Augmentative Communication News

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# Upfront

We all learn skills and new behaviors by watching others. Imitation, they say, is "the sincerest form of flattery." Modeling is, in fact, not just a matter of imitation, but often is an intentional instructional strategy, and this kind of instruction plays a crucial role for many individuals struggling to learn augmentative and alternative communication (AAC) skills.

Showing someone how to do something so that they can do it some time in the near or distant future (modeling) can be deliberate, as when a teacher instructs a child with complex communication needs (CCN) to "watch," while pointing to the graphic symbols (noted in caps) and speaking [I WANT the DOLL.]. Modeling can also be incidental (conscious or unconscious), such as when a child observes other children in class using their communication boards. Later, the teacher may notice the child pointing to symbols on a display while playing in the doll corner with a peer.[1]

Modeling is valuable, both as a teaching and a learning strategy, at any age or stage. However, it is often a crucial component of AAC instruction for beginning communicators with CCN who have not yet developed metacognitive skills (ability to think about thinking) and metalinguistic skills (ability to use language to think about language/communication). In fact, many AAC practitioners and researchers are convinced that modeling is an essential instructional strategy, because it:

- Provides individuals with CCN opportunities to observe the functional uses of their AAC system.
- Provides language models for beginning communicators to emulate.
- Sensitizes facilitators (clinicians, family members and teachers) to difficulties inherent in using AAC approaches (graphic/manual) as forms of expression.
- Requires that facilitators become competent users of AAC strategies and technologies, and thus ensures some accountability for those who teach children to use AAC.
- Confirms that adults and peers consider speech generating devices (SGDs), manual signs and communication displays, *etc.* valuable modes of communication.

However, many things about AAC modeling remain unclear. When should modeling be instruc-

*Continued on page 2*

# For Consumers

## Seeing is believing

**By Kate May**

One of the many ways children learn is by observing others. Babies develop language by listening to their parents formulate words and then trying to imitate them. A person who uses a communication device to produce language also deserves a role model, someone to imitate and learn from. Often, however, a child is the only one in his or her school using a speech generating device (SGD).

For the last 13 years, I have worked as a mentor and communication partner for children who use augmentative and alternative communication (AAC). I was employed at several AAC camps, and then, in August 2006, I began working full-time as the Assistive Technology (AT) Teaching Assistant in a Texas school district. I communicate with children using my SGD, so that they can get a clear picture of what it is like to interact using an SGD.

I never had an AAC role model, but it is something I always wanted. It is amazing to observe children when they watch me use my SGD. Their eyes light up with this glow that says, "Hey, she is using a communication device to talk to me. Perhaps I could do that too." Having a living, breathing model helps to give them drive and to motivate them to communicate. It also allows them to glimpse their full potential.

*Continued on page 2*

# inside this issue

*For Consumers, Continued from page 1*

One of my high school students uses a communication system with Minspeak™. Initially, he had an SGD with very limited vocabulary, and he rarely showed any interest in using it. When I would ask him questions such as, *When's your birthday?* or *What do you like to eat?* he wasn't able to answer because the appropriate vocabulary wasn't in his device. I noticed that he seemed intrigued by my SGD, especially because I can quickly access lots of words, so I decided to let him have a shot at using it.

After some exploring, he told his speech therapist he wanted a big device like mine. I let him borrow my old communication device, and with the guidance of my co-workers, who are speech therapists, I taught him to use Minspeak™ sequences so he could use the device more effectively. We developed a strategy—I modeled the use of an icon sequence on my device, and he did the sequence on his device. I also encouraged him to use complete sentences by connecting his device to a computer so he could see what he was typing on the computer screen.

Another of my students uses auditory scanning and a switch behind his head. Many years ago, he memorized the layout of a QUERTY keyboard and began spelling everything. He is adamant about speaking in complete sentences. While I appreciate his preferences, this process is very time consuming and labor intensive.

This year he is taking a computer class and one of the class objectives is to become a faster typist. Currently, he is also learning to use his SGD to interface with a computer. He enjoys talking to me, and one of the things we talk about is the importance of using a language program so that he can avoid fatigue and become a more proficient communicator. He's learning to use the language software Gateway Pro™ so he can recall vocabulary quickly, rather than spell everything. We have come up with a system that helps him learn the location of words in *Gateway*. Whenever he begins typing a word that is in the language software, I assist him to locate the word on his device.

Recently, a student who reminded me of myself at her age moved away. Like myself, she has some intelligible speech. Before I started working with her, she was using a simple SGD with only four messages and a communication book. My co-workers had told me that this student was not interested in using a more sophisticated SGD. When working with her, I used a combination of speech and my SGD. I had to depend on my SGD when she didn't understand what I was saying. By interacting with me, she began to understand the importance of having a device to assist her when she is not understood. Within two weeks, she wanted a more powerful SGD.

## Summary

I believe that by providing a model for my students, I make a unique connection. They become more aware of what is possible technologically and of their own potential. It is my hope that some day they, too, will be good role models for younger people and show them the power of AAC.

Editor's note: Kate's article shows that the person who provides the model can make a significant difference in how modeling is perceived. Kate's success with modeling is based on her being an expert user of SGDs herself. She has experienced, and continues to experience, the real difficulties and rewards of AAC. In the article, she illustrates two kinds of modeling: (1) acting as a role model and (2) using modeling as an instructional strategy to teach icon sequences.[2]

*Upfront, Continued from page 1*

tional and when should it be incidental? How do you make the person modeling conscious of variables that can impact learning (*e.g.*, attention, ability to shift attention, fast-mapping)? Is the person doing the modeling clear on what, when or how to model (*e.g.*, talk in short sentences while pointing to two or three symbols)? And so on.

The purpose of this issue is both to raise issues about AAC modeling and to point out areas of confusion. **For Consumers** describes the experience of being a role model to high school students who rely on AAC. In **Clinical News** we explore the use of modeling as a key component of AAC instruction. **Types of Modeling** discusses the range of modeling approaches used in AAC. **University & Research** highlights studies that explore the impact of AAC modeling and **Training Partners** considers approaches to teaching AAC facilitators. Finally, **AAC-RERC** announces the availability of some new products and materials. Thanks to all who assisted with this issue, especially David P. Wilkins, who helped me think when there were few brain cells left. See **Resources and References**.

