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Upfront

This issue focuses on "access" for people with complex communication needs. "Access to what?" you may ask. AAC devices? Communication boards? Computers? Other mainstream technologies? The Internet? Employment? Education? Housing? Commerce? Community? Telecommunications? Recreation? Self-determination and a decent quality of life?

Each question is worthy of asking and answering. In this issue, however, we will specifically highlight access to language using AAC devices.

In this context, the goal of access is to enable individuals to use language that is located in or on an AAC device. For some, providing access simply means addressing physical barriers. For example, AAC teams may seek to improve an individual's positioning, identify reliable movements, select and mount switches, evaluate head control, etc.

In addition, providing access to language in or on AAC devices requires careful consideration of cognitive and linguistic barriers. For example, individuals must understand the symbols that are displayed and know how to find them in order to communicate.

Providing access to AAC systems often requires finding solutions to environmental and societal barriers, as well. For example, it may be necessary to procure funding for an AAC device or identify someone to set up equipment.

Finally, access can be hampered because of technological barriers. Equipment may be unreliable, or AAC devices may not be compatible with other technologies, thus restricting communication options. In the broadest sense, access means making sure people with disabilities get the same communication opportunities as everyone else.

Solutions to access barriers are rarely simple because communication is a complex process, and we live in a complex world. Some

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inside this issue

Clinical News

AAC access: Still a long way to go

More than two decades ago, AAC device developers set out to solve a host of access problems. While much progress has been made, some problems have proved a lot more intractable than others. Many family members and individuals who rely on AAC devices have difficulty learning to use the devices. In addition, many clinicians, teachers and even manufacturers' representatives find some AAC devices complex and difficult to use and to teach.

Can AAC devices be designed in ways that are more user-friendly, easier to learn and more accessible to people with complex communication needs and those who seek to support them? Can manufacturers produce AAC technologies that require less learning and practice? Can AAC technology assume more of the cognitive and physical "load" and require less work from users?

Man-machine interface

First, let's look at what we mean by AAC access. In order for someone to use an AAC device, there needs to be an interface. An interface typically refers to the connection or crossing point between an individual (with a severe communication impairment) and a technology (an AAC device, communication display or computer with communication software). Over the years, the AT

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industry has developed a myriad of interface options that have enabled people with even the most severe disabilities to operate AAC devices. As a result, many people can now converse, make requests, send email, give a lecture and so on.

Ideally, well-designed interfaces are intuitive, error-free and easy to learn and use. In fact, for the general consumer market, interfaces are often so well designed that we hardly even know they are there. Learning to operate TVs, microwaves, telephones, coffee pots or ATM machines can take only moments. Exceptions exist, of course. When an interface to a device is complex or difficult, many people simply won't bother using it, or they will underutilize its capacity (*e.g.*, many people use VCRs to watch videos, but not to record TV programs).

The AAC interface

Using language that is displayed in front of you to converse with others is a complex process that involves the integration of cognitive/linguistic, visual/sensory, perceptual and motor processes.[1]

Physical access

For years, clinicians have focused on the motoric components of physical access (*i.e.*, identifying movements under a person's control that are reliable, easy to use and do not cause fatigue). In addition, decisions about physical access require consideration of a person's sensory or perceptual impairments, *e.g.,* visual field, hearing. AAC devices typically offer two kinds of physical access solutions:

> *Direct selection*. Individuals either point directly at a display (*e.g.*, using their hands, eyes or feet) to generate language, or use a device (head pointer, mouth pointer, eye tracker) to point to messages.

> *Indirect selection*. Individuals with more severe physical disabilities select messages indirectly. For example, they may use scanning (row-column, directed, step scanning) approaches.

Because both techniques (direct and, especially, indirect selection) are slow, AAC interfaces often include rate enhancement features (*e.g.*, letter or word prediction, macros, coding strategies or some combination of these). Scanning and rate enhancement methods are not simply motor acts. They require learning and considerable practice to use.

Many people continue to struggle with physical access. For example, scanning is dreadfully slow, and people who rely on head pointing and eye pointing technologies often grapple with calibration and accuracy. Also, fatigue and overuse of certain muscles can interfere with successful access.

New technologies can improve physical access. For example, many individuals may not be able to use a full keyboard, but can use more than one or two switches. One option for them is the ambiguous keyboard.

