Augmentative and Alternative Communication and Autism: A Review of Current Research

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Autism is something I cannot see. It stops me from finding and using my own words when I want to. Or makes me use all the words and silly things I do not want to say. (Beukelman & Mirenda, 1998, citing Donna Williams, an Australian woman with autism, in Williams, 1994)

Autism, a lifelong disability, is a spectrum disorder that is identified in the Diagnostic and Statistical Manual of Mental Disorders, DSM-IV (APA, 1994) as a pervasive developmental disorder characterized by perceptual, cognitive, and social differences. The limited ability to produce and comprehend spoken language is one of the most common factors informing the diagnosis. The DSM-IV classifies autism as a disorder within a broader group of pervasive developmental disorders (PDD) which includes Autism, Childhood Disintegrative Disorder (CDD), Rett’s disorder, Asperger’s Disorder, and Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS). Practitioners frequently use the term Autism Spectrum Disorder (ASD) when referring to any or all of these disorders.

Generally speaking, a diagnosis of autism is made when an individual possesses characteristics in these three areas:

- Qualitative impairment in social interaction
- Qualitative impairments in communication
- Restricted, repetitive, and stereotyped patterns of behavior, interests, and activities

While all people with autism have language and communication difficulties, there is a considerable range in language ability among individuals with this diagnosis.
Language difficulties that may be present include difficulties with non-verbal communication, delay in or lack of expressive language skills, significant differences in oral language, repetitive and idiosyncratic speech patterns, echolalic speech, restricted vocabulary, and difficulty with pragmatics of conversation (B.C. Ministry of Education, 2000). Approximately 50% of individuals with autism do not develop functional language and many of those who do exhibit abnormalities in usage (Scott, Clark & Brady, 2000). For this reason, communication interventions are critical components of any program designed to support students with ASD. Many of these students are candidates for augmentative and alternative communication (AAC) systems, either to supplement their existing speech or to act as their primary means of communication (Mirenda, 2003). This review will briefly describe the types of AAC intervention commonly employed with students with ASD and will summarize several analyses of current literature to illuminate the significant gaps in the research in the field of AAC and autism. Specific studies in this area will be described to demonstrate the limitations of current research and to direct further investigations in the use of Voice Output Communication Aids (VOCAs) in AAC interventions.

Communication interventions with students with autism involving AAC have been used for three decades. In the early days, methods involving tangible symbols, lexograms, and manual signs were favored. Beginning in the 1970’s and continuing through the 1980’s, communication interventions based on traditional orthographic symbols (e.g. writing) were introduced. From the early 1980’s until present day, practitioners have emphasized AAC based on visual-spatial symbols (e.g. photographs, line drawings) because of the importance of visual supports for language development.
The use of visual-spatial symbols continued with the introduction in the late 1980’s, throughout the 1990’s and to present day of VOCAs as a means to facilitate language comprehension and to help students with autism address their challenging behaviors and develop functional communication skills (Ogletree & Harn, 2001).

There are two types of AAC techniques: unaided and aided. Unaided communication does not require anything other than the body and involves the use of symbols such as manual signs, pantomimes and gestures. Aided communication incorporates devices that are external to the communicator, like communication books and VOCAs, and involves symbols such as photographs, line drawings or orthography (Mirenda, 2003). Most communicators use combination or multimodal communication depending on the environment or context and the communication partner. The primary goal for any AAC intervention is to compensate for the individual’s communication impairment and to provide generalized, functional communication across a variety of natural settings (Mirenda, 2003).

Traditionally, AAC interventions for people with autism have focused on the use of unaided communication (e.g. gestures and signs). However, since many individuals with ASD experience difficulty generating spontaneous communication, combining signs to communicate more complex information, and communicating with those who don’t know signs, aided communication is being explored more for this population. While unaided communication systems may be more portable, aided systems offer some advantages specifically for people with autism because they are intelligible to a wide range of partners and they play to the visual-spatial strength by using pictures or symbols. (Light, 1998).
Despite the fact that many communication interventions for people with autism now involve some form of AAC in general and VOCAs in particular, several authors have noted a significant lack of research in this area. Mirenda (2001) conducted an extensive review of published, empirical literature on the use of AAC and assistive technology to support communication and learning in persons with autism. She selected studies to review following strict criteria, reviewing those studies that used aided AAC symbols, included at least one person with autism, provided at least minimal outcome evaluation, were published in English journals or books, and focused, at least minimally, on the functional, interactive use of AAC for communication. Mirenda (2001) used several categories to analyze the study findings including assessment, staff/family training, and supports for augmented input, augmented input/output, and augmented output. In each of the categories, she reported the results of the few studies available, noting the general lack of research in most areas concerned with communication support for individuals with autism. Noting that the research to date has been dominated by single subject or quasi-experimental studies providing little information on the effectiveness of AAC intervention, she concluded her examination with recommendations for future research in all categories reviewed.