*Sarah W. Blackstone, Ph.D. CCC-SP*

Clinical News

## The role of modeling in AAC

AAC modeling is almost always very useful (and frequently invaluable) for an individual with complex communication needs (CCN) who is learning to use AAC techniques, strategies and technologies. For example, adults with CCN and intact language (*e.g.*, people with amyotrophic lateral sclerosis, cerebral palsy) can benefit enormously from observing and interacting with other adults who rely on AAC, but they do not necessarily require modeling to learn how to use a speech generating device (SGD) or other AAC strategies. Why? Because they have the metacognitive and metalinguistic skills to take charge of their own learning process. Thus, instruction can be more explicit and specific to their perceived needs.

These individuals are likely to be self-motivated and can bring relevant past experiences to bear on their learning (*e.g.*, computer expertise, literacy skills, *etc.*). They often have established dominant learning styles and preferences—some seek direct instruction, while others may elect to read an instructional manual, watch a video about how to use an ETRAN, join a support group, attend an AAC conference, or just start *playing around* with equipment. Many depend on family members and friends rather than professionals for their ongoing support. As a result, AAC interventions are apt to be episodic.

On the other hand, AAC modeling is crucial for young children with CCN and for individuals with CCN who have cognitive/linguistic challenges, because they have not yet developed *meta* skills. Also, they aren't necessarily motivated to communicate using graphic symbols, manual signs or SGDs because the benefits of doing so are not obvious to them. The fact is, these children are not surrounded by a community of people who use the modes of communication they need to learn (*e.g.*, graphic symbols, manual signs or SGDs). They have no natural models to observe and imitate. Showing, encouraging and supporting, not "telling," is the way to encourage these children to communicate using AAC.

There are problems, however, because communication partners, who are in a position to show, encourage and support AAC approaches for these children often don't know how to do it. In fact, most family members, teachers and clinicians usually are not systematically taught to use AAC techniques and technologies and/or model their use for others.

## Modeling as a teaching and learning tool

> We need to improve the language environment and to scaffold the communication and language development of children who use manual and graphic communication. . .[3]

There is a consensus that modeling and scaffolding* hold an important place in the arsenal of instructional strategies employed by AAC practitioners.[4] Like all children learning to communicate, young children with CCN need ongoing support from more competent adults and peers during early stages of language learning.[5]

Both explicit (direct teaching) and incidental AAC modeling can be powerful teaching and learning tools. However, since incidental AAC modeling rarely occurs "naturally," it also must be implemented deliberately during play, meal times, and so forth. For modeling to work, learners have to (1) pay attention, (2) retain a mental image or verbal description of the model so they can reproduce it later with their own behavior, (3) make an effort to reproduce or imitate the model and have multiple opportunities to practice the modeled behaviors and (4) be motivated (either internally or externally) to imitate the modeled behavior.[6]

In the AAC literature, researchers use modeling (and scaffolding) to describe components of many different AAC instructional programs (*e.g.*, aided language stimulation, augmented input, aided language modeling, aided AAC modeling, total communication). In clinical practice, modeling is used extensively, albeit perhaps in a more happenstance, less well-defined and less controlled fashion.

## Challenges

Most would agree with Martine Smith, who wrote:

> Children acquiring language using graphic symbols [manual signs, SGDs] are embarked on a journey that is not clearly mapped out.[7]

While theories of normal language development may provide a context, the truth is we have limited information about how to teach

*Continued on page 4*

*Scaffolding is often used with modeling to extend or expand language use. It means providing a structural connection between a child's early attempts at communicating (pointing to a symbol) and more advanced use of an AAC system. For example, to encourage the use of multi-symbol utterances, a clinician or family member might expand a child's single symbol utterance by pointing to a sequence of two or three symbols while also providing a spoken model (sentence).

*Clinical News, Continued from page 3*

beginning communicators to use aided and/or unaided AAC. AAC clinicians, professors and researchers are often quick to acknowledge that it is important for children with CCN, especially beginning communicators, to have partners who can model and scaffold AAC approaches (*i.e.*, support their use). In reality, however, research has shown that this seldom happens. Even when partners are trained, speaking children and adults rarely use aided modes or manual signs when communicating with children who rely on AAC, and they never use AAC with one another. This means that children who rely on AAC often have very restricted input (speaking and AAC modes) and have fewer communicative experiences across environments than children who develop speech.[8,9,10]

Restricted input and limited opportunities to practice using AAC are compounded by characteristics of AAC approaches themselves, such as limited vocabularies, difficulty navigating through systems, setup time, learning requirements, *etc*.). Not surprisingly, most children with complex communication needs

- have very limited access to vocabulary, so even when they want to 'say something,' they cannot.
- produce very few symbols each day, when compared to children who rely on their speech.[7]
- use telegraphic messages that alter spoken language word order and lack function words and morphological markers.[11,12,13]
- rarely use AAC modes of communication during interactions with their speaking peers.[14]

Thus, while we know modeling is an important, if not a key, instructional strategy, we also know that modeling does not flow naturally from environmental exposure and daily social interactions.[3] Rather, it must be orchestrated, and to do so presents a number of unique challenges for those who provide models and supports. Challenges for facilitators include:

1. Dealing with the constraints of AAC systems (*e.g.*, small and limited access to vocabulary, lack of grammatical morphemes).[14]
2. Using AAC modes in an effective manner during ongoing interactions and activities, to both model and scaffold language for the child.
3. Understanding modeling-related factors related to attention (*e.g.*, Can child shift attention from system to partner to activity?) as well as those related to positioning the AAC display or SGD, managing the system and activity, and so forth.[15,16]
4. Determining the amount of support a child might need (*e.g.*, Is the child able to fast-map—easily attach meaning to symbols? How to help motivate the child?).[15,17]

## Next steps

As you read these words, the vast majority of young children with CCN needs are not surrounded by people who support their use of AAC by modeling, scaffolding and expanding their understanding and use of AAC modes during natural interactions. This is a critical language learning time for them. They desperately need and deserve these opportunities.