> Ambiguous keyboards. A reduced set of keys (*e.g.*, 8-10), coupled with powerful linguitic prediction software. The keyboards improve efficiency and increase communication rates, particularly for those who now use scanning. Products with ambiguous keyboards are Enkidu's *Impact* and the *Dynawrite* (Dynavox, Inc.).[2]

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solutions are mechanical (changing the position of a person or adjusting equipment). Other solutions may be technological (finding ways to connect a switch and an AAC device, or an AAC device to a computer). Often solutions involve changing attitudes (e.g., accepting the use of an AAC device in a classroom). In any case, AAC access solutions almost invariably involve education (teaching people to set up, program and use AAC devices, changing perceptions and so on).

Clinical News *discusses in more detail AAC access and the need for improved access options.* **For Consumers** *provides perspectives on access from four adults who rely on AAC devices.* **AAC-RERC** *announces 15 new projects seeking to improve access to AAC technology.*

This issue also introduces ***Social Networks,*** *a new section of ACN aimed at sharing information about the uses of this assessment and intervention planning tool.*

Many thanks to all who contributed their ideas and expertise. (See page 8.) Special thanks to my guest authors Joe Hemphill, Juli Trachtman Pearson, Tracy Rackensperger, Johana Schwartz and Tom Younkerman.

[Note: The upcoming issue of ASHA's SID-12 newsletter *Perspectives on Augmentative and Alternative Communication* also highlights access. Delva Culp, the guest editor, assembled three excellent articles on access written by AAC-RERC partners Janice Light, David Beukelman, Jeff Higginbotham and their colleagues.]

Sarah W. Blackstone, Ph.D. CCC-SLP

Developers are also looking into ways to improve head pointing technologies. New approaches are the eye-safe laser and absolute head tracking:

Eye-safe laser. Laser pointers have advantages over existing head control technology because they do not require extreme head movements or re-calibration. Research has shown that eye-safe lasers can enable individuals with disabilities to (a) learn to control miniscule movements (*e.g.*, Locked-In Syndrome), (b) point to low-tech displays and (c) access AAC devices and computers (Zygo Industries).[3]

Absolute head tracking interface. In this University of Nebraska project, head movement is monitored using two cameras. A computer algorithm triangulates head position. An interface module enables individuals to control AAC devices, computers, *etc*. Researchers found that individuals with ALS, cerebral palsy, spinal cord injury and brainstem stroke were 100% accurate and experienced no occurrences of misalignment or need for re-calibration. In comparison, individuals using the Head Mouse had 100% occurrences of misalignment and 38% need for re-calibration.[3]

Before long, it is likely that physical interfaces will also offer multi-modal access options. Developers are working on ways to incorporate residual speech and gestures so that, for example, someone might begin a scan using a vocalization or gesture and then select a desired message with a switch.

Finally, by modifying the AAC interface in ways that make the task of scanning more explicit, researchers at Penn State have demonstrated that children can learn to scan at much younger ages, enabling them to access AAC devices during their preschool years.[1]

Cognitive and linguistic access

Major cognitive and linguistic challenges are inherent in the AAC interface. First, language as represented on the AAC device must be recognizable to the individual. Second, language must be organized in ways that enable the individual to find and use it to communicate.

Representation. In most AAC devices graphics represent language (*e.g.*, text, symbols, pictures, photos). Auditory scanning and tactile symbols (objects, textures) are also used when people have visual impairments. In any case, unless individuals understand what symbols mean, they can not use them to communicate.

Research has shown that graphic symbols are NOT readily understood by young children, even after some instruction.[1] In addition, researchers have found that individuals with acquired conditions (aphasia, traumatic brain injury) and people with autism may also have difficulty using pictographic symbols. Many do better with photos or text. Finally, some individuals have strong preference about how language is represented on their AAC device.[4,5]

Organization. Communication requires accessing hundreds (if not thousands) of words/messages, but AAC devices can only reveal a limited number of symbols at one time. Thus, if the desired message is not visible, the person must know where to find it or how to create it (*e.g.*, by spelling). The language in AAC devices is typically organized in one of six ways:

1. *Schematic organization*. Vocabulary is organized according to activities (*e.g.*, bedtime, snacktime, shopping).
2. *Semantic-syntactic organization*. Vocabulary is grouped together grammatically (agent-action-descriptors-objects from left to right).
3. *Taxonomic organization*. Vocabulary is grouped according to hierarchical categories (*e.g.*, people, places, food).
4. *Alphabetic organization*. Vocabulary is organized alphabetically according to the first letters of words, as in a dictionary.
5. *Idiosyncratic organization*. Vocabulary is grouped to reflect an individual's preferences.
6. *Coding organization*. Vocabulary is accessesd using codes [*e.g,* MinSpeak requires learning icons and sequences; Morse code requires spelling abilities].

