Using a Speech-Generating Device to Enhance Communicative Abilities for an Adult With Moderate Intellectual Disability

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Abstract

For adults with disabilities who are unable to speak, the literature recommends that intervention include augmentative and alternative communication (AAC) to improve communication and interactions with others. Some adults with moderate intellectual disabilities who exhibit limited functional speech are often overlooked as candidates for AAC interventions because they have some speech abilities. The perception is that they are too old to improve their language and communication skills. This article presents a case report of a 30-year-old woman with a moderate intellectual disability and a severe expressive language disorder who uses a speech-generating device as a compensatory strategy to facilitate her communicative abilities, independence, and self-determination.

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Adults with mild to moderate intellectual disabilities often exhibit speech and language difficulties. Though the literature about language intervention for these adults is very limited, in the early 1980s, treatment for adults with mild to moderate intellectual disabilities shifted from a focus on developing grammar and syntax to achieving communicative competence. Pragmatic-based goals are now integrated into naturalistic contexts and include training for communication partners. Yoder and Calculator (1981) suggested that the principal goal of intervention for adults with intellectual disabilities should be to maximize their ability and opportunity to independently interact with a wide variety of listeners. At the same time, however, these adult communicators should decrease their dependence on those same listeners for deriving their intended meaning (Yoder & Calculator, 1981).

For adults with severe intellectual disabilities who are also not able to speak, more recent literature has recommended that language intervention include the use of augmentative and alternative communication (AAC) systems to improve communication and interaction with others. AAC is an intervention approach that provides an avenue by which to replace or augment existing spoken communication skills (Romski, Sevcik, & Fonseca, 2003). It is multimodal in that it encompasses many forms of communication from unaided modes, such

as simple vocalizations, gestures, and American sign language, to aided modes, including nonelectronic picture communication boards and electronic speech-generating devices (SGDs; American Speech-Language-Hearing Association [ASHA], 2002). For individuals with severe intellectual disabilities, AAC can serve multiple roles. It may be used as a primary means of communication, a supplement to existing communication, and/or for fostering the development of language and communication abilities. Its use can change the quality of an adult's life by enhancing communication in inclusive environments, transitions from school to work, family and peer interactions, the perceptions and attitudes of others toward adults who do not speak (Romski & Sevcik, 1996), and access to selfdetermination (Wehmeyer, 1996, 1998).

Research efforts in the field of AAC intervention and adults with intellectual disability typically have focused on those individuals with severe intellectual disability and communication disorders who do not speak (Graves, 2000; Jacobs, Drew, Ogletree, & Pierce, 2004; Jones, 2004; Soderholm, Meinander, & Alaranta, 2001). With the exception of a few early studies (Locke & Mirenda, 1988; Romski, Sevcik, & Pate, 1988; Romski, White, Millen, & Rumbaugh, 1984), sign language and nonelectronic communication boards were the preferred AAC mode for individuals with severe in-

tellectual disabilities because it was believed that these individuals could not demonstrate sufficient benefit to support the purchase of more sophisticated voice-output communication technologies (Turner, 1986). More recent studies, however, have supported the use of SGDs for persons with severe intellectual disabilities and have indicated that the use of these devices may play a critical role in AAC language learning (O'Keefe & Dattilo, 1992; Romski & Sevcik, 1996). Schlosser, Belfiore, Nigam, Blischak, and Hetzroni (1995) compared the acquisition of visual-graphic symbols paired with voice output with the acquisition of visual-graphic symbols alone by 3 adults with severe intellectual disabilities. They found that the voice output + visual-graphic symbols resulted in more efficient learning, with fewer errors than the visual-graphic symbols alone. Schepis and Reid (1995) examined the effects of an SGD on the communicative partners of a 23-year-old woman with severe disabilities. Results indicated that residential staff members interacted with the woman more frequently when she had access to her device than when the device was not available for her use.

What about adults with mild to moderate intellectual disabilities who have some functional, but limited, speech? In practice, they are often overlooked as candidates for AAC interventions because of their extant, albeit limited, speech abilities, chronological age, and perceived inability to improve on their existing language abilities. Although there is no empirical evidence for using AAC, specifically an SGD, as a compensatory intervention strategy with individuals with moderate intellectual disabilities who have some speech, there is evidence for the continuation of language intervention into early adulthood to improve communication abilities. There is some evidence that simple AAC systems in the form of picture supports can facilitate expressive language abilities (O'Keefe & Dattilo, 1992). In a longitudinal study designed to examine the individual growth trajectories of 31 individuals with Down syndrome (5 to 20 years of age) with varying levels of intellectual disability, Chapman and her colleagues (Chapman, 2003; Chapman, Hesketh, & Kistler, 2002) found that study participants continued their expressive language growth well into adolescence. In a subsequent study of individuals with Down syndrome who were 12 to 20 years old (Miles, Sindberg, Bridge, & Chapman, 2006) the researchers reported that picture support, in the form of wordless picture text during narrative tasks, enhanced the participants' ability to produce longer utterances. The potential effect on the participants' overall communicative abilities and interactions with communication partners, however, is not known. This case report characterizes the communication and social changes in a 30-year-old woman with diagnoses of moderate intellectual disability and a severe expressive language disorder when she obtained and used an SGD as a compensatory strategy to facilitate communication and language abilities.