Research evidence demonstrates the positive effects of modeling (and scaffolding) as a component of AAC instruction for children with CCN (see pages 7 to 11). There is also strong neuropsychological evidence that very young children with CCN require early intervention, and that the consistency and quality of the instruction they receive is likely to have a lasting impact on the level of linguistic and communicative competencies they will ultimately achieve. Even so, few people are ringing loud the alarm bells.

We can't just *tell* beginning communicators how to interact with members of their community using AAC. We need to show them how to use the modes of communication they are able to access (*e.g.*, graphic symbols, manual signs or communication devices) and demonstrate that using AAC works and can work for them. And, they need to practice, practice, practice using these AAC modes during meaningful exchanges that take place in natural environments. We must also make sure that the family members, teachers and clinicians available to provide AAC modeling and scaffolding are well prepared to do so and stress how important it is that they follow through.

## No time to lose?

We hope that this issue of ACN will help our readers understand how strongly current AAC research and best practice support the early use of a variety of modeling strategies as key components of AAC instruction. We also hope to demonstrate how wide a range of divergent strategies are actually incorporated under the rubric of AAC modeling, which makes it difficult to compare various approaches (apples vs oranges), or to identify anything like a prevailing or consensus view of how to proceed and with whom. And, finally, we hope these pages do help ring some of those alarm bells regarding the inadequacies of current practice in providing models and modeling opportunities to all individuals who rely on AAC, particularly our beginning communicators.

# Types of Communication

## Approaches to AAC instruction

AAC interventions often rely on modeling and scaffolding to address a range of language and communication goals. As AAC-related goals differ, so do the modeling procedures and the ways researchers and clinicians measure their impact. In a recent interview, Janice Light suggested that there are four different types of modeling currently being employed in the area of AAC: (1) Modeling as a language immersion approach; (2) Modeling to support comprehension; (3) Modeling to support production of specific language targets; and (4) Modeling as a component of a prompting hierarchy.[18] Summarized in Table I, these four approaches are discussed in more detail below.

1. Modeling AAC as a language immersion approach. Immersion is a way to set up the conditions for natural language acquisition. In immersion, the focus is not on instruction, but rather on activities and interactions. Modeling (and scaffolding) occur throughout the day in natural contexts with multiple partners who are competent users of the language. The learners experience people interacting with them, and also observe people as they interact with one another. Total immersion may be ideal, but in practice most programs use partial immersion.

In AAC, the immersion experience differs from natural language learning in many ways. First, facilitators do not naturally use AAC to communicate with one another. Second, most communication partners are not experts in AAC use, so they too must learn how to use AAC strategies and often find that very difficult. Third, facilitators are teaching ways of representing language (*e.g.*, graphic symbols) and multi-modal ways of communicating, not just modeling the language of the community (*e.g.*, English, Italian). Fourth, the use of AAC immersion must accommodate the learner's skills and abilities, which may not be well understood. Facilitators must be aware of issues like attention, attention shifts and fast-mapping, as well as factors related to AAC technologies, the communication context, task and partners.

In short, implementing a true AAC immersion approach is difficult, if not impossible, because there is no community that relies on AAC—it has to be artificially created. Also, as noted in **Clinical News**, the quantity and quality of AAC input are limited at best, when compared to typical language immersion approaches.

The ultimate goal of AAC immersion is setting the stage for production of language using AAC, rather than eliciting it. Thus, outcomes are typically measured by increases in the person's use of AAC modes (aided and/or unaided), as well as increases in natural speech. Examples include:

> An Aided Language Stimulation (ALgS) strategy pioneered by Goossens'. [See pages 7 and 8.]
>
> An immersion approach in inclusionary preschools in Norway as described by von Tetzchner and his colleagues. [See box].

2. Modeling AAC to support comprehension. In this approach,

*Continued on page 6*

### AAC Immersion classrooms[19]

Stephen von Tetzchner and his colleagues describe inclusive preschool classrooms in Norway in which the teachers, typical children and children with CCN are taught to model the use of signs and graphic symbols and to scaffold their use during natural interactions with one another. The goal is to establish shared communicative competence among the speaking children and children with CCN.

Arguing that a shared means of communication is a necessary prerequisite for interactions between children using AAC and their speaking peers, these researchers demonstrate that children with typical language development are able to adapt themselves to users of manual and graphic communication systems, provided they have sufficient knowledge of the AAC approaches used. Using case examples, researchers explain how children were taught to use AAC systems both explicitly, through direct teaching by the staff, and implicitly, by staff using manual signs and graphic symbols in a prominent way. Staff also were taught to scaffold the children's communicative interchanges—but not by using praise (*e.g.*, "Good pointing") or other forms of external rewards.

These researchers have demonstrated that children with cerebral palsy and autism can learn to use AAC by observing and interacting with others using AAC modes and speech in relation to daily events they found important and meaningful.

**Table I. Types of Modeling[18]**

| Goals of AAC Modeling | Description | How Success is Measured | Target Populations | Who Models? What Modes? Frequency? | Examples |
|---|---|---|---|---|---|
| To support comprehension and production through immersion | Trained facilitators model the use of the AAC system (signs, communication displays and SGDs) throughout the day and across contexts. | Increase in use of AAC modes and speech during natural interactions. | Beginning communicators<br>Very young children | **Who?** Trained facilitators (teachers, clinicians, family members, aides).<br>**What?** Focus on aided AAC approaches (paired with speech). Multi-modes used.<br>**Frequency?** All the time in at least some natural contexts. | von Tetzchner - preschool classrooms<br>Goossens' *et a*l. Aided language stimultaion (ALgS)<br>Dada - ALgS<br>Bruno & Trembath - ALgS<br>Cafiero - Natural ALgS |
| To support comprehension (not necessarily production) | Trained facilitators use augmented input (text, graphic symbols, speech synthesis) to scaffold understanding of spoken language. | Increase in participation & successful interactions. Increase in comprehension of language (all modes). | Individuals with severe cognitive and linguistic challenges<br>Adults with global aphasia<br>Very young children | **Who?** Trained facilitators (teachers, clinicians, family members, aides).<br>**What?** Focus on aided AAC (paired with speech).<br>**Frequency**? As often as possible in specific contexts. | Romski & Sevcik - SAL<br>Garrett -Written Choice<br>Mirenda - Visual supports<br>Beukelman - Visual scene displays |
| To support production of a specific langauge target | Trained facilitators model use of target form, typically using keywords (symbols) and speech. | Production of target language form (*e.g.*, two-symbol utterances). | Children learning language<br>Children with language impairments | **Who?** Clinician/researrcher/teacher.<br>**What?** Models specific language target.<br>**Frequency?** In classroom, clinical environment. | Binger & Light - Aided AAC modeling<br>Harris & Reichle - ALgS<br>Drager *et al* .- Aided language modeling |
| To elicit target behaviors as part of a prompting hierarchy | Trained facilitators use most-to-least or least-to-most hierarchy, as necessary. | Production of target behavior. Amount of prompting; maintenance/ carryover . | Children and adults with language and other developmental delays | **Who?** Clinician/researcher/teacher .<br>**What?** Models, as necessary, using target mode.<br>**Frequency?** As necessary to elicit target. | Lovaas - Behavioral treatment<br>Nigam, Schlosser & Lloyd - Matrix strategy and mand-model procedure. |