A best way to organize language on AAC devices for specific individuals or groups of individuals is not yet clear. However, it is increasingly clear that organizational strategies that seem obvious to adults with intact language systems are not easily understood or learned by young children and others with limited cognitive/linguistic skills.[1,4,5]

Improving AAC interfaces

The effectiveness and efficiency of access depends not only on the skills and impairment patterns of the person, but also on the design of the AAC systems themselves.[1]

In a series of studies over the past five years, Janice Light, David Beukelman and their colleagues have demonstrated that current AAC interfaces are difficult for young children and people with cognitive and/or linguistic impairments to learn and use. As a result interface designs that are more "user-friendly" and target the needs of specific populations are underway.

Researchers in the AAC-RERC (see page 6) have found that using personalized and even generic scenes with familiar contexts enable young children, individuals with autism and adults with aphasia to use a significant amount of language and to learn to do so communicate, quickly and easily.

In summary, the extent to which people with severe communication challenges can use language in and on AAC devices may largely determine what else they can do. Thus, AAC devices and access technologies that take some of the physical, cognitive and linguistic load off of the person can make communication more about the content of communicating and less about the process. We have come a long way, but we still have a long long way to go. Stay tuned.

For Consumers

Communicators on the front line

I asked some members of the newly formed AAC-RERC Writers Brigade to reflect on access issues that arise in their daily lives.

[Note: The AAC-RERC Writers Brigade is a NIDRR funded project with goals to expand dissemination acitivities of the AAC-RERC and develop employment capacities of individuals who rely on AAC by improving their technical writing skills.]

Johana Schwartz

Petaluma, California

I currently use an augmentative communication (AAC) device (Pathfinder by Prentke Romich Company). I have always used my AAC device as an interface to a computer, because I regularly rely on word processing and Internet applications. Sturdiness, reliability and compatibility are important access issues for me.

Sturdiness, reliability and compatability. The sturdiness of my equipment (AAC device, cables, T-Tam) is important because a variety of caregivers handle the components and set them up for me to use. The parts (wires, pins) need to withstand the wear and tear inflicted by my aides. The equipment also needs to be easy to assemble and user friendly, because most aides are not familiar with AAC technologies.

Reliability is another important consideration. I prefer to use a Macintosh because I have found it more reliable than my PC, which was subject to viruses and crashing. Unfortunately, my current AAC device, the Pathfinder, is not compatible as an interface with the new Macintosh operating system (OS). Finding compatibility is a work in progress. The Macintosh OS evolves and AAC devices evolve, but neither company assumes responsibility for maintaining the compatibility between them; and there is no third party who is committed to making it their business either. Computers are all moving to USB ports but AAC device makers are not, or at least not in a timely fashion. I have found someone involved in product development at the TRACE Research and Development Center and am now field testing an interface and working with Prentke Romich Company and TRACE to improve its functionality.

Wireless technology. Another important access feature for me is technology that serves multiple purposes and increases my self-sufficiency and mobility. The Pathfinder enables me to operate external devices and use environmental controls. Having wireless technology also means there are fewer components to set up.

Joe Hemphill

Fresno, California

The Message Mate (by Words+, Inc.) gives me quick access to neighbors and friends whom I don't see very often. One phrase I use when I go to church is, "May peace be with you." To access the prerecorded messages in the Message Mate, I use a finger on my left hand. For me, it is important to have messages that are personalized and that I can access quickly.

Personalizing, organizing and using "quick" messages. Accessing the message "May peace be with you," does two important things. First, it lets others know very quickly that I know what is happening around me. Growing up with a speech disorder, I learned that some who heard me speak thought I was retarded. Second, I feel good being able to say nice greetings to others, because I enjoy people.

Since the Message Mate is a digitized speech device, someone has to record each message. Much thought goes in to recording the messages. A friend and I spent hours planning how messages needed to be recorded and arranged so I can say what I want to say.

My Message Mate has 144 possible phrases. It contains four levels.

The first level has simple greetings such as "My name is Joe."

The second level has needs. For example, "I need cash from my ATM card."

The third is for emergencies, such as "Call 911."

The fourth is for miscellaneous phrases.

Sometimes accessing the desired phrase is difficult because I don't yet have a keyguard. A keyguard would possibly make me surer of myself using this device. Also, I have the Message Mate tied to my power chair, and I have to reach between my legs to pull it up into my lap to use it. While this is cumbersome, having a laptray or something similar would probably cause even more access problems.