Case Report

Jane (a pseudonym) was a 30-year-old woman with diagnoses of a moderate intellectual disability and a severe expressive language disorder who lived at home with her parents. She communicated through vocalizations, facial expressions, gestures, pictures, and limited speech. Even though she could speak in intelligible words, she typically did not. Her speech intelligibility was compromised because of a lack of precise speech sound articulation and very low volume. She was aware of her communication difficulties and expressed increasing frustration at her inability to adequately express herself to her communication partners. Her frustration was noted in her facial expression and nonverbal behaviors (e.g., gesturing with her hands, using phrases like "I forgot"). She often relied on her mother to speak for her when others initiated communication with her in the community, at restaurants, and family events. She held her head down and did not typically make eye contact with others. She was described by her family as "shy." Although low overall muscle tone was noted, she had functional use of both of her upper extremities and walked independently. Her hearing and vision were within normal

Jane attended a public school special education program from Ages 5 to 20 years in the metropolitan Atlanta area with the exception of 2 years at a specialized private school for children with disabilities during first and second grades. Public school classroom placement was in a self-contained classroom for students with moderate intellectual disabilities. Goals addressed through her individualized education plan (IEP) focused on functional skills of daily living such as counting money, basic reading, cooking, and household chores. Through work-study programs in high school, she experienced brief employment-training opportunities at local restaurants, a hospital cafeteria, a grocery store bakery, and a craft supply store. Since she has finished school, she has not been employed but engages in community activities such as aquatic classes and volunteering with family members at a horse farm.

At Ages 4 and 5, Jane received 2 years of private speech-language intervention (two times per week) that focused on spoken communication. She received regular speech therapy during her school years, and her mother reported that the clinicians did not want to use an SGD because Jane had some functional speech.

Speech and Language Assessment

Jane was referred to us at Georgia State University by a speech-language pathology graduate student to determine if an SGD could enhance her overall functional communicative abilities with family, peers, and unfamiliar communication partners. The assessment was conducted over the course of two visits, each about 2 hr in length. Participating team members included the authors, two of whom are licensed speech-language pathologists (SLPs); Jane's neurologist; family members (mother and sister); Jane; and a local communication technology representative. Jane was assessed using formal and informal language measures and trial use of a range of SGDs. As shown in Table 1, three formal measures were administered. The Expressive Vocabulary Test (EVT; Williams, 1997) and Peabody Picture Vocabulary Test-III (PPVT-III; Dunn & Dunn, 1997) were administered to determine expressive and receptive vocabulary abilities, respectively. In general, test items were responded to by Jane only after extremely long response latencies and much prompting by the SLP to answer. The Adapted Sequenced Inventory of Communication Development for Adolescents and Adults With Severe Handicaps (A-SICD; McClennen, 1989) also was administered to determine overall receptive and expressive language abilities. This test indicated Jane's ability to follow two-part requests involving two actions and objects, identify basic number and descriptive concepts, answer simple wh- questions (with single words), and name pictured objects. The Vineland Adaptive Behavior Scales (VABS; Sparrow, Balla, & Cicchetti, 1984) was administered to Jane's mother to gain an understanding of Jane's daily functional abilities in the areas of communication, daily living, and socialization. Informal measures included both family (i.e., mother, sister) and Jane's report and a 10-min language sample collected during conversation involving Jane, the primary assessor, and Jane's mother and sister. Her family reported that Jane attempted to initiate communication and respond to questions, but only with family and close friends with whom she was

Table 1 Pre- and Post-SGD Assessment Results

| Test measure | Standard score | Percentile ranking | Age equivalent | | | | |
|---|----------------|--------------------|-------------------|--|--|--|--|
| Expressive Vocabulary Test ^a | | | | | | | |
| Pre-SGD | 40 | <1 | 4:1 | | | | |
| Post-SGD | 40 | <1 | 5:7 | | | | |
| Peabody Picture Vocabulary Test-IIIb | | | | | | | |
| Pre-SGD | 40 | <1 | 6:0 | | | | |
| Post-SGD | 40 | <1 | 5:9 | | | | |
| Vineland A | daptive Be | ehavior Sca | les ^c | | | | |
| Communication | | | | | | | |
| Pre-SGD | 35 | <1 | 7:5 | | | | |
| Post-SGD | 32 | <1 | 6:10 | | | | |
| Daily Living | | | | | | | |
| Pre-SGD | 27 | <1 | 5:10 | | | | |
| Post-SGD | 38 | <1 | 6:8 | | | | |
| Socialization | | | | | | | |
| Pre-SGD | 48 | <1 | 6:5 | | | | |
| Post-SGD | 49 | <1 | 7:9 | | | | |
| Adaptive Behavior | | | | | | | |
| Composite | | | | | | | |
| Pre-SGD | 34 | <1 | | | | | |
| Post-SGD | 37 | <1 | | | | | |