modeling is used primarily as a way to provide support to children and adults who have difficulty understanding spoken language. The goal is to increase participation across daily activities and interactions. Trained facilitators use AAC modes (aided and/or unaided) *paired with speech.* They might (1) point to symbols, pictures or parts of a picture, (2) produce signs or (3) write down words as they speak.

Note: Sometimes facilitators, while speaking, point to a symbol and then to its referent to teach the meaning of specific symbols/words.

Outcomes are measured by increases in comprehension and participation and, in some cases, by decreases in frustration or challenging behaviors. Expressive communication may also be tracked, but is not the true focus. Examples include:

*Beginning communicators*. The System for Augmenting Language (SAL) supports the development of language comprehension in toddlers, preschoolers and adolescents with significant developmental delays by modeling the use of symbols on the child's SGD. [See pages 9 and 10.]

*Aphasia*. Using visual scene displays (VSDs), facilitators model and scaffold the use of language during conversation, so interactions are sustained across multiple turns. [VSDs are based on individualized photographs depicting events or familiar scenes and are designed to encourage co-construction of messages. VSDs are also used effectively with beginning communicators] See *ACN*, 2004, vol. 16 #2.

*Aphasia*. In Kathy Garrett's *Written Choice* technique, trained facilitators write down or point to key words or symbols to scaffold comprehension of language and support participation during natural interactions with people who have global aphasia. See *ACN*, 1991, vol. 4 #1.

*Autism.* Clinicians and teachers regularly use 'visual supports' to scaffold comprehension and encourage participation. They may point to a calendar, schedule board, map or graphic symbol while speaking. Visual supports also include text. For example, I once worked with a high school student with autism who had a history of violent outbursts. He struggled to process and use spoken language, but could read and write words and enjoyed doing so. The outbursts stopped when his teacher began writing key words in his notebook to explain disruptions and unexpected events (*e.g.*, There is a *FIRE DRILL*. It's *OK*. Were going *OUTSIDE, but* we'll *COME BACK* very *SOON*). See *ACN*, 2003, vol. 15 #4.

3. <u>Modeling AAC to support production of specific language target</u>. Sometimes AAC modeling is used to teach specific vocabulary, syntactic structures or communicative functions. A skilled clinician or teacher models the target AAC form(s) while speaking. The goal is to elicit the target form (immediately or in the future). In addition to modeling, the facilitator may repeat, recast, expand or extend (scaffold) the child's utterance using targeted AAC modes, again combined with speech. Outcomes are measured by the child successfully using the targeted language forms in ever expanding contexts.

This approach is most often used with young children who are learning language and are relying on AAC to express language. See page 8 (Harris & Reichle), page 10 (Drager *et al*.) and page 11 (Binger & Light) for examples.

4. <u>Modeling AAC as a component of a prompting hierarchy</u>. Modeling is widely used in clinical and educational settings as a compo-

nent of discrete behavioral training. There is a target behavior (*e.g.*, using symbols to communicate) and the child is systematically taught to produce it. As a component of instruction, the teacher uses a prompting hierarchy to ensure the child produces the behavior. Modeling is one part of the hierarchy. Prompting hierarchies are often described as most-to-least or least-to-most.[See page 12 for an example.] Outcomes are often measured by the number of times an individual produces the target behavior and the circumstances under which that production occurs, *i.e.*, the amount and types of prompts required. Carryover to new environments and maintenance of target behaviors are also noted. Although Lovaas's approach is often the one cited, there are many other examples of behavioral approaches to teaching language.[20,21]

## Summary

Recognizing different types of modeling as components of AAC instruction helps to frame discussions about what instructional strategies to use, with whom and under what circumstances, particularly with beginning communicators. However, important questions remain about what strategies are most efficient and effective in helping children with CCN learn to use AAC to communicate. We need to consider casting a theoretical framework around these questions. Discrete behavioral approaches reflect a more limited view of language and communication. Our framework, and the instructional strategies we use, must help us to account for the role of culture and language in communication, as well as to value the use of multiple modalities across multiple contexts and partners.

# University & Research

## The effects of modeling aided AAC

Some AAC researchers are investigating the impact of AAC modeling (often with scaffolding) as a component of AAC instruction. They are asking if AAC modeling is effective and efficient, with which populations, under what circumstances and for what purposes. Perusal of the literature reveals that comparing studies is extremely difficult. The terminology is inconsistent; and modeling procedures, as described, diverge substantially. Research has been carried out in both natural and clinical settings using a variety of research methodologies. Also, the research questions differ, and therefore, what is measured and how it is measured differs. For example, researchers focus on ways to increase a child's comprehension of graphic symbols, production of graphic symbols, production of symbol combinations, use of symbols to request objects, use of multimodalities during interaction and so on. Finally, the populations under investigation are diverse, including children (toddlers to adolescents) with diagnoses of verbal apraxia, dysarthria, autism, cerebral palsy, Down syndrome and other genetic conditions, severe mental retardation, and so forth.