Tom Younkerman

Denver, Colorado

I have a DynaVox 3100 (by Dynavox, Inc.) that allows me to communicate with others. I also rely on the computer (email) to communicate. Important access requirements for me are rate and being able to use my device in the community.

Rate enhancement, displays and mounts. The DynaVox 3100 has a flat touchscreen and I use my fingers to type what I want to say. I also use word prediction to speed up my typing. Communicating with an AAC device can be a slow process. Some people are patient, but others are not. I try to type what I want to say ahead of time, but that isn't always possible. I also store things that I say a lot, so I can just hit one or two buttons and speak the sentence. For example, when taking a bus, I can quickly tell the driver where I need to get off.

Unfortunately, the screen is hard to see outside and this makes communicating difficult, especially in direct sunlight. I have to move to a shady area before I can see the display to prepare a message. I think you can buy a tinted screen cover, but I haven't purchased one yet.

I use an electric wheelchair when I go to work and go out. Having my DynaVox mounted to the wheelchair enables me to access it wherever I go. The mount has a swing-away arm so that when I am not using it, I can put the device down by the side of my wheelchair. This is especially useful for getting close to a table or desk.

It would be helpful if I had a way to contact people when I am out, particularly if I get stranded. For me, a cell phone isn't practical, because I can't talk and trying to use my DynaVox with a cell phone would be difficult. There are pagers with keyboards for sending text messages. But how small are they and could I use them?

Tracy Rackensperger

Maitland, Florida

Currently, I use an augmentative communication device (Pathfinder made by the Prentke Romich Company), a computer with an adaptive keyboard (Intellikeys made by Intellitools), a power wheelchair (Invacare) and a speaker telephone. The need to communicate and access technology is fundamental for my becoming a successful individual. The factors that influence my decisions about access technologies are: ease of access, speed, affordability and durability.

Ease of use, speed, affordability and durability. I need easy access because I am an extremely independent person and do not want, nor do I need, help most of the day. Thus, I like to be able to roll up to a technological device and use it "on-demand" without needing an outside party to set it up for me every time.

Speed, the rate at which a technology can be used productively, quickly and efficiently, is another important factor when deciding on an access method. Besides being self-sufficient, I live quite a busy life. I need access methods that allow me to communicate promptly and to produce quality work.

Affordability is an issue when choosing access methods. In most cases, I am a self-payer for equipment. While Vocational Rehabilitation has paid for the more expensive devices I need (an AAC device and a power wheelchair), I pay for the "non-expensive" access methods.

The access solutions that work best for me are those requiring little setup and those with proven durability. Technology is amazing; and I have had very few issues receiving the adaptations I need to access it.

Summary

These individuals have written about issues they face accessing their technology and using it to engage people in their social circles and fulfill their professional and societal roles. Speed, rate, ease of use, compatability, durability, sturdiness, reliability, personalizing messages, displays, mounts and affordability are important to them.

Further thoughts

The lack of compatability between AAC devices and computers, cell phones, PDAs, software and other mainstream technologies is an ongoing problem. While everyone may well agree on the concept of universal design, technology keeps moving forward, old systems are not supported and new systems offer options that people naturally want to access and use. AAC device manufacturers try to collaborate with and keep pace with the computer industry. However, this is next to impossible because consumer products are constantly changing.

The Trace Research and Development Center, the AAC-RERC and many others are participating in the development of interoperability standards. The goal of these standards is two-fold: (1) for people with disabilities to be able to operate any products they encounter and (2) for people to be able to connect their assistive technologies to any products they encounter. We've come a long way, but there is still a long way to go before people who rely on AAC devices can easily access most information technologies. [See www.tracecenter.org/world for more information about standards and progress toward solutions.]

ASHA CEUs for 2003

All who registered for ASHA CEUs in 2003 and sent in their completed ACN quiz have received 1.2 CEUs. Congratulations! If you need proof, call me [831-649-3050] or email me at sarahblack@aol.com

ASHA CEUs for 2004

You can sign up for ASHA 2004 CEUs anytime between now and the end of the year. A quiz will be sent with volume 16 #4 in December and will be due January 15, 2005. The cost for ASHA CEUs is $20, plus your annual subscription.