Note. SGD = speech-generating device. ^aWilliams, 1997. ^bDunn and Dunn, 1997. ^cSparrow, Balla, and Cicchetti, 1984.

comfortable and knew well. The language sample, analyzed using the Systematic Analysis of Language Transcripts (SALT; Miller & Chapman, 1985), indicated a mean length of utterance (MLU) of 1.61 and a mean turn length in utterances of 1.0, indicating that, on average, she used one utterance per communication turn. Jane responded to questions with 39% of her overall utterances and used intelligible utterances in 80% of her overall utterances. Final informal measures were taken to account for her reading ability. Through informal observation and high school IEP records, Jane recognized words at the 4th-grade level and was able to spell two-letter words with minimal accuracy and three-letter words with little to no accuracy, often confusing letter order.

SGD Assessment

Based on speech-language testing and observation, participant characteristics, and family report, we determined that Jane might benefit from an SGD. Voice output was determined to be a critical component in the selection of a communication system. A picture board alone would require too many demands on Jane's communication partners to visually attend to the graphic display and assume her intended meaning. Voice output lessens these demands, allowing for immediate comprehension of the intended message and enabling Jane to interact more easily with a variety of communication partners, both familiar and unfamiliar.

Given her profile, we focused on an SGD that offered a range of features, such as an expansive vocabulary–language system, picture and text representations, direct selection, multiple layout options, easy customization, digitized and synthesized voice output, and lightweight portability. Given Jane's strengths and communication needs, dedicated systems to be considered included only those that had dynamic display touch screens with a categorical layout of vocabulary and graphic symbols along with orthographic labels to supplement comprehension and learning of the symbol vocabulary.

Because of these described features and system requirements, SGD systems using static display boards with limited vocabulary options (e.g., 6 Level Communicator [Enabling Devices, Hastings on Hudson, NY]; TechTalk [Advanced Multimedia Devices, Hicksville, NY]) were not considered. SGDs using association-based, multiple-meaning graphic symbols (i.e., Minspeak SGD systems, Prentke Romich Co., Wooster, OH) also were not considered because of Jane's strength in comprehension of language categories.

To determine the most appropriate SGD with the desired features for Jane, assessment was conducted with various dynamic-display SGDs through observation of Jane during structured and focused interactions with the SLPs and her family. We used Jane's nonverbal response (positive or negative) to the device and her operation of the device to infer whether the features met her communication needs. The Dynamo, with digitized speech and a dynamic display in black and white (which has been upgraded to the MiniMo [Dynavox Technologies, Pittsburgh, PA]), was first introduced to Jane. Although the device permitted her to access numerous messages on many pages, in asking her if the device included phrases she wanted to say, she remained quiet, not responding with a yes and smile as she did for other, later devices during the assessment. Her response indicated that she could not create numerous novel sentences with this device and it had only a limited amount of vocabulary given her language-comprehension ability. This device appeared to be too limiting for her daily use.

Next, Jane was presented with the palmtop Impact-D (Dynavox Technologies, Pittsburgh, PA) with the picture-communication-symbol (Picture Communication Symbol, 1986)—based configuration. Each page had approximately 12 symbol locations. Jane demonstrated the ability to move through the pages and activate appropriate icons during conversation using direct selection with the stylus. When questioned, her response was similar to the Dynamo. She acknowledged with a yes response that she realized the limitations of vocabulary size and inability to create many novel utterances. She indicated that she would like to try a different device.

Jane was then presented the DynaMyte (currently known as the Dynavox MT4 [Dynavox Technologies, Pittsburgh, PA]) with 54 locations per page. She immediately demonstrated the ability to navigate through multiple, dynamic-display screens and categories to access vocabulary of her choice. She was presented with the Gateway to Language and Learning page set (Bruno, 1997) on the DynaMyte with 54 locations. This program provides pages of preprogrammed, single words that can be combined into sentences. Several pages of preprogrammed complete messages are present as well. Most levels (e.g., 12 locations, 20 locations) include access to a keyboard page. Given the Gateway pages, Jane demonstrated the ability to combine two and three words to form a sentence, used the keyboard page with word prediction to spell words, and used the color-coded categories to visually group and track various vocabulary categories to quickly access the intended icon. Given the expansive vocabulary and categorical layout provided by the Gateway to Language and Learning (Bruno, 1997) software, a trial period of use with the DynaMyte 3100 was provided before final purchase recommendations were made.