Mirenda (2003) conducted a second, more recent, review of the literature to determine if there is a preference in AAC modalities with people with autism and to examine what is currently known about the use of VOCAs with these individuals. In this review, she compared studies that examined the use of total communication, aided communication and both. She noted that, while there are substantial bodies of research documenting the potential of both total communication and aided AAC techniques for
individuals with autism, many of the studies suffer from significant threats to internal validity and are, therefore, suggestive but not conclusive (Mirenda, 2003). She also examined studies that involved aided and unaided AAC techniques and the effect on natural speech development. In this area, she noted that the limited research on natural speech development following AAC use suggests that both manual signs (unaided) and aided techniques might help facilitate this development. Mirenda (2003) described one study in particular that found there was no difference between aided and unaided AAC in developing natural speech. Because of the lack of definitive evidence, she pointed to the need for further research in this specific area.

With the use of VOCAs as an AAC intervention, Mirenda (2003) found only one published study that investigated the effectiveness of VOCA versus non-VOCA feedback in people with autism. This study focused on improving the single participant’s spelling ability, not in improving his functional communication. She reported several other studies that investigated the use of VOCAs to train students with ASD to make simple requests. All four studies described reported positive results, but Mirenda (2003) noted significant methodological and design flaws with each. Finally, she reported on her own retrospective examination of the database of a province-wide technology loan program in British Columbia in which she examined the use of VOCAs over a five year period by 58 students with autism (Mirenda, 2000). In this study, Mirenda (2000) analyzed annual follow-up reports of students’ use of VOCAs and assigned “success scores” based on participant responses. Fifty-three percent of the students were rated as successful or very successful, 33% had limited or some success, and 14% had little or no success using their
VOCA. From these results, she concluded that many students with autism could use VOCAs successfully.

Mirenda’s general conclusion that literature in the area of AAC intervention generally and VOCA use specifically, continues to be limited and that those studies which have been conducted are narrow in scope or plagued by internal and external validity issues is certainly substantiated by this review. The literature search conducted for this review definitely confirmed her findings. While there appear to be many practitioners implementing AAC interventions in the field, there are very few researchers publishing empirical studies that could help guide this implementation.

Another author conducted a review of general communication interventions to support students with ASD. Koegel (2000) reported a significant need for research in the social and communicative aspects of the development of students with this disorder. Koegel (2000) in summarizing recent study findings, reported that current research shows that non- or minimally-verbal students with autism can increase their verbal imitation, word production, and spontaneous utterances if intervention programs are begun early (before age 5) and are based on improved teaching approaches. Improved approaches would focus on following the child’s lead, capitalizing on the child’s motivation to respond, providing frequent opportunities for expressive language in natural settings, and using motivational techniques such as direct and natural reinforcers. He made the claim that a number of studies that have utilized these types of intervention programs have seen significant improvements generalizing communication outside of the intervention setting. In this author’s experience implementing AAC with students with ASD, this is certainly
the case. Teams implementing these types of teaching methods appear to achieve the best communication outcomes for their students.

Despite the promising results of studies in this area, Koegel (2000) described several gaps in the current literature. One such gap is the investigation of the spontaneity and initiation of language of students with ASD. In discussing this important area, he noted that several studies have shown that non-verbal autistic students can initially learn to use their AAC systems, but they exhibit significant difficulties generalizing this use without constant adult prompting. Since spontaneous interactions are necessary to be socially competent, Koegel (2000) emphasized the importance of pursuing research in this area. “Scientifically sound procedures related to the teaching of spontaneous use of AAC outside a clinical setting are clearly lacking in the literature.” (p.384) To this end, he reported that some research is now being directed at teaching autistic individuals to ask questions rather than to simply request objects or actions or to protest. In observing a number of students utilizing their AAC system in intervention and generalized settings, this author can substantiate Koegel’s claim that many students that appear to know how to use their AAC system in the training setting, fail to utilize it elsewhere. Research is needed to guide practitioners in training methods that will result in communication generalization.