AAC-RERC

SPREAD THE WORD

Access: a major theme for the next five years

The AAC-RERC recently embarked on 15 new research and development projects, extending and expanding its previous work. Funded by the National Institute for Disability and Rehabilitation Research (NIDRR), the AAC-RERC has ten partners from seven institutions. The AAC-RERC's six key research and development themes and priority areas were identified through several AAC stakeholder forums, including the State of the Science Conference, the Demand Pull Forum, ACOLUG, constituent surveys of various AAC stakeholders, advisory board recommendations, the NIDRR AAC-RERC Summative Review and the results of recently completed AAC-RERC research and development projects. Key research and development themes are described below. Please note that many of the new projects easily fit under several themes.

1. Enhancing access for individuals with cognitive and/or linguistic limitations. The learning demands of current AAC devices and approaches make them difficult to use, particularly for young children, children and adults with severe multiple disabilities, individuals with autism and persons who have aphasia as a result of cortical strokes. Researchers are developing technologies that will reduce the learning demands of future AAC devices. Three projects are included:

Contextual scenes for beginning communicators (Janice Light, Pennsylvania State University)

Contextual scenes for adults with aphasia (David Beukelman, University of Nebraska; Jeff Higginbotham, University at Buffalo-New York)

Contextual scenes and intelligent agents for persons with autism (Howard Shane, Children's Hospital-Boston; Kevin Caves and Frank DeRuyter, Duke University)

2. Supporting the societal roles of people who use AAC. Some individuals who rely on AAC are integrated into school, employment and their communities, but many continue to face barriers to literacy, employment, education and social participation. The following projects addess some of these barriers:

Literacy support technologies for individuals who rely on AAC (Janice Light and David McNaughton, Pennsylvania State University)

Telework to improve employment outcomes for people who rely on AAC (David McNaughton)

Specialized AAC vocabulary research (Diane Bryen, Temple University)

Enhancing the role of listeners in AAC interactions (David Beukelman; Kevin Caves)

3. Connecting AAC technology more seamlessly to the world. AAC devices do not interface easily with current information technologies. Two projects specifically address these problems:

Technology and policy watch (Frank DeRuyter and Kevin Caves; Diane Bryen; David Beukelman; Howard Shane)

AAC Webcrawling-communication content from the Internet (Jeff Higginbotham)

4. New interface technologies for persons not well served by current AAC systems. AAC-RERC research partners are working on new interfaces that use residual capabilities to access AAC and AT technologies. Four projects are included:

AAC technology to supplement intelligibility of residual speech (David Beukelman; Kevin Caves)

Recognition of dysarthric speech (Kevin Caves; Howard Shane; Diane Bryen)

Gesture recognition (Kevin Caves; Howard Shane)

Brain interface (Kevin Caves and Frank DeRuyter; Jeff Higginbotham)

5. Usability, learnability and acceptance of AAC technology. AAC-RERC researchers are investigating the usability and learnability of current AAC technologies and will suggest improvements to the person/machine interface.

Improving interface performance efficiency between AAC and information technology systems (Kevin Caves; Jeff Higginbotham)

6. AAC simulation and performance. This project will simulate and then optimize the performance of AAC technologies during real-time interactive communication.

Communication performance assessment: monitoring/simulating AAC (Jeff Higginbotham)

Summary

The AAC-RERC partners have demonstrated an ability to work collaboratively with each other and with multiple stakeholder groups. Projects conducted over the next five years will demonstrate the commitment within the AAC-RERC to improve access for people with complex communication needs to AAC technologies, and to the world.

The AAC-RERC section is partially funded by the National Institute on Disability and Rehabilitation Research (NIDRR) under Grant #H133E030018. The opinions herein are those of the grantee and do not necessarily reflect those of the U.S. Department of Education.

AAC-RERC

SPREAD THE WORD

Social Networks

Mr. R: Communicating with aphasia

Juli Trautman Pearson

Mr. R is a 67 year old man with mixed aphasia (expressive greater than receptive) and right hemiplegia. He is six years post stroke. Mr. R and his wife came for an AAC evaluation about a year and a half ago. Their goal was to find a device that would provide verbal output. Our initial recommendations included using a Talking Photo Album™ with simple phrases and pictures on each page. After several months, I learned that Mr. R was not using the device and continued to have unmet communication needs.

During a second visit, I administered the *Social Networks Inventory*. Participating were Mr. R, his wife, a nurse aide, the executive director of the Triangle Aphasia Project (TAP) and myself, a speech-language pathologist. The *Inventory* helped us to identify meaningful goals and guided our collaborative planning process.

Circles of communication partners. In January 2003, we found that Mr. R's social circles were not as balanced as they had been prior to the stroke. (See Figure 1). Mr. and Mrs. R said their community involvement had been drastically reduced since his stroke and they both missed this type of social interaction.