Dynavox Technologies loaned us, for a 2-week trial period, the DynaMyte 3100 for Jane to use at home. During this time, her mother and sister modeled communication and use of the DynaMyte. Jane immediately used the DynaMyte to independently initiate communication. Her mother and her sister gave her direct instruction on how the vocabulary was arranged by modeling and aided input (e.g., her sister would use the device to highlight how target vocabulary words were found within a category

when talking with Jane about upcoming family events) during naturalistic conversation at least four times a week. Jane independently explored the vocabulary on the DynaMyte and did so for at least 1 hr daily during the entire trial period. At the end of the 2-week trial, Jane was able to navigate to various topic pages, find appropriate vocabulary, and understand the basic mechanics of the SGD (e.g., volume, charging). For example, Jane was able to independently navigate to the foods page without prompting to find a drink she wanted to order when taking the DynaMyte to a restaurant. She also used the DynaMyte to independently initiate conversation with family about going to her aquatics exercise class by combining the words "go to pool."

Jane activated the icons "good" and "vacation" to tell her family that she had fun on their vacation. Her mother reported that Jane used the DynaMyte when she previously would not have spontaneously expressed her thoughts.

A Dynavox MT4 (the upgraded version of the 3100) was recommended for purchase. Specifically, the Gateway to Language and Learning Software 60 (Bruno, 1997) was recommended because it permitted Jane to organize language using words she already comprehended for easy access in expressive communication. The Gateway vocabulary set chosen consists of 60 icons per page and at least 60 categories of pop-up page sets (e.g., foods, places, verbs, and expressions).

SGD Funding Process

The SGD was 100% funded through Georgia Medicaid and was received 2 months after the request was made. Requirements for Georgia Medicaid to approve the funding included a denial from Jane's primary insurance company, a written letter of medical necessity, a prescription from her physician recommending the equipment, a comprehensive assessment report from the SLP, and an equipment price quote from Dynavox Technologies. All paperwork, along with consent forms signed by the family to release information to Dynavox Technologies, was given to a Dynavox funding coordinator who first requested funding from Jane's primary insurance company. It was denied and funding through Medicaid then proceeded. Critical components of the funding request involved both the comprehensive written assessment report by the SLPs that supported Jane's language-communication abilities and needs and her physician's involvement in the assessment. Within the report, the need for medical necessity of the SGD was highlight-

ed by indicating Jane's inability to adequately express her wants, needs, and feelings related to her medical status. Her neurologist felt strongly about her need for an SGD and worked with Jane, the evaluating SLPs, and her family to support the funding request.

Participant and Communication-Partner Instruction

The literature describes different recommended intervention strategies when teaching a person to use AAC modes, such as an SGD. These strategies include communication-partner instruction, aided input, increased communication opportunities, and use of the SGD during typical activities and routines in natural environments (Elder & Goossens, 1994; Light, Dattilo, English, Gutierrez, & Hartz, 1992; Romski & Sevcik, 1996). In this case report, the intervention course primarily focused on communication-partner instruction because of the critical role it can play in the learning of the symbolic nature and communicative purpose of an AAC system (Romski & Sevcik, 1996). Light et al. (1992) found that by instructing adult facilitators to decrease their conversational control and provide more opportunities for communication, their adult partners using AAC increased their frequency of initiations and were more reciprocal in turn-taking during communication interactions. Therefore, following receipt of the MT4, Jane's mother served as her communication partner and was seen for two instructional sessions over a 3month period that addressed several communication intervention strategies. The intervention strategies included three main topics: (a) how to use augmented input with Jane, (b) how to provide Jane increased communication opportunities, and (c) how to customize the Gateway to Language and Learning (Bruno, 1997) layout as needed for her individual communication needs. Both verbal and written feedback was provided.

First, Jane's mother was taught the intervention strategy of augmented input to enhance Jane's use of the SGD for communication with various communication partners. Augmented input is a communication tool and is described in the literature by Romski and Sevcik (1996) as a strategy whereby the communication partner uses the SGD in natural communication interactions to show how the SGD is used functionally for communication. Jane's mother, therefore, had to become very familiar with the SGD to provide augmented input during their daily activities. She was instructed to pick at least 10 target vocabulary words a day and to teach Jane Enhancing communicative interactions for an adult

where they were located. Her mother reported, however, that due to Jane's high level of interest in the SGD, she often already knew how to navigate to the target words but needed assistance in how to use that vocabulary to communicate in a social context. For example, when Jane was asked a question by a friend or family member, instead of answering for Jane, her mother used augmented input and directed Jane to look at the device as her mother found the appropriate category and then activated an appropriate answer to show Jane how the SGD was used for communication. Jane's mother also was instructed to provide augmented input for the use of "little words" such as and, to, with, and for, when communicating with her. Jane often left these words out of her verbal expression; however, she appeared to understand them in formal testing. The use of these words would allow Jane to expand her utterances, increase her ability to use sentences to communicate with others, and, thus, improve her communication partner's comprehension of her message. Her mother modeled the use of these words and showed her in the message window where the text was displayed. Jane could see how these words fit before, between, or after certain subject and object words she had already used to convey a message. Jane's mother explained to Jane how these little words clarify the meaning of the subject,

