Augmentative Communication News

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## INSIDE THIS ISSUE . . .

UPFRONT

Nonelectronic devices should be a critical part of most, if not all, AAC user's communication systems, including those of expert users of high technology. This issue focuses on the design and construction of communication displays for low tech devices. Two important assumptions are made throughout: 1) appropriate vocabulary already has been selected and 2) the symbols being used to represent the vocabulary are meaningful to the individuals involved. Note: Topics covered previously in Augmentative Communication News (Vol.1, # 5 -Vocabulary; Vol. 3, #2 - Graphic symbols). In an effort to examine trends and issues, I spoke with master clinicians and reviewed chapters and articles dealing with communication displays and overlays. I also read, discussed, and thought about how humans (with and without disabilities) categorize and organize their world at various ages and stages. Many thanks to those who contributed so much, so willingly (see list of **Resources** on page 10). **For Consumers** considers different types of displays and introduces relevant information from cognitive science, human factors engineering, and graphic design. **Clinical News** provides a step by step framework to assist in the design and construction of displays, and gives two pages of examples. **Equipment** considers how technology both constrains and enhances communication devices and displays, and **Governmental** raises issues of cost. Finally, **University/Research** highlights augmentative activities at Penn State University in Pennsylvania. *(continued on page 2)*

For Consumers

Thinking a little harder about communication displays

The purpose of a communication display is to *arrange language in space* so individuals can, by selecting from the available options, say what they wish to say as quickly as possible, and can do so with a minimal amount of effort. Currently, clinicians design and construct displays and then teach clients to use them. Decisions about the organization of symbols are often based on the visual and motor capabilities of the user (i.e., size of symbols, access method, range of motion), and the "Fitzgerald Key." Janice Light[2] postulates, however, the design of AAC systems should correspond to the individual's cognitive organization, be designed to address strengths, and overcome limitations. Several types of organizational arrangements are currently used on displays, including four that may be viewed within a cognitive framework: *Schematic, taxonomic, semantic-syntactic* and *alphabetic*.

1. **Schematic:** biographical groupings based on experiences. *Purpose:* To depict people doing things or capture an experience (e.g., trip, birthday party, family reunion, earthquake). *Examples:* Photo albums, conversation books, remnant bags, and activity-based miniboards. Comment: Biographical organizations are particularly helpful for young children and people with memory/cognitive deficits or dementias who rely on episodic memory. Because knowledge exists across contexts however, schematic displays are most valuable when available in multiple contexts. Organizing communication books with pages representing various events probably will necessitate repeating some symbols. *(continued on page 2)*
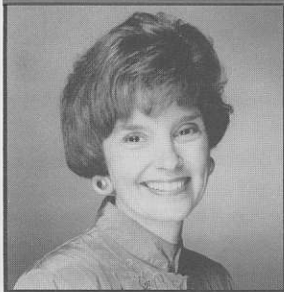
(from page 1) <u>Continuing Education</u>: Good news! If you completed the 1992 CEU examination and returned it to ACN, you have earned 1.2 CEUs for 1992! ASHA will mail you a confirmation within a few months. Any questions call me or ASHA (301) 521-9000.

<u>From then to now:</u> Exactly five years ago, Gary Poock and I published the first issue of ACN (March, 1988.) We have worked very hard to promote ACN and ensure each subscriber receive a quality publication. As many of you know, Gary passed away in January after a year-long battle with pancreatic cancer. In addition to being publisher, he was a professor for 25 years at the Naval Postgraduate School, a respected researcher in the area of speech recognition and biometrics, Editor in Chief of the AVIOS journal, and an extraordinary man, husband, mentor, and teacher. Words are hard to find under such circumstances, but please know how deeply I appreciate your expressions of support and encouragement. I'd like to share a story sent to me.[1] It not only represents my current reality, but has something important to say about teachers and learners. In the field of AAC (*and in life*), each of us is both!

from JACOB THE BAKER -- NOAH BEN SHEA

Once there was a student who was with a teacher for many years. And, when the teacher felt he was going to die, he wanted to make even his death a lesson.