	Circle 1 Family	Circle 2 Friends	Circle 3 Acquaintances	Circle 4 Paid Workers	Circle 5 Strangers
Initial number of partners (January 2003)	17	2	8	4	2
Current number of Partners (January 2004)	18	6	15	5	6
Change in number of Partners (January 2004)	+1	+4	+7	+1	+4

Initial Modes (January 2003)

Additional Current Modes (January 2004)

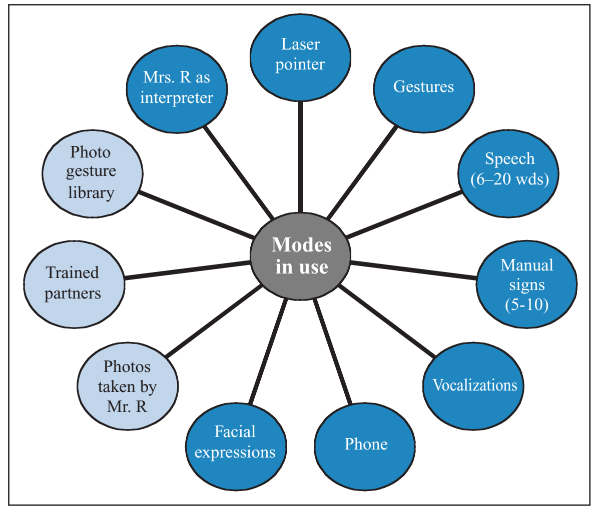

Figure 2. Mr. R's use of communication modes

Modes. Figure 2 illustrates that Mr. R used a variety of communication modes. We learned that he used all modes with partners in circles 1, 2 and 4. However, he used only gestures, vocalizations and speech with people in his 3rd and 5th circles, who were less familiar. The nurse aide described numerous gestures that Mr. R used, but also said other aides didn't understand him as well. Examples include

Hand to nose = needing a tissue; Touching his stomach = pain; Laser pointing to cabinet (specific information about what he wants based on its location.)

Topics. Although it became clear that Mr. R could communicate basic wants, needs and preferences most of the time with familiar partners, he had a desire to engage in more social conversation and to communicate with less familiar partners (in his 3rd and 5th circles). Mr. R specifically wanted to converse with people in his 3rd circle about personal information, preferences, stories and sports.

Personal preferences. Mr. R was not interested in obtaining or using a voice output device. The executive director at TAP noted that Mr. R did well using photographs to tell stories and answer questions in his aphasia group. His wife also noted that prior to his stroke, photography had been one of his main hobbies.

Type of communication: While Mr. R was dependent on familiar partners and contextual cues to communicate, he clearly wanted to become a more independent communicator. Based on this information, we developed there goals.

Communication goals

1. Use adapted camera to take pictures and then use the pictures to interact with people in his 2nd and 3rd circles.
Baseline: No use of camera. Minimal use of photos during the aphasia group. Difficulty interacting in group.

2. Develop and use gesture dictionary with three additional caregivers.
Baseline: Only wife and primary nurse understood Mr. R's gestures.

3. Train partners to support Mr. R's interactions at church and in his local model train group.
Baseline: Interactions were minimal at church. He no longer attended the model train group.

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Resources

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Intervention strategies/progress

1. We collaborated with Duke University's Biomedical Engineering Department to modify a camera so Mr. R could use it independently. We supported the use of his photos during social interaction with family, friends, peers and acquaintances. In the fall, he took pictures at his family reunion, which gave him the important role of family photographer. He subsequently shared these photos with his peers in the weekly aphasia group. Mr. R also used photos to share his model train collection with the local model train group.

2. The team made a photo gesture dictionary for use with partners in his 4th circle. As a result, his caregivers can now understand him better.

3. During the *Social Networks Inventory* process, we learned the aphasia group at TAP had trained staff and volunteers that could help Mr. R reintegrate into community activities. TAP members now support Mr. R at church and provide training and communication coaching during his model train group.

Outcomes (January 2004)

Mr. R has met or exceeded all his communication goals. As shown in Figures 1 and 2, he now relies on a wider range of modes to communicate. He uses photos to interact with friends and acquaintences (2nd and 3rd circles), making his circles more balanced and full. He also has more trained partners who can support his communication efforts because of the gesture dictionary and the people from TAP. To summarize, Mr R is becoming more independent in his communication, and he and his partners are experiencing more successful communication exchanges.

ACN

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