The second intervention strategy addressed teaching Jane's mother how to provide increased opportunities for communication. Because of her limited speech and no augmented way to express herself in the past, Jane had learned to rely on her mother to speak for her and, in turn, was not provided many opportunities to respond during typical communication interactions with others. When opportunities to communicate were provided, they often were in the form of closed-ended, yes/no questions. On rare occasions, opportunities for more expanded communication were presented. It often was difficult for communication partners to wait long enough for Jane to formulate a response to their comment or question. Jane's mother was taught a series of strategies for increasing opportunities to communicate in multiple settings, including offering open-ended questions, encouragement, and support (in the form of augmented input as described previously) for Jane to communicate for herself instead of relying on her mother and providing pause time to allow for more spontaneous and independent communication. Her mother was instructed to

object, and verb of the sentence.

ask open-ended questions or questions with multiple-choice answers to allow Jane to find her answer on the MT4 instead of using limiting yes/no questions. Suggestions were given to Jane's mother about how to modify yes/no questions; for example, she was asked to say, "Tell me about aquatics class today?" instead of "Did you enjoy aquatics today?" and "What kind of snacks should we buy?" instead of "Do we need apples at the store?" Her mother also was taught to look for opportunities for which Jane could use the MT4 to express herself. Jane was given examples of places, such as the doctor's office, to express her feelings and provide biographical information, restaurants to order meals, and shopping centers to request specific clothing colors or prices. Jane's mother also was instructed to pause or wait approximately 10 s after communicating so Jane could respond independently using the MT4.

The third component of the intervention was to teach Jane's mother specific programming techniques so that she could customize the vocabulary as needed. Some page sets within the Gateway to Language and Learning 60 (Bruno, 1997) format were individualized and expanded so that Jane could communicate with a variety of communication partners about family and friends, places and items of interest, and special events. To teach Jane the function of connecting words such as to, for, and, the, and so forth, her mother customized the device by placing these common words on pop-up pages that typically contained only nouns so they were easily accessible to Jane as she learned the function of them.

Communicative Use of the SGD

Following acquisition of the SGD, Jane's mother was asked to keep a journal documenting the use of the SGD in natural environments and with multiple communication partners to account for qualitative changes in communication. Table 2 outlines examples of entries made by Jane's mother regarding Jane's use of the SGD in multiple environments, the messages communicated in that environment, the success of the interaction, and the communication partner's response to Jane's use of the SGD.

Jane's mother reported that prior to the acquisition of the SGD, Jane used single-word verbal communication exchanges with novel communication partners only if and when prompted. Following the SGD purchase and communication-partner training, Jane's mother reported that Jane had become more independent in her communicative interactions and

| Message | Success of interaction | Communication-partner response |
|---|------------------------------------|---|
| | Home | |
| | 100% understood | Understanding of communication and affirmation of her understanding of events around her |
| find the word she was trying to think of, but could not verbally recall to describe what she drew. She found "sun" to name what she had just drawn. | | |
| Used numbers to note the time favorite TV shows come on. | 100% understood | Understanding of what time she wants to watch a TV show |
| | Restaurant | |
| Ordered food independently on multiple occasions (e.g., "Burger, ketchup, pickles, lettuce, French fries, coke") | 100% understood | Understood food order, novel communication partners interested in communication device |
| Fa | Family holiday gatherings | |
| Commented continually to add to conversations of those | 75%: some family members did not | Understanding and acknowledgment of |
| alouliu liel. | to comment about the conversa- | interaction with others around her. The |
| | tion; they did not give her enough | partner often responded back to her |
| | pause time and attention during | comments and therefore expanded the |
| | the interaction | conversation. |
| Expressed thanks for gifts received at holidays | 100% understood | Understanding and ability to further expand discussion with Jane |
| | Dentist's office | |
| "Help, bathroom" while waiting in the room where her moth- | 100% | The hygienist showed Jane where the rest- |
| er was having dental work done. | | room was |

her daily activities at home and in the community. Jane no longer needed consistent prompting to communicate her thoughts with new people. Jane's mother also noted that familiar communication partners, such as close friends and family, were nicely surprised at the amount and quality of information Jane now conveyed. These familiar communication partners stated that, prior to her SGD use, they never thought Jane was cognitively capable of expressing such a variety of thoughts and ideas.