The research gap reported by Mirenda and Koegel is supported by a third review of the literature. Ogletree & Harn (2001) noted that “although AAC has found its way into various communication interventions for persons with autism, the dearth of literature specific to this application is astounding” (p.138). They reported that,
AAC systems have been employed with individuals with autism across several decades. However, as in other domains of behavioral intervention relatively few studies of treatment efficacy have been performed. In the majority of published investigations, the number of participants has been small, and the treatment group has typically comprised individuals with severe disabilities, only some of whom fall within the diagnostic category of autism.” (p. 139)

All reviews described report very similar conclusions. To illustrate the points made by the authors, several specific studies involving implementation of AAC interventions will be described.

Dyches et al (2002), focusing on the generalization of communication skills to natural community settings, trained an adolescent girl with multiple disabilities to use two AAC systems to convey simple requests. The research team investigated various community settings and created two appropriate and identical pictograph-based communication boards, one that she accessed by physically pointing at the pictographs, and the other, which was placed on a simple, multiple-message VOCA. The study participant, due to her low cognitive functioning and physical disability, had an existing communication system based on unintelligible speech and gestures which were understood only by those very familiar to her. She rarely initiated interaction with unfamiliar people. Using very specific training sequences, researchers trained the study participant to make requests of familiar adults using both boards. Once she had mastered the use of the boards in the familiar school setting, they went into the community where she selected a store or restaurant to enter and made a request. Researchers not only recorded her attempts to communicate, but also the responses of her unfamiliar communication partners. Study variables included communication partner latent response time, focus of attention, and message comprehension.
Dyches and her team’s results contradicted earlier studies that supported the impression that users utilized VOCAs more successfully when communicating with unfamiliar partners. In this case study, there was no significant difference in partner focus of attention and message comprehension when comparing the physical communication board and the VOCA. Researchers attributed the slight difference in partner response time in some situations to the difficulty in hearing the VOCA message in a noisy or crowded environment. The study participant, when asked, indicated that she preferred the physical communication board to communicate her requests. She had not used a picture communication system prior to the study and yet, through training, was able to learn the appropriate sequence for approaching adults, making her communication system visible, making a successful request using her communication system, and terminating the interaction at the appropriate time. The research team concluded that generalization of communication skills had occurred with both types of AAC devices. They also emphasized the importance of using a variety of communication modalities, taking into consideration user preference, training options, and communication settings.

This study is typical of those in this area of research. It is a single-subject investigation conducted over a short time span in relatively controlled settings. The study participant did not have ASD and the investigation contradicts other studies that indicate that individuals with autism often prefer the use of VOCAs to other AAC methods. The study does offer an interesting suggestion for methodology for generalizing communication to more social settings.

Another single subject study involved the investigation of the effect of AAC intervention on the communication, behavior, and academic program of an adolescent
with autism. (Cafiero, 2001). In this study, the researcher explored the use of a holistic, total immersion approach to augmenting language. Cafiero used an aided language stimulation strategy, which employed contextually relevant, reinforcing environments and natural language activities with a 13-year old boy. Prior to the treatment, the study participant used a picture-based choice board to reinforce receptive and expressive language but exhibited many problem behaviors such as bolting, screaming, tantrums, and non-compliance. His educational program was nonacademic and staff reported a low level of communication and behavioral expectations for him. At the beginning of the study intervention, researchers trained staff in aided language stimulation techniques and in data collection protocols. Teachers involved in the study collected data over a 22-month period using language boards for communication interactions throughout the school day. Communication initiations were tallied, graphed, and analyzed.

Study results indicated that the participant’s vocabulary increased from a baseline of 16 symbols to 67 symbols. Initially the participant’s use of the symbols was limited to modeling or pointing to the same symbol as the staff member. However, as the study proceeded, he began to initiate communication around novel subject areas. In addition, he began to chain two or three words in sequence to make full sentence requests. He used the symbols in multiple environments, indicating that generalization of the AAC system had occurred. Because of the more complex cognition shown during the study, teachers and support workers adjusted his instructional program to include more complex, academic goals. In addition to the unexpected benefit to his academic program, there were gains in positive behaviors directly attributable to the study treatment. Incidents of bolting and tantrums significantly decreased to one-third or one-half of daily
frequencies. Researchers concluded that the study demonstrated the significant benefits of using natural aided language for students with autism. Use of this technique with AAC interventions appeared to increase the student’s receptive and expressive vocabulary, giving him communication tools that apparently increased positive behaviors.

