
AUGMENTATIVE COMMUNICATION

IDAHO ASSISTIVE TECHNOLOGY PROJECT

INFORMATION SHEET #12

Information taken from *Alternative and Augmentative Communication; Electronic Communication Devices: A Look at Features*; and *Manual Communication* all by Gilson Capilouto; *Introducing Augmentative Communication: Interactive Training Strategies* by Caroling Musselwhite; and the *Tech Use Guide* from the Center for Special Education Technology.

Introduction to Augmentative Communication

Alternative and Augmentative Communication (AAC) refers to the use of aids or techniques which enable a person to communicate when standard methods, such as speech, are not sufficient. AAC comes in many forms ranging anywhere from a sophisticated electronic device to a simple array of objects. These systems are highly individualized. Factors such as the age of the individual user, the cause of the disability, the course of the disability, and the user's environmental demands are all important considerations in the selection of the system and effect the user's subsequent success with the system.

The term *augmentative communication* refers to the total functional communication system of an individual, including: (a) a communicative technique (e.g., speech, manual signs, physical boards); (b) a symbol set or system (e.g., Blissymbolics, Signs of American Sign Language); and (c) communication/interaction behavior (e.g., demands/requests, conversations). The designation *aided communication* refers to all techniques where some type of physical object or device is used, such as techniques using communication boards or mechanical or electrical aids. In contrast, *unaided communication* refers to all expressive techniques that do not require any physical aids, such as manual, gestural, manual/visual, sign or facial communication, as well as segments of oral speech.

The late 1970's and early 1980's witnessed an explosion of information and action in the area of augmentative communication. This explosion can be seen in the organization of augmentative communication evaluation teams in many countries, the development of new courses on this topic at numerous universities, the introduction of several publications directly related to augmentative communication, and the formation of an international organization dedicated to the needs of augmented communicators (see Information Sources at end of this Information Sheet).

Electronic Communication Devices

The versatility and flexibility afforded by today's electronic communication devices can make them an excellent alternative when standard modes of communication, such as speech, are not sufficient. The use of the term "electronic" refers to the fact that these devices utilize electronic and/or computerized parts. The past few years have seen a tremendous increase in the number of high technology systems available for use by the non-speaking population.

Major rehabilitation centers, local speech and hearing centers, hospitals and private consultants in speech and language pathology are often equipped to provide evaluations and make recommendations regarding the selection of alternative methods and augmentative devices for individuals. The actual person doing the evaluation and making the recommendations may be a speech/language pathologist, but often the decision requires the cooperation of a physical therapist, an occupational therapist, a classroom teacher, a vocational counselor, and of course, the potential user and his or her parents or primary care-givers. Locating available professionals in your area can be accomplished through accessing centralized information services. In Idaho, United Cerebral Palsy of Idaho (UCPI) and the Idaho Assistive Technology Project employ knowledgeable staff in the area of augmentative communication. UCPI provides comprehensive assessment services to help individuals with disabilities to select an augmentative communication device.

Speech Technologies

Speech synthesis and speech recognition systems are reshaping the lives and education of individuals with disabilities. Speech synthesis, also called synthetic speech, adds a "talking" dimension to products such as computers, calculators, typewriters, watches, and adding machines, allowing ease of access to them by individuals with vision impairments, dyslexia, and other disabilities. The world of synthetic speech is their access to communication and information, thus eliminating major, historical barriers to learning and allowing them to participate in all environments.

Synthetic speech also serves as substitute speech for nonvocal and nonverbal people. The inability to speak has often limited the participation of nonverbal/nonvocal children in regular school programs. Talking computers, particularly laptops are a technological breakthrough that increases the number of students with disabilities who can be educated fully. Early speech products often had metallic or echo-sounding voices that could be difficult to understand. Many of today's speech products, however, have near-human-sounding voice quality. The improved quality has led to increased sales of speech products and a proliferation of the companies producing them.

Speech Synthesis

Synthetic speech is produced in two ways: by analysis and by using rules. With synthesis by analysis, a human voice is recorded, analyzed, stored, and played back as needed. Before being incorporated into either software or hardware, the digitized voice is compressed; the computer then acts as a digitized computer tape recorder. Entire words and phrases are stored in the computer's memory and then recalled on command. The highest quality speech output can be achieved through digitalization at a sampling rate of 10,000 to 25,000 samples per second.

Speech synthesis is generally provided by hardware, either through one or more microchips installed in the computer or by a separate peripheral with its own power supply and speaker that can be plugged into a port on the computer. These products can either be hand-held, laptop, or the size of a desk-top computer. The prices for

products using speech synthesizers range from \$300 for a synthesizer, to more than \$10,000 for the hardware. Software is less expensive than the hardware.

Speech Recognition

Speech recognition provides support for people who cannot use a keyboard, roll a screen up or down, exit a file, produce a spreadsheet, or perform other tasks. Today's speech recognition systems also offer enormous potential for the nonvocal/nonverbal population. After a day or two of training, speech-impaired children and adults are able to use speech recognition systems in special schools and in rehabilitation training.

There are two types of speech recognition: isolated utterances and continuous speech. Isolated words are single words or short phrases, such as computer commands. Continuous speech is "normal" speech with multiple speakers and without pauses.

Isolated Utterances

In an isolated utterance system such as Dragon Dictate, when a word is spoken, the microphone translates the word into an audio signal. The speech-processing board then converts the audio signal into digital data that will be processed by the computer. As the speech data characterizing the word enters the computer, a recognition program compares it to the acoustic word models resident in the active vocabulary. The statistical language model helps select the most likely words, which are sent to the display.