Despite their diversity, the research reports summarized in this article have a common thread—all studies investigate the use of aided AAC modeling as a key component of AAC instruction. Researchers have used different terms (*i.e.*, aided language stimulation, augmented input, natural aided language, aided language modeling, aided AAC modeling) and the same terms differently. For example, aided language stimulation (ALgS), originally cast as an immersion approach, is used to describe studies that occur in clinical, rather than natural, settings and focus on explicit teaching in addition to, or in place of, incidental exposure to partners using ALgS. Table II on page 9 is an effort to point out similarities and differences among the studies that are described in more detail below.

**Aided Language Stimulation (ALgS).** ALgS is widely used and describes a variety of strategies employed with children and youth with CCN. Originally, ALgS referred to an intervention package developed by Carole Goossens', Sharon Crane and Pam Elder.[22,23] It was described as a partial immersion approach designed to teach children with severe speech and physical impairments to use communication boards, as well as to support their language development.

Clinicians, teachers and family members learned how to (1) engineer an environment (*e.g.*, classroom) in ways that allow for incidental AAC modeling, (2) design language-rich displays, (3) model the use of graphic symbols on communication displays (or devices) during interactions throughout the day and (4) encourage the use of symbols to express language. Practitioners learned to develop activity-based displays containing at least 12 graphic symbols arranged across grammatical categories in a Fitzgerald key configuration. Facilitators learned to model the use of AAC in natural environments,

*Continued on page 8*

*University & Research, Cont. from page 7*

sometimes highlighting graphic symbols (one or more per utterance) while speaking (*i.e.*, providing aided and spoken input). *[WHERE* should we *PUT* the *BABY*? In the *CHAIR*?] Facilitators also were expected to provide aided input consisting primarily of comments (80%) and open-ended questions (20%) and models most of the time (70%) during interactions with the child. In ALgS children are encouraged, but not required, to use graphic symbols (aided language) to communicate.

**Goossens' (1989).** In a single case example, Carole Goossens' used ALgS with a six-year-old girl with cerebral palsy. The goal of the study was to determine the impact of ALgS on **the development of speech and language**. After seven months of intervention, the child had progressed from having no expressive language to producing up to three-symbol messages, including some intelligible speech.[22]

For the past 15 years, ALgS has been applied clinically around the world, and gradually its research base has expanded. However, ALgS as described in the following studies have goals, procedures and outcomes that differ considerably from Goossens', *et al*. and from one another.

**Dada (2004)**. In her dissertation, Shakila Dada investigated the **impact of ALgS on the receptive acquisition of graphic symbols.** She used a multiple participant-multiple probe design across behaviors and trained facilitators to implement a program that carefully followed the Goossens' *et al*. ALgS program. [She did not measure production.] Four children ages 8 to 11 years participated in a structured, activity-based intervention program. Participants were children with Down syndrome and cerebral palsy with little or no functional speech who attended a school for children with cognitive disabilities in South Africa. The children had not previously received AAC services. All could identify line drawings and point to symbols.

The research took place during three group activities, over a three-week period, for a total of 15 sessions. During each activity, facilitators modeled the use of eight symbols. All displays contained a range of grammatical categories.

At the end of the intervention period, all children understood the meaning of the 24 targeted symbols. In addition, they demonstrated gains on language tests (although these results did not reach a level of significance). The author concluded that ALgS supports the receptive acquisition of graphic symbols and may also positively affect language development in general.[24]

**Bruno and Trembath (in press)**. Joan Bruno and David Trembath conducted a pilot study of nine children ages 4 to 14 years with diagnoses of cerebral palsy, apraxia, schizencephaly and Down syndrome. Prior to the study, these children had used low-tech displays and speech generating devices (SGDs) for from one to ten years.

Researchers conducted the project over one-week during a summer camp program designed for children who rely on AAC. Data was collected during activity-based groups, two times daily for 45-minute sessions, over five consecutive days.

The goal was to **improve syntactic performance using aided AAC systems (both low-tech and high-tech)**. There were two conditions: (1) children used their speech generating devices (SGDs) and (2) children using activity-based communication boards designed by the researchers. Available vocabulary in both conditions included a range of grammatical categories. Researchers modeled the use of the child's system using messages that were one step more advanced than each child's mean aided message length at baseline. Results showed that under both conditions, the length of the children's utterances increased, as did the complexity of their output. The youngest participants made the greatest gains. Results also showed that while most participants performed better using manual communication boards, some older children (with more experience using their SGDs) performed better on their devices. Researchers felt that being able to see all relevant vocabulary at once may benefit children who are learning to combine symbols.[25]

**Harris and Reichle (2004)**. Mike Harris and Joe Reichle used a single-subject multiple-probe design to study the use of an adapted version of ALgS. In this study, a facilitator would first point with a finger to a referent in the environment and then sequentially point to its graphic symbol and labeled it during a scripted routine that was embedded within preferred play activities. The goal was to **teach**