That night, the teacher took a torch, called his student, and set off with him through the forest.

Soon they reached the middle of the woods where the teacher extinguished the torch, without explanation

"What is the matter?" asked the student.

"This torch has gone out," the teacher answered and walked on.

"But," shouted the student, his voice plucking his fear, '"Will you leave me here in the dark?'"

"No! I will not leave you in the dark," returned his teacher's voice from the surrounding blackness.

"I will leave you searching for the light."

And so we shall! The ACN Hotline number is (408) 649-3050.

Sarah Blackstone, Ph.D.

For Consumers *(cont. from page 1)*

2. **Taxonomic**: groupings based on categories.
Purpose: To arrange vocabulary items according to familiar taxonomies (e.g., clothing, food, people, places, school, holidays, feelings) so symbols can be located more quickly. "Topic" boards often use taxonomic organizations.
Examples: Pictionaries. Topic boards, e.g., *I want to talk about___home/family/feelings*.
Comment: Requires knowledge of superordinate categories, which typically emerges with formal education. This type of arrangement makes it difficult to express relational concepts or complex thoughts and almost impossible to use syntax.

3. **Semantic-syntactic**: groupings based on some knowledge of grammar.
Purpose: To provide a way to generate complex thoughts using expressive language, to develop linguistic skills, and to facilitate literacy skills.
Examples: Grammatical arrangements (subject-verb-object); Fitzgerald key (modified)*3,4.
Comment: Requires at least a beginning understanding of semantic relations and syntactical rules (e.g., agent/action/descriptor; who, doing what, to whom) by both the user and listener. Can make it possible for partners to model language using augmented input/aided language stimulation techniques.[5]

*Note: the Fitzgerald Key is a method developed to teach syntax to deaf children and later modified by McDonald and others for use on communication boards.

4. **Alphabetic**: groupings based on the alphabet.
Purpose: To provide unrestricted access to language, to provide word boards, to alphabeticalize elements within categories, and to encourage the development of spelling.
Examples: "Stand-alone" alphabet boards, word boards and combination symbol boards.
Comment: Configuration of the alphabet will depend on users prior experiences, future goals and the selection technique being used. Word boards are typically arranged grammatically. Requires literacy skills and metalinguistic knowledge. Letter cueing can be useful for people with some intelligible speech to help clarify words or to change/introduce new topics.

Young children begin to classify their world using *schematic* organizations and gradually learn *taxonomic* categories. Language-based schemas also emerge, at first with *semantic-syntactic* categories and later, *alphabetic* classification systems. These organizational structures may assume different emphases over time. However, it is clear that displays that do not reflect an individual's linguistic and cognitive skills/style are not likely to be useful. For example, some children and adults with developmental and/or acquired disabilities do not learn linguistically-based systems very well or at all, and many depend on schematic or taxonomic classifications.

Making good decisions about organizing and constructing communication displays is also dependent on an understanding of the person's motor, sensori-perceptual capabilities, life style, goals, and preferences and information about their partners. Organizations based on *Frequency of use* and *Partner influences* are described below:

5. **Frequency of use**: groupings based on placing symbols/words that are most frequently used where they can be accessed quickly and easily.
Purpose: To arrange vocabulary so users can select items most efficiently.
Examples: Displays laid out in a semi-circle for people who use head sticks. Laptray displays for people who can not cross midline, with some items on left and others on right. Wrist bands with high frequency phrases for ambulatory individuals.
Comment: Requires assessment of person's range of motion, visual perception, and a knowledge of the symbols the person uses most frequently.

Direct selection arrangements will differ from those designed for scanning.