Twelve-Month Postacquisition of SGD Assessment

Formal language measures. All measures, formal (as shown in Table 1) and informal, were readministered after Jane used the SGD for 12 months. An additional language sample also was completed 2 years after the SGD was acquired to provide further documentation of Jane's enhanced communication abilities (as shown in Table 3). Whereas Jane used her speech only during pre-SGD measures, she used a combination of both her SGD and speech in post-SGD measures to respond to formal test items and to participate in conversation during the language sample.

Both EVT and PPVT-III standard scores and percentiles remained the same (Standard Score = 40, percentile of <1). The age equivalent for the PPVT-III remained relatively stable. A substantial change was seen, however, in the EVT raw score and age equivalent. The raw score increased from 41 at pre-SGD to 56 at post-SGD, which resulted in an overall age equivalent increase of 1 year, 6 months.

Postresults from the A-SICD indicated no change in Jane's receptive language abilities. She continued to follow two-part directions and identify basic number and descriptive concepts. Like the increase on the EVT, expressive language results on the A-SICD indicated Jane's expanded ability to answer a variety of question types and use a wider variety of prepositions appropriately. Not only was Jane able to answer simple what, when, and how questions, but she also was able to answer if-what and how-many question forms. Whereas Jane was able to verbally produce the prepositions in, on, and under during pre-SGD assessment, it was only at the 1-year post-SGD assessment that they were used appropriately in context. Perhaps the consistent and repetitive visual input provided by the SGD and the augmented input instruction provided by her mother permitted Jane to more readily retrieve vocabulary for immediate use in context.

Jane's mother again served as informant for the 1-year post-SGD administration of the VABS. Changes were not noted for the subdomain standard scores of Communication and Socialization or the Adaptive Behavior Composite. Changes were evidenced, however, for the subdomain of Daily Living Skills. Post-SGD administration noted an 11-point increase in the standard score, from 27 pre-SGD to 38 post-SGD. No change was seen in the percentile rank. The age equivalent for Daily Living Skills increased 9 months, from 5 years, 10 months to 6 years, 8 months. Analysis of the Daily Living Skills subdomain items showed Jane's increased ability to independently function and communicate at home and within her community. At post-SGD, Jane was reported to order her own meals in restaurants and state the current date when asked. Although no standard score change was noted for the Socialization subdomain, the age equivalent increased by 1 year, 4 months, from 6 years, 5 months at pre-SGD to 7 years, 9 months at post-SGD. Analysis of Socialization subdomain items indicated some important increases in Jane's ability to interact with and communicate with others who were not present prior to SGD use and communication-partner instruction. This increased ability to socially interact was noted by her family across familiar and unfamiliar communication partners. At 1-year post-SGD, Jane was reported to sometimes label her own feelings to others and verbally use complex vocabulary in appropriate contexts that

Table 3 Pre- and Post-SGD Language-Sample Measures

| Measure | Pre-SGD | 1-year post-SGD | 2-years post-SGD |
|---|---------|--------------------|---------------------|
| MLU in words | 1.65 | 1.24 | 2.35 |
| Mean length of turn in utterances | 1.73 | 1.05 | 3.06 |
| % responded to questions | 39.13 | 61.90 | 66.00 |
| % of overall conversational intelligibility | 85 | 100 | 94 |

Note. SGD = speech-generating device; MLU = mean length of utterance.

she had never used before. For example, when commenting about not being able to attend aquatics class because of a storm, Jane said "that thunder and lightning just messed up our schedule today." At 1 year post-SGD, she also was reported to frequently watch television for relevant day-to-day information (e.g., weather, news reports) and initiate conversations on topics that were of particular interest to others (e.g., family pets, the weather forecast, her father's day at work).

Language transcripts. Language samples 1- and 2-years postintroduction of the SGD, were transcribed by a graduate student in the Communication Disorders Program at Georgia State University and an undergraduate psychology student trained in language transcription methods and SALT (Miller & Chapman, 1985) conventions. A second transcriber checked the transcripts and the two transcription reviews resulted in the final transcripts. Table 3 compares pre- and post-SGD language-sample-analysis results.