**Table II. Research on AAC Modeling: Some examples**

| Terminology | Components of instruction | Target population | Equipment | Research type and context | Research Results |
|---|---|---|---|---|---|
| **Aided language stimulation (ALgS)** Goossens, Crane, Elder (1998). Immersion | Facilitator modeled interactive use of language rich displays in meaningful contexts use graphic symbols and speech. over months | 6 year old child with cerebral palsy | 12 or more graphic symbols on displays arranged in Fitzgerald key. Acitivity-based. | Case example. Individual instruction in classroom | Learned to use AAC displays. Increased natural speech. |
| **ALgS** Dada (2004) Impact on comprehension of vocabulary | Facilitators used ALgS (ala Goossens) during three activities over a three-week period for a total of 15 sessions. Structured group setting. | 4 children ages 8 to 11 Down syndrome, cerebral palsy | 24 graphic symbols (8 per activity) from several grammatical categories. Activity-based. | Multiple participant-multiple probe design across behaviors. Group instruction in classroom | Children learned 24 previously unknown, targeted symbols. |
| **ALgS** Bruno & Trembath (in press) Improve syntactic performance | Facilitator modeled use of child's system using aided message length above child's baseline for 5 days, two times a day for 45 minutes during group activities. | 9 chilren ages 4 to 14 Cerebral palsy, apraxia, schizencephaly, Down syndrome | Condition #1- SGD Condition #2 - activity-based display | Pilot study | Length and complexity of utterances increased under both conditions. |
| **ALgS** (adapted) Harris & Reichle (2004) Impact on object labelilng | Facilitator points to referent and then to symbol and provides label d Drring scripted routine embedded in play activity. | 3 preschool children with moderate cognitive impairment Down syndrome, developmental delay | 12 graphic symbols | Single-subject multiple-probe design | Children acquired symbols at different rates and more slowly at first |
| **Natural ALgS** Cafiero (2001) Facilitate language & participation | Family, peers & professional hehpers point to symbols on child's display. Symbols placed around classroom. | 1 child, age 13 years Autism | Graphic symbols on displays | Case example | Child began using 67 symbols with some multi-word combintations. Behavior improved. |
| **Augmented input** - SAL Romski & Sevcik Impact on comprehension & expression | Facilitators model use of SGD with symbols using individualized vocabulary During natural interactions | Adolescents and Toddles/preschoolers with moderate/severe cognitive impairments and CCN | SGD with graphic symbols on displays | 2 longitudinal studies | Children increased comprehension & production of symbols and speech. 2 group patterns identified. |
| **Aided language modeling** Drager et al. (2006), Impact on comprehension & production | Facilitator points to targeted referent in environment and then graphic symbol while saying the word During interactive play activity | 2 preschoolers with autism | 12 graphic symbols (mostly nouns) | Multiple-baseline across sets of symbol vocabulary | Children increased comprehension & production of targeted symbols. |
| Aided AAC modeling Binger & Light (in press). Increase multi-symbol utterances | Factilitator touched symbol combinations while labeling each and then provided an expanded model During play sessions | 5 preschoolers Down, Prader-Willi, DiGeorge syndromes | SGD and/or non electronic boards with graphic symbols | Single subject multiple-probe | 4 children reached criteria (12 two-symbol messages during 15 minute period over 2 sessions). |

**object labeling.** Three functionally nonspeaking preschool children with moderate cognitive impairments participated. Two of the children had Down syndrome and one had a diagnosis of developmental delay (unspecified). All passed a fast-mapping task.

A total of 12 symbol-referent targets were taught (all nouns). During each scripted routine, researchers provided four opportunities to use each symbol. Symbol comprehension and production were assessed in a decontextualized manner (match-to-sample task that occurred daily, prior to the scripted routines).

Results showed that children differed in their rates of acquisition. At first, however, all acquired symbols more slowly than they did later on. Researchers concluded that ALgS procedures seemed to facilitate the concurrent acquisition and maintenance of symbol comprehension and production, noting that their participants were able to attend to both graphic symbols and the spoken words. Finally, they suggested that the ability to fast-map influences the effectiveness of their ALgS approach.[26]

**Natural Aided Language Stimulation**. Joanne Cafiero describes an approach specifically designed for children with autism spectrum disorders (ASD) based on ALgS as described by Goossens' *et al*. One difference of Natural Aided Language Stimulation is that it uses principles of applied behavior analysis.[27]

**Cafiero (2001)** described the use of the approach in a single case study of a 13-year-old, nonverbal, cognitive and behaviorally challenged adolescent with autism who used only five manual signs to communicate. Goals were to **facilitate language, interaction and participation in daily activities**. Communication partners (family, peers and professional helpers) were taught to touch key symbols/words on a child's language board while saying the words. Graphic symbols (with text) were also placed around the classroom on language boards and SGDs. [The number of available sym-

*Continued on page 10*

*University & Research, Cont. from page 9*

bols on a display will vary depending upon the child.] The child's primary communication partners were taught to take responsibility for modeling the use of the boards across meaningful environments. Progress was monitored using specific data collection protocols. Data collection included time samples of both the child's and partner's initiations and responses.

Following 12 months of intervention, the child was functionally using 67 symbols with some multi-symbol combinations. Results showed a strong relationship between the quantity of modeling that speaking partners used and the communication output generated by the child. In addition to increasing language use, Cafiero reported a decrease in this child's tantrums and an increase in on-task behaviors.[27]

**Augmented input—SAL**. In the mid 1990s, Mary Ann Romski and Rose Sevcik described an approach to language and communication instruction known as the System for Augmenting Language (SAL).[28] SAL is comprised of five features that involve communication partners providing augmented input using an SGD, as follows:

1. An individualized visual-graphic symbol vocabulary/lexicon. 2. A speech generating device (SGD). 3. Instruction through naturally occurring communication exchanges. 4. Communication partners who are specifically taught to provide augmented input. 5. Periodic monitoring of multiple variables.

The goal of SAL is to **improve the children's understanding and use of aided and spoken language.** Communication partners are trained to provide a model by using the child's system during natural interactions across contexts.

Over the past decade, these researchers and their colleagues have investigated the use of SAL with both adolescents and very young children who have significant developmental disabilities and limited speech. Their initial studies were longitudinal, with data collected across multiple variables. During interactions with the child, the communication partners are taught to activate graphic symbols on the child's SGD, as well as to speak. Thus, their input is multimodal. Children are encouraged, but not required, to use their AAC system. Increases in comprehension and expression are measured.

Adolescents. Researchers followed 13 adolescents for two years to measure the impact of SAL. All the children learned to use their SGDs, plus a repertoire of gestures and vocalizations, to communicate. Thus, all began using both aided and unaided modes to communicate with adults and peers at school and at home. Some children also exhibited gains in intelligible speech and reading.

The researchers described two patterns of symbol acquisition: (1) Beginning achievers—children who developed the use of a small set of symbols (between 20 and 35) over the two years and (2) Advanced achievers—children who evidenced a rapid acquisition of symbol vocabulary (100 or more). Beginning achievers learned the meaning of the symbols before producing them. Advanced achievers learned to comprehend and produce symbols concurrently. They also began to use symbol combinations.

Researchers also reported that communication partners modeled the use of AAC only a small percentage of time (10-14%) and were most likely to do so with the beginning achievers and at the end of an utterance.[28]

Preschoolers/Toddlers. Romski and Sevcik followed ten children (ages 2 to 3 ˚ years) and their families for one year. These children had severe developmental delays and no speech. Parents were taught to implement SAL using their child's SGD and individualized symbol vocabulary.