6. **Partner influences**: arrangements based on listener orientation and needs.
Purposes: To model the use of symbols in an effort to expand language skills and encourage communicative use of symbols. To decrease cognitive and socio-emotional demands on partners.
Examples: Displays designed to allow facilitators to model. Highlighting biographical information and instructions for listeners. Displays oriented toward listeners (e.g., "upside down" to user and "right side up" for the listener.)
Comment: Communication displays can only be interactive mediums if both the user and partner know what to do. It is important to consider the skill level and needs of familiar and unfamiliar partners.

Designing displays is, more than anything, an organizational process. Even if there is only one vocabulary item, decisions must be made about where and how to put what. A large number of factors affect the usefulness of the organizational schemes we ultimately select, including the nature of the material to be classified and the cognitive abilities of the person trying to construct, learn or use the system. According to cognitive scientists, the very nature of categorization results in "patchwork systems of organization that emerge by way of compromise" for the following reasons[6]:

■ First, organizations are structures that evolve over time. They are not rigid, static, or enduring. There is always pressure to change category systems to handle new ways of looking at the world. These pressures come from changes in: a) characteristics of the users or the creators of the system, b) function to which the system will be put, and c) what is known about the material being organized.

■ Secondly, people resist change. It takes an extraordinary effort to develop and implement new organizational structures. Moreover, if there is a loss of continuity with the old system, it will be confusing and disconcerting. As a result, people often "make do" rather than attempt to reorganize.

Communication displays are a good example of the difficulties inherent to classification schemes. Even the most *well-thought-out-in-advance* displays are likely to become more disorganized over time. Displays must be dynamic to be useful, i.e., vocabulary needs to be constantly updated. However, if we are constantly changing displays, we make automaticity (i.e., being so familiar that you do not have to "think" about what you are doing) impossible for the user Note: That's why we don't replace a display until the user is familiar with a new one. The organization must make sense to the person designing the display and to the user, or it will not be helpful. Remember what makes perfect sense to you, may not be obvious to someone else. This is particularly true when several organizational schemas are used on a single display (organizational "branching").

It is advantageous to organize visual information in ways most compatible with what we know about human perception, retention, comprehension and retrieval.[7]

The visual display of information on a communication board is critical. Studies of human memory unanimously show that organized material is perceived, retained, comprehended, and retrieved better than comparable unorganized material.[7] Thus, it is advantageous to organize visual information in ways most compatible with what we know about human perception, retention, comprehension and retrieval.[7] Human factors research and graphic art theory can be applied to help us construct displays that make information clear and more easily utilized. Reilly and Roach's research review gives us some important hints:[7]

1. **Proportion**: determining relationships among the dimensions of objects and their location in space.

■ Consider the height, width, depth, amount of surrounding space, degree of shading, the intensity and choice of color.

■ Group logically related symbols.

■ Separate categories of data using spacing, columns, borders or by varying intensities and colors of groups of data.

2. **Spacing**: using "white" space

■ Be aware that using columns produce an orderly/legible display,

■ Know that warm colors, such as red and yellow, usually appear larger than cool colors such as green and blue.

■ Arrange objects in sequences to facilitate logical eye movement through display information.

■ Use color coding to highlight related data (e.g., Headings)

■ Arrange data so similarities, differences, trends, and relationships are obvious.

■ Be aware certain things attract the eye: big more than small objects; bright more than subdued colors, color more than black & white; irregular more than regular shapes, moving objects more than still ones.

■ For scanning, left-justify lists and align them vertically.

3. **Emphasis**: enhancing important messages (e.g., instructions and survival symbols.)

■ Place these messages in central part of the display and highlight.

■ Avoid unnecessary ornamentation, unwanted graphic patterns, illusions and flaws in alignment.

■ Use color conservatively to avoid an appearance of clutter.

■ Display only information essential to the user's current needs.

■ Minimize the number of items displayed simultaneously.

■ Remember the more items displayed, the more time it takes to detect and extract information.

■ Research suggests no more than 90 percent of the available positions should be used.

■ Put the brightest color in the most important place and use little additional color.