Continuous Speech

For years, people have dreamed of having natural, continuous voice input for their computers' applications. Continuous speech technology is knowledge-based; it makes use of phonemes, the basic elements of speech. Speech Systems, Inc., for example, has used phonemes to develop a system that recognizes continuous speech, not only words, but entire sentences and phrases. It provides speaker models able to recognize speech from a variety of speakers.

The system operates on general purpose computers. Its components include a voice input peripheral (phonetic engine and generic male and female speaker models), run-time recognition module (phonetic decoder), and a developer's tool kit (syntax compiler, standard dictionary, application interface module, test and debug tools, and performance measurement tools).

Manual Communication

Manual communication boards can be an inexpensive and highly functional means by which an individual can communicate if standard methods, such as speech, are not sufficient. The term "manual" refers to the fact that the system does not involve any electronic parts. The user's message can be represented in a variety of ways, limited only by one's imagination. Objects, photographs, abstract symbols, and printed words are a few examples of what is referred to as "display language." Often it is appropriate to use a combination of "languages", as in the case of a user who is beginning to read, or an individual who recognizes only some objects in pictured form,

or an individual who is learning to recognize pictorial representations of abstract concepts (fast, hot, all gone).

When would I choose a manual system?

The primary reasons for selecting manual communication devices over electronic ones are their low cost and flexibility in design. One must consider the possibility that potential users may be more comfortable with non-electronic solutions, and the user's communication partners may also be inclined toward low technology aids. The decision to use a manual board can be viewed as an introduction to an electronic device, although one must be cautious in this assumption, as potential users may desire and be motivated by the features that only electronic devices can provide, such as voice output and integration with a computer. It is important to ask oneself what an electronic device could offer the user that a manual board would not. Furthermore, users of electronic devices should also be provided with manual communication systems, should electronic ones need repair or be unavailable. Keep in mind the fact that many disabled individuals are best served through the implementation of a variety of systems (signs, pictures, electronic devices) as opposed to reliance on any one system.

Where do I begin?

Whether choosing an electronic communication device or a non-electronic one, the first question to ask is, "How is the individual communicating now?" Discovering the individual's present modes of communication can provide information regarding with whom the individual tends to communicate, about what they tend to communicate, and how effective they are at utilizing non-symbolic expressions: vocal, affect, tactual, gestural, physiological, body movement, and visual. It will be important to modify and/or incorporate those present strategies of interaction into the more formal communication system. The non-speaking person's current strategies and interaction patterns should not be immediately replaced or ignored, as that may have a negative influence on the acceptance and success of a new system. Rather, through modeling and demonstration, the individual's existing methods can be gradually integrated into a new system.

The user's skills will dictate the design of the system. Through careful assessment of an individual's abilities, one can be assured that the system will account for the user's physical limitations, visual abilities, and cognitive skills. Any assessment whose goal is to prescribe an alternative or an augmentative communication system, whether manual or electronic, should seek to match the user's skills and the system's capabilities.

Information Sources

ISSAC - The International Society for Augmentative & Alternative Communication is an organization whose sole focus is advancement of the transdisciplinary field of augmentative and alternative communication techniques and aids. Contact: Susan Sansone, NY State Assn. for the Help of Retarded Children, 2900 Veteran's Memorial Hwy., Bohemia, NY 11716.

USSAC - United States Society for Augmentative Communications - Membership in USSAA includes membership to ISSAC. Contact: Adaptive Communication Systems, Inc., P.O. Box 12440, Pittsburgh, PA 15231.

RESNA - Association for the Advancement of Rehabilitation Technology is an organization concerned with the application of science and technology in the rehabilitative process.

Augmentative Communication News -

a quarterly newsletter that concentrates on publishing information in the area of augmentative communication. Subscriptions available. Contact: Augmentative Communication News, One Surf Way, Suite #215, Monterey, CA 93940.

Communication Outlook -

Newsletter of ISAAC covers new products and developments in the area of Augmentative and Alternative Communication. Contact: Artificial Language Laboratory, Michigan State University, East Lansing, MI 48824. (517)353-0870.

AAC - Augmentative & Alternative Communication Journal -

Concentrates on non-verbal communication, integrating theory, technology and systems development and practice in the assessment, treatment, and education of augmentative and alternative systems users. Contact: Williams & Wilkins, Subscription Fulfillment Dept., 428 E. Preston Street, Baltimore, MD 21202. (800)638-6423.

Closing the Gap -

Bimonthly newspaper is devoted entirely to the use of computers by disabled persons. Contact: Bud Hagen, Editor, Rt. 2, Box 39, Henderson, MN 56044. (612)248-3294.

ASHA - American Speech & Hearing Assn.

Publishers: ASHA; The Journal of Speech & Hearing Disorders; the Journal of Speech & Hearing Research; Language, Speech & Hearing Services in Schools; ASHA monographs, and ASHA reports. Contact ASHA, 10801 Rockville Pike, Rockville, MD 20852. (800)683-3868.

NARIC/ABLEDATA -

AbleData is a computerized data retrieval system for information on rehabilitation products, operated by the National Rehabilitation Information Center. Contact: NARIC, The Catholic University of America, 4407 Eighth Street NE, Washington DC 20017. (202)635-5826. TDD (202)635-5884. AbleData (202)635-6090.

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