The children's comprehension of graphic symbols and spoken words and phrases improved significantly. All children learned to use symbols communicatively with parents, siblings and other family members. Once again, two language profiles emerged. Five children (who came to the symbol-learning task with fairly well-developed comprehension skills) used substantial symbol vocabularies and developed some functional speech. The other five children, who began with minimal speech comprehension, acquired smaller symbol vocabularies and showed no advances in speech production.[29]

Parent implemented language intervention for toddlers. In their current study, Romski and Sevcik are investigating the impact of three types of parent-implemented interventions. Sixty toddlers with significant developmental disabilities and expressive speech-language impairments and their families are participating. Twenty children are randomly assigned to one of three groups and the focus of instruction is different for each group:

Group 1: SCI—No aided AAC with emphasis on supporting only the

child's spoken interactions.

Group 2: ACI—Augmented communication input with an emphasis on the child's comprehension of speech and symbols;

Group 3: ACO—Augmented communication output with an emphasis on the child's production of speech and symbols;

Initial results suggest that parents can learn to implement all three interventions. Interestingly and importantly, children in the ACI and ACO groups improved more in their production of symbols and speech than children in the SCI group, suggesting that ACO, and to a lesser extent, ACI interventions make it much more likely that children with these profiles will talk after a parent-implemented intervention. Children in all three intervention groups also made significant receptive and expressive language gains on commercially available scales, although there was no difference between groups. In summary, their findings demonstrate that, when parents model the use of AAC, very young children with significant disabilities are able to communicate via visual-graphic symbols and digitized words.[30] [See page 13 for a description of the parent training procedures.]

**Aided Language Modeling.** Kathy Drager and her colleagues, Valerie Postal, Leanne Carrolus, Megan Castellano, Christine Gagliano and Jennifer Glynn developed an approach they call Aided Language Modeling. They used modeling within a natural context to teach graphic symbols to children on the autism spectrum. Procedures are similar to the Harris & Reichle study.

**Drager et al. (2006)**. Researchers used a multiple-baseline design across sets of symbol vocabulary. The goal was to increase **symbol comprehension and production**. The research was carried out in a daycare center during three interactive play activities. Two preschool children with autism (age four years) were taught 12 targeted vocabulary items (mostly nouns). A facilitator pointed to a targeted referent in the environment and then (within 2 seconds) pointed to the corresponding graphic symbol while simultaneously saying the word.

Results showed that children increased their comprehension and production of targeted symbols and maintained this over time. They noted that at least some children learned symbol comprehension and production simultaneously rather than sequentially. Finally, they suggested that children's performance may be influenced by three variables: (a) the iconicity of the symbols, (b) the reinforcement value of the referent and (c) the child's ability to fast-map.[31]

**Aided AAC Modeling**. Cathy Binger introduced a terminology to enable clinicians and researchers to differentiate between different kinds of AAC input.

**Aided AAC input** (input using graphic symbols/text on low-tech or high-tech)

**Unaided AAC input** (input via manual signs and/or gestures)

**Multi-modal AAC input** (input using signs, an SGD, low-tech displays, *etc.*)[32]

**Binger & Light (in press)**. Researchers used a single-subject, multiple-probe research design. The goal of the study was to **increase the use of multi-symbol messages** in preschoolers who rely on AAC. Five preschoolers between the ages of 3 and 5 years participated. They had diagnoses of Prader-Willi syndrome, DiGeorge syndrome, Down syndrome and developmental delay with suspected childhood apraxia of speech. All used aided AAC (three used SGDs and two used non-electronic communication boards).

Prior to the study, the children communicated primarily using single word utterances. However, all demonstrated comprehension of some early two-word semantic relations. Partners were taught to touch a combination of symbols on an AAC system, while labeling each (DOG SPILL) and providing an expanded spoken model (The dog spilled the tea!).

The intervention consisted of three 15-minute play sessions, one to three times per week. Within each 45-minute session, the researchers provided a minimum of 30 aided AAC models until the child reached criterion—use of 12 two-symbol messages during a 15-minute play period over three consecutive sessions.[33]

# Training Partners

## Learning more about what to do

Being an effective communication partner or AAC facilitator is not intuitive. It often requires one to change long-established, unconscious ways of communicating. Quite simply, most people don't know what to do when interacting with a child or adult with complex communication needs (CCN), or how to support someone who may be learning to rely on manual signs, a communication display or a speech generating device (SGD) to communicate. Research shows that the partners of people with CCN tend to ask predominantly *Yes*/*No* questions, interrupt, take the majority of conversational turns, provide few opportunities for communication and focus on the technology, rather than the individual.[34]

There are, of course, certain qualitative differences, as well as challenges, when communicating with individuals who use AAC. Some interactants seem to communicate effectively with minimal effort, while others really struggle. In practice, familiar communication partners (often family members, personal assistants, classroom aides) often assume major responsibility for setting up equipment, as well as for supporting the person's language and communication efforts during interactions. These facilitators require direct instruction in modeling and other supportive strategies.

## Learning to model aided AAC (with Cathy Binger)

To teach partners how to become effective facilitators, Binger and Kent-Walsh use a cognitive strategy approach, *i.e.*, step-by-step instruction that supports the learning of new skills.[35,36] They are currently evaluating the effectiveness of a number of instructional strategies (often used in concert) that aim to teach facilitators to support the language and communication skills of individuals who rely on AAC (especially early expressive communication skills). These strategies include

- Responding contingently to a child's point of focus
- Using aided AAC modeling
- Using expectant delay
- Asking open-ended questions
- Using direct verbal prompts.[36]

Binger points out that the above instructional techniques often function within a cueing hierarchy, as shown in Table III. In a least-to-most prompting hierarchy, the facilitator begins with a comment and, if the child does not respond, then follows up with higher level prompts as needed. Whenever the individual produces the target form, the facilitator responds contingently.[36]

Kent-Walsh, Binger, and colleagues have taught parents and educational assistants from various racial and ethnic backgrounds to use aided AAC modeling and other instructional strategies to support the development of language and communication skills for children who rely on AAC. In addition to changing partner behaviors, they report that these strategies result in an increase in children's communicative turn taking, use of communicative functions, length of utterances, semantic diversity, and syntactic complexity.[33]

