Autism and Developmental Disorders*, 26, 173-178.
- Rogers, S. (2000). Interventions that facilitate socialization in children with autism. *Journal of Autism and Developmental Disorders*, 30(5), 399-409.
- Romski, M. A., & Sevcik, R., A. (1996). *Breaking the speech barrier*. Baltimore: Paul H. Brookes.
- Romski, M. A., Sevcik, R., Adamson, L., & Cheslock. M. (2006, August). Toddlers, parent-implemented augmented language interventions and communication development. Paper presented at the ISAAC Meeting, Dusseldorf, Germany.

Literacy Learning: An Intervention for Children With Autism

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Introduction

For decades, professionals have been challenged to find a way into the world of children with autism in order to teach them needed skills. Historically, skills related to the understanding of language and social reciprocity has been particularly resistant to change, which is problematic given that these two deficit areas are the cornerstone of the diagnosis of autism itself.

Equally challenging is finding a viable way out for children with autism, a way to communicate their inner thoughts and desires. This is most obvious when working with children who are nonverbal or less than typically verbal. It has been estimated that 50% of children with autism will not develop enough speech for functional communication (Romski & Sevcik, 1996). For them, augmentative and alternative communication (AAC) is a viable avenue for expressive and receptive language learning and yet there is limited documentation as to best practice for the use of AAC for this population. In addition, there is a limited broad-based body of research on literacy and autism and the research for developing literacy skills for children with autism who use AAC is almost nonexistent.

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- Schepis, M. M., Reid, D. H., Behrmann, M. M., & Sutton, K. A. (1998). Increasing communicative interactions of young children with autism using a voice output communication aid and naturalistic teaching. *Journal of Applied Behavior Analysis*, 31, 561-578.
- Schwartz, I. S., Garfinkle, A. N., & Bauer, J. (1998). The Picture Exchange Communication System: Communicative outcomes for young children with disabilities. *Topics in Early Childhood Special Education*, 18, 144-159.
- Wendt, O., Schlosser, R., & Lloyd, L. (2005, November). How effective are AAC interventions for children with autism? A meta-analysis of research. Paper presented at ASHA annual Convention, San Diego,
- Yoder, P., & Stone, W. (2006). Randomized comparison of two communicative interventions for preschoolers with autism spectrum disorders, *Journal of Consulting and Clinical Psychology*, 74(3), 426-435.