■ Increase the amount of white space surrounding symbols you want to set apart.

■ Use light colors on a dark background to advance information toward the viewer; use dark colors on a light background to make information recede.

4. **Unity**: making elements of a display look as if they belong.

■ Arrange data in logical groups (e.g., sequentially, functionally, by importance or by frequency).

■ Convey separation by using contrasting colors. Convey similarity using similar, differentiable colors.

■ In addition to unifying components of a display, use borders to unify the entire display.

■ Use white space to surround similar items.

■ Use symbol sets that are related in size, shape, texture and color.

5. **Balance**: distributing the "optical weight" in a display.

■ Create feelings of stability and confidence by using a balanced display (note: unbalanced displays create a feeling of stress)

■ Control the color, size, tone and shape of objects in a display.

■ Be aware that color is visually heavier than black and white; big things are visually heavier than little things, irregular shapes are heavier than regular shapes.

Clinical News

Designing & constructing displays: Some tips

Designing, constructing, and evaluating a low tech display requires thought, expertise, planning and time. I asked master clinicians to share examples of best practices and difficulties they have observed. To summarize, displays perceived positively have the following features: they are organized, look attractive and take into account both the needs of the listener and user. Displays that do not reflect best practices have inadequate vocabulary, are poorly organized or disorganized, and are unattractive. Table I lists specific comments.

across multiple contexts, means the design and construction process will be time and labor intensive. Both approaches are important, and in each case, using a design-process model can improve the quality of the display:[8]

- **Identify Needs:** Is the display for an individual or group? for one or multiple contexts?
- **Define goals of board:** Set goals for today, but also for tomorrow. Will board have multiple functions or be limited? be used for a short or long period? Is goal to carry on conversations? inform nurses about pain? answer questions? encourage peer interaction?

Table II. Three ways to Assess Organizational Preferences[9]

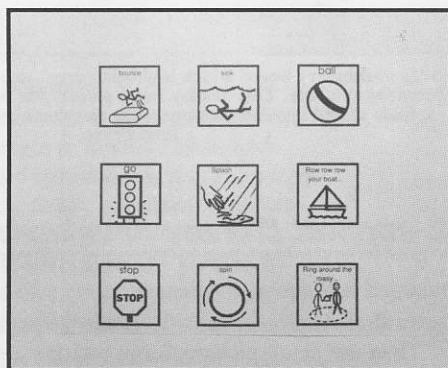| |
|---|
| 1. Give symbols that will be used to the individual to sort or group. Repeat several times. Analyze consistent patterns. |
| 2. Give a target symbol to user, e.g., symbol for toys or people. Present other symbols and ask individual to select item that "goes with" the target item. Analyze consistent patterns. |
| 3. Mock up 2 alternative organizational arrangements. Present each to user and teach underlying principle. Observe/ask for their preferences. |

For Consumers. You'll need to be thinking about materials also.

- **Consider a variety of solutions and evaluate.** It generally helps to mock up the display. Most clinicians start by using a grid and writing words/phrases in spaces before deciding on color schemes and actually adding symbols. It is quite common for designs to change considerably during this step. When you are ready, try the mocked up version with the individual. Do this before you embark on the next step.
- **Finalize the design and make the display.** Lots of tools and materials are required for this step (*symbol books, copy machines, ink pencils, colored pencils/paper, computer graphics program, paste, scissors, rulers, and so on.*). Although it may feel labor intensive, this step actually requires comparatively little time. For some, this is the fun part (the graphic artist types), for others who are not artistically inclined (me included), this is the time to find a volunteer with graphic/artistic skills or use computer-based tools. Aesthetics are very important. Displays should be neat and cheerful and appropriately reflect the person's age.
- **Determine if it works.** Proof (of the effectiveness of a display) is in the pudding. . . so to speak. *The purpose of a communication display is to arrange language in space so individuals can, by selecting from the available options, say what they wish to say as quickly as possible, and can do so with a minimal amount of effort.* Does it?