The post-SGD language transcripts were taken with Jane using her SGD as well as natural speech. The analysis of the transcripts indicated that Jane's MLU in words and mean length of turn in utterances remained fairly stable after 1 year of using the SGD. After 2 years however, she increased the mean number of utterances used as well as her mean length of turn in utterances. Her responses to questions in conversation significantly increased from 39% to 62% to 66%. Her overall conversational intelligibility increased modestly. Her varied conversational intelligibility appears to be consistent with her profile. Pre-SGD use, her utterances were less intelligible because of her inability to fluently communicate her thoughts when there was no visual support. She was relying only on natural speech and having great difficulty finding appropriate target words to use verbally. She often stopped before finishing a word and reduced the volume of her speech at the end of a word so the communication partner could not understand her. It seemed that Jane's overall confidence in communicating was low. Oneyear post-SGD, her speech intelligibility increased, but her MLU decreased because of her heavy reliance on the SGD alone to communicate one- and two-word utterances. Two-years post-SGD, Jane integrated more natural speech into her use of the SGD. Her MLU increased; however, her overall intelligibility minimally decreased. This minimal decrease in intelligibility may have been due to Jane's greater use of natural speech in addition to the

SGD and her use of longer utterances per communication turn.

Discussion and Future Directions

We have presented a case study of an adult with moderate intellectual disabilities and some functional speech who benefited from the use of an SGD. We described how the introduction of an SGD, AAC intervention strategies, and communication-partner instruction enhanced Jane's overall communicative abilities and desire to interact with others. Specifically, we described changes in Jane's communication interactions within home and community contexts as well as increases in her spontaneous communication, commenting, and answering with familiar and unfamiliar communication partners. The "expressive" benefits included increased naming abilities on language testing, increased conversational intelligibility, increased number of words used in conversation, increased ability to take conversational turns, and increased ability to answer questions in conversation. The "adaptive" benefits of using an SGD for this participant were evidenced in Jane's increased ability to actively participate in daily household and community activities with a variety of communication partners.

Although never identified in previous assessments, there appeared to be some verbal word-finding difficulties evidenced by her inability to respond immediately with a verbal utterance. When given the visual support of graphic symbols on the SGD, Jane's ability to verbally retrieve words for standardized naming tasks, as well as for commenting, requesting, and independently communicating was enhanced. Her expressive language gains also may have specifically been due to the use of voice-output technology. Researchers have indicated that the use of voice-output communication systems is a critical component in AAC language learning and communication (Romski & Sevcik, 1996; Schlosser et al., 1995).

Fristoe and Lloyd (1979) have suggested that AAC systems are effective because they remove the pressure to speak and reduce auditory short-term memory and processing. For Jane, it appears that these factors may have contributed to her overall increase in expressive communication and interaction skills and decreased dependency on her mother to communicate for her. Jane also might have had word-finding difficulties that went undiagnosed. The SGD device mediated Jane's difficulty in word retrieval and allowed her to express language that she understood, but never used productively, before.

Enhancing communicative interactions for an adult

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Use of an SGD can enhance the quality of life for persons with intellectual disabilities and severe expressive language disorders by providing a way to interact with familiar and unfamiliar communication partners. It also may enhance their intellectual credibility as perceived and assessed by others.

The use of a case study for this report is a limitation of this finding. Case studies are uncontrolled observational reports of events and outcomes in a single case and, in communication disorders, are considered to be a weak level of evidence. This case report serves as a beginning point for the development of the knowledge base of evidence-based intervention services and supports for adults with moderate intellectual disabilities who have some speech. The results suggests that an adult with intellectual disabilities can continue to develop his or her communication skills given appropriate technology and supports. Research studies are needed to document this preliminary outcome.

Clinically, this report suggests that an adult may benefit from services and supports directed toward communication even though he or she is past the typical developmental window for language development. Today, there are many SGDs on the market in a broad range of features and cost that can meet an individual's communication needs. The range of SGD manufacturers can be found at http://www.ussaac.org/links.html#AAC_Technology/Manufacturers.

SGD devices offer an opportunity that opens the world of communication to adults who have a broader range of presenting speech and language characteristics than originally thought. Research studies are needed to verify and expand the findings of this case report for the population of adults with intellectual disabilities who have limited speech skills.

References

- American Speech-Language-Hearing Association. (2002). Augmentative and alternative communication: Knowledge and skills for service delivery. ASHA Supplement 2002, 22, 97–106.
- Bruno, J. (1997). Gateway to Language and Learning (Version 1.06) [Software]. Pittsburgh, PA: Dynavox Systems.
- Chapman, R. S. (2003). Language and communication in individuals with Down syndrome. *International Review of Research in Mental Retardation*, 27, 1–34.
- Chapman, R. S., Hesketh, L. J., & Kistler, D. J. (2002). Predicting longitudinal change in lan-