Cafiero’s study (2001) examined an AAC intervention that used pointing to static language boards to make requests or to respond to questions. This study, like the previous one, is suggestive, but not definitive. The single subject did have ASD and the study took place over a significant time period, but the researcher relied on teachers and support workers to record data. This might have led to data collection errors or discrepancies. However, of interest is the practitioners’ use of aided language stimulation to teach the AAC system. Even though the study treatment involved a static language board, similar methodology could be employed when teaching a VOCA based AAC system.

A third single subject study, one reviewed by Mirenda (2003) involved introduction of a multimodal AAC system with a 6-year old boy with autism who had severe expressive and receptive language impairments. Light et al (1998) were interested in implementing comprehensive AAC assessment methods and intervention planning to support the communication needs of the study participant.

Light et al (1998) began by conducting ecological inventories and facilitator interviews to determine the study participant’s communication needs, current communication skills, and barriers to communication opportunities. Once the assessment had been conducted, an AAC intervention plan was developed to ensure that the student
had the tools and skills required to communicate effectively, as well as support for his facilitators in providing effective communication opportunities. The intervention plan described an AAC system that included traditional orthography, pointing and gesturing, a communication book to facilitate face-to-face communication, a laptop computer with a voice output talking word processor, and a remnant pocket to support the study participant in initiating communication with others. The plan also provided for systematic and thorough training of the student in the use of the AAC system.

Researchers reported that the study participant, as a result of the AAC intervention, made significant gains in both receptive and expressive communication. Use of the talking word processor enabled him to follow and complete more complex tasks. His natural speech also improved significantly and he developed the ability to generate meaningful, short, spoken sentences and to interact socially with others. He continued to have difficulty with abstract language and changes in routine, but problem behaviors decreased significantly.

This study has the limitations and validity issues of the other studies described earlier. It is a single-subject investigation involving a multi-modal communication intervention utilizing cognitively rigorous orthographic symbols. It, however, does make a strong argument for extensive and thorough assessment prior to introduction of an AAC system with students with ASD. Since individuals with this disorder have unique communication profiles and needs, accurate assessment and AAC system matching are crucial to successful intervention no matter what system components are employed.

The importance of assessment and multimodal communication interventions are highlighted in another study conducted by Sigafoos & Drasgow (2001). In their study, a
14-year old boy diagnosed with a moderate to severe intellectual disability and autistilike behaviors was trained to use aided and unaided communication to gain and maintain access to preferred items. The boy had considerable deficits in the communication and social domains being able to speak only a few intelligible words. By using a specific training sequence involving reinforcing the target behaviors of reaching, direct selecting a VOCA message, and manual signing, researchers were able to teach the student to quickly and successfully request preferred items. Training took place over two 90-minute sessions in a clinical setting. Sigafoos & Drasgow reported that it took 4 minutes with 11 verbal prompts to reach independent use of the manual sign for “want” and 1 minute and only one verbal prompt to reach independent use of the VOCA. During the final phase of training, the student was reinforced for whichever method of communication, aided or unaided, he chose to use. When the VOCA was present, he opted to make 100% of his requests by selecting it rather than manually signing. The researchers speculate that this may have been due to the combination of visual salience and physical ease of the VOCA.

Sigafoos & Drasgow (2001) were able to demonstrate rapid acquisition and conditional use of aided and unaided AAC, but they recognize that they cannot generalize their results beyond the scope of their clinical investigation. Their recommendation for multimodal AAC intervention is based on the success of this study as well as their observation that many individuals trained only on aided AAC are unable to communicate if the device is not readily available or it malfunctions. They also agree with Light et al. (1998) in emphasizing the importance of thorough and accurate assessment when designing an individual’s AAC system.
The research described here illustrate what the reviewing authors allege – that there is a significant lack of definitive and empirical studies that explore the use of AAC interventions with individuals with ASD and that studies that are available are narrow in scope and cannot be generalized. As practitioners continue to implement AAC systems as communication interventions, including those that use VOCA technologies, it is crucial that studies be undertaken to establish a solid foundation of knowledge in this area. Studies to date give suggestions as to where to direct future research but do not provide clear direction. Investigations into effective assessment methods, techniques for AAC training like natural aided language stimulation, and strategies for generalizing communication skills to social settings are all indicated. Without research in these and other areas of AAC intervention with students with ASD, implementation of AAC systems with this population will continue to be challenging and unpredictable.

References