## Comparing intervention approaches (with Mary Ann Romski)

In a recent study, 60 children with CCN and their parents were randomly assigned to three intervention groups.[30] As described on page 10 and 11, each intervention group focused on helping parents learn to provide models and to scaffold their child's communication efforts. One intervention focused solely on

**Table III. Least-to-Most Prompting Hierarchy** (by Cathy Binger)

| Partner's use of prompts (Least to Most) | Example [Teaching 2-symbol messages while reading a "Little Critter" storybook] |
|---|---|
| When child produces target (in this case a 2-symbol message), provide contingent response. | Child: PUPPPY HOME.<br>Partner: Yes, {Little Critter LITTLE CRITTER} and the {puppy PUPPY} both went {home HOME}. |
| Comment on what child is doing while providing an aided AAC model, then provide expectant delay. | Child: (Points to Little Critter and puppy in book)<br>Partner: Look, Little Critter is {walking WALK} his {puppy PUPPY} [Expectant delay of at least 5 seconds]. |
| Ask open-ended question while providing an aided AAC model, then provide expectant delay. | Child: PUPPY<br>Partner: Yes, {what WHAT} is the {puppy PUPPY} doing? [Expectant delay of at least 5 seconds]. |
| Answer the open-ended question while providing an aided AAC model, then provide expectant delay. | Child: (Does nothing)<br>Partner: The {puppy PUPPY} is going {home HOME} [Expectant delay of at least 5 seconds]. |
| Provide a direct verbal prompt (may also point toward the SGD). | Child: (Does nothing)<br>Partner: (Points toward the SGD) Your turn. [Expectant delay of at least 5 seconds]. |
| CAPS = using AAC device; { } = events that happen simultaneously | |

**Table IV. Teaching parents to support communication**[30]

| | Spoken Communication Intervention SCI=20 | Augmented Communication Input ACI=20 | Augmented Communication Output ACO=20 |
|---|---|---|---|
| **Goal of intervention** | SLP/P and child use speech to communicate. | SLP/P uses SGD to provide input to child. | Child uses speech generating device to communicate. |
| **Type of vocabulary** | Individualized vocabulary of spoken words. | Individualized vocabulary of visual-graphic symbols. | Individualized vocabulary of visual-graphic symbols. |
| **Procedures** | SLP/P encourages and prompts the child to produce spoken words. | SLP/P provides vocabulary models to child using SGD. Symbols positioned in environment to mark referents. | SLP/P encourages and prompts child to produce communication using SGD. |
| **Supports** | SLP provides resource/ coaching for parent. | SLP provides resource/ coaching for parent. | SLP provides resource/ coaching for parent. |
| **Results at 9 weeks** | 25% increased use of speech over baseline. | 100% increased use of symbols.<br>45% increased use of speech. | 100% increased use of symbols.<br>65% increased use of speech. |
| **Results at 12 weeks** | 20% maintained use of speech at home. | 95% maintained use of symbols.<br>60% maintained use of speech. | 100% maintained use of symbols.<br>65% maintained use of speech. |

**SLP - speech language pathologist; P =parent**

supporting speech and the other two introduced graphic symbols and speech generating devices (SGDs) in addition to natural speech.

All participants went through a 12-week program. Data were collected at baseline and at intervals during the training program. Parents were mostly mothers (from multiple ethnic groups) with a mean age of 37 years. All had completed high school. All the children were toddlers and preschoolers under three years of age with significant developmental disabilities and CCN.

Participants were assigned to three groups, as shown in Table IV. At baseline, there were no differences between the three groups.

Parts of the intervention procedures were the same for all groups. Each dyad (parent and child) participated in 24 sessions (over 12 weeks). The first nine sessions took place in the lab (nine weeks) and the last six sessions (three weeks) were conducted in the child's home.

Sessions 1-8 (4 weeks). Parents observed their child in treatment while the SLP modeled the intervention procedures.

Sessions 9-14 (3 weeks). SLP coached the parent during each session to carry out the procedure.

Sessions 15-24 (5 weeks) Parent conducted the sessions by themselves. [Note: Each week parents were provided with a manual and materials to implement.]

Each session lasted 30 minutes and was divided into three 10-minute activity blocks, which always included play, book reading and a snack. The vocabulary taught was individualized for each child.

Researchers asked and answered three questions:

Question #1: Can parents and interventionists implement these procedures? The answer was yes. All parents were able to implement the features of the intervention that they were assigned consistently across the sessions and activities. Parents found it no more difficult to implement use of the SGD than the oral language intervention. However, data showed that parents and SLPs were more likely to use the child's vocabulary during sessions in the SGD conditions. Thus, the ACI and ACO conditions promoted use of a larger percentage of target vocabulary during each session than did SCI. [See Table IV above.]

Question #2: Does parent intervention result in child language gains? Again, the answer is yes. All the children increased their use of target vocabulary over baseline. However, there were significant differences in how much progress the groups made, as shown in Table IV.

Question #3. What are each parent's perceptions of his/her child's language development? Specific questions asked before and after intervention were: (1) How does the parent feel about her/his child's communication development, and (2) How does the parent feel about the kinds of interventions that his/her child received. All parents perceived their children were making progress and being more successful at the end of 12 weeks. However, their perceptions of the severity of their child's communication difficulties decreased for the two augmented interventions, but increased for the spoken language intervention.

## Teaching operational competence by modeling

Wendy Quach, a doctoral student at the University of Nebraska-Lincoln, is investigating two ways to use modeling to teach children operational competencies using a speech generating device (SGD).[37]

1. Error free condition. The researcher will guide children to each target selection, *i.e.*, model what to do.
2. Error correction condition. The child will first attempt to produce the target sentence. The researcher will provide a model only if corrections are necessary.

The SGD being used has a dual-screen interface, *i.e.*, two identical screens, which enables both the child and the researcher to see identical material on the display *[Note: this feature is currently available on the LightWriter.]* Participants in the study include 20 typically developing 6- and 7-year-old children. Each child is given sentences to type using the SGD. Quach hopes her results will provide information about the use of modeling to teach school-aged children to operate an SGD.

AAC-RERC

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*Continued on page 16*

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