- guage production and comprehension in individuals with Down syndrome: Hierarchical linear modeling. *Journal of Speech*, *Language*, and *Hearing Research*, 45, 902–915.
- Dunn, L. M., & Dunn, L. M. (1997). Peabody Picture Vocabulary Test—Third edition. Circle Pines, MN: American Guidance Service.
- Elder, P., & Goossens, C. (1994). Engineering training environments for interactive augmentative communication: Strategies for adolescents and adults who are moderately/severely developmentally delayed. Paper presented at the Southeast Augmentative Communication Conference Publications, Birmingham, AL.
- Fristoe, M., & Lloyd, L. (1979). Nonspeech communication. In N. R. Ellis (Ed.), *Handbook of mental deficiency: Psychological theory and research* (pp. 401–430). Hillsdale, NJ: Erlbaum.
- Graves, J. (2000). Vocabulary needs in augmentative and alternative communication: A sample of conversational topics between staff providing services to adults with learning difficulties and their service users. *British Journal of Learning Disabilities*, 28, 113–119.
- Jacobs, B., Drew, R., Ogletree, B. T., & Pierce, K. (2004). Augmentative and alternative communication (AAC) for adults with severe aphasia: Where we stand and how we can go further. Disability and Rehabilitation: An International Multidisciplinary Journal, 26, 1231–1240.
- Jones, S. (2004). Augmentative and alternative communication: Management of severe communication disorders in children and adults. Journal of Applied Research in Intellectual Disabilities, 17, 133–134.
- Light, J., Dattilo, J., English, J., Gutierrez, L., & Hartz, J. (1992). Instructing facilitators to support the communication of people who use augmentative communication systems. *Journal of Speech, Language, and Hearing Research*, 35, 865–875.
- Locke, P., & Mirenda, P. (1988). A computer supported communication approach for a non-speaking child with severe visual and cognitive impairments. Augmentative and Alternative Communication, 4, 15–22.
- McClennen, S. E. (1989). Adapted sequenced inventory of communication development for adolescents and adults with severe handicaps. Seattle: University of Washington Press.
- Miles, S., Sindberg, H., Bridge, C., & Chapman, R. S. (2006). Sampling context affects MLU in

- the language of adolescents with Down syndrome. Journal of Speech-Language-Hearing Research, 49, 325-47.
- Miller, J., & Chapman, R. S. (1985). Systematic Analysis of Language Transcripts (Version 9) [Software]. Madison: University of Wisconsin.
- O'Keefe, B., & Dattilo, J. (1992). Teaching the response-recode form to adults with mental retardation using AAC systems. Augmentative and Alternative Communication, 8, 224–233.
- Picture Communication Symbols. (1986). San Diego, CA: Mayer Johnson.
- Romski, M. A., & Sevcik, R. A. (Eds.). (1996). Breaking the speech barrier: Language development through augmented means. Baltimore: Brookes.
- Romski, M. A., Sevcik, R. A., & Fonseca, A. H. (2003). Augmentative and alternative communication for persons with mental retardation. International Review of Research in Mental Retardation, 27, 255-280.
- Romski, M. A., Sevcik, R. A., & Pate, J. L. (1988). The establishment of symbolic communication in persons with mental retardation. Journal of Speech and Hearing Disorders, 53, 94–107.
- Romski, M. A., White, R., Millen, C. E., & Rumbaugh, D. M. (1984). Effects of computer-keyboard teaching on the symbolic communication of severely retarded persons: Five case studies. Psychological Record, 34, 39-54.
- Schepis, M., & Reid, D. (1995). Effects of a voice output communication aid on interactions between support personnel and an individual with multiple disabilities. Journal of Applied Behavior Analysis, 28, 73–77.
- Schlosser, R., Belfiore, P. J., Nigam, R., Blischak, D., & Hetzroni, O. (1995). The effects of speech output technology in the learning of graphic symbols. Journal of Applied Behavior Analysis, 28, 537-549.
- Soderholm, S., Meinander, M., & Alaranta, H. (2001). Augmentative and alternative communication methods in locked-in syndrome. Journal of Rehabilitation Medicine, 33, 235–239.
- Sparrow, S., Balla, D., & Cicchetti, D. (1984). Vineland Adaptive Behavior Scales (Interview edition, survey form). Circle Pines, MN: American Guidance Service.

- Turner, G. (1986). Funding VOCAs for the lower cognitive functioning. Closing the Gap, 5, 26.
- Wehmeyer, M. L. (1996). Self-determination for youth with significant disabilities: From theory to practice. In L. E. Powers, G. H. Singer, & I. Sowers (Eds.), On the road to autonomy: Promoting self-competence in children and youth with disabilities (pp. 134–155). Baltimore: Brookes.
- Wehmeyer, M. L. (1998). Self determination and individuals with significant disabilities: Examining meanings and misinterpretations. Journal of the Association for Persons With Severe Handicaps, 23, 5–16.
- Williams, K. T. (1997). Expressive Vocabulary Test. Circle Pines, MN: American Guidance Service.
- Yoder, D., & Calculator, S. (1981). Some perspectives on intervention strategies for persons with developmental disorders. Journal of Autism and Developmental Disorders, 11, 107–123.

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