Table I. Low Technology Displays: Observations of Best Practices

Best Practices	NOT!
1. When board is organized (e.g., frequency of use, topics, alphabetically, or by activities).	1. When vocabulary is inappropriate (e.g., 3 year old with only *yes, no, eat, drink, colors;* when vocabulary only allows a user to respond or take a single turn.)
2. When organization is made salient through color and made explicit to people using display.	2. When you ask yourself, "Am I having fun?" and the answer is no! Probably the user isn't either!
3. When motor, sensory, cognitive linguistic skills of users are taken into account.	3. When symbols don't make sense to the user and/or communication partners.
4. When design also is appropriate for partners.	4. When user is ready to communicate with more complex language, and it is not available.
5. When size of items vary so that user's accuracy is improved.	5. When communication board/book is diluted (i.e., so many activities on it that it is useless for saying anything substantial).
6. When print is enlarged to enhance reading.	6. When there is no organization or it doesn't make sense.
7. When commercially available tools are used, but individualized.	7. When user doesn't understand the organization of the board.
8. When display is attractive and reflects personality of the user.	8. When user/partner can't read or see symbols.
9. When people who use the display participate in its development.	9. When the board is sloppy or poorly constructed (e.g., when writing size differs across board).
	10 . When vocabulary is available for expression only (i.e., need at least 12 items on boards if want to use modelling).

Designing Displays: A Process

Developing a communication board is an ongoing process. As long as a display is being used, the process never ends. Initial steps always involve decisions about vocabulary and how best to represent vocabulary. We shall assume these decisions already have been made. So now what? The process of designing and constructing a display may take anywhere from 15 minutes to several weeks, even months depending on the complexity, whether it is someone's 1st or 35th display and so on. Getting symbols together before leaving to visit a relative can take minutes. On the other hand, designing a display for someone with a large vocabulary that will serve as his/her main access to language

- **Obtain pertinent data.** Know as much as possible about the user's motor, sensor-perceptual, cognitive, linguistic capabilities. Table II. shares ideas about determining the type of organizational schema to try. The daily habits of users and partners, contexts and communicative tasks should be known.
- **List specifications/requirements:** Based on available data, make decisions about the size and shape of the display, the organizational schema/arrangement of symbols, the use of color, white space, text, and graphics. Consider cognitive, linguistic, motor, sensor-perceptual, as well as instructional and frequency issues. Use good principles of design as discussed in

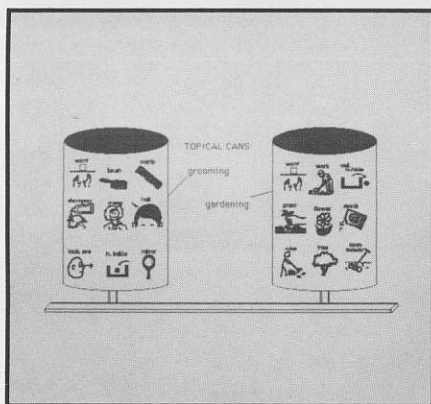# IDEA PAGE #1: Examples Of Communication Displays

For young children

- Dictionaries with pictures of familiar objects depicting their function, e.g., an open refrigerator with food inside labelled with a symbol.
- Category boards (e.g., weather, clothing, food, most frequently used objects).
- Topic/context boards and activity-based boards.
- Single sheet theme displays can be made in different shapes for the occasion (e.g., heart for valentines day).
- Folders with pockets for remnants and topic setters
  Mobiles for young children

Mandy's book is 81/2" x 11" closed - 22 " open. Inside the front cover are pictures of important people and the symbol for want. There are 6 cardboard pages, which contain symbols for objects on one side and associated verbs on the backside. The book encourages her to construct meaning using sequences of symbols. Some symbols have an additional symbol "hiding" underneath. The design is appropriate, aesthetically pleasing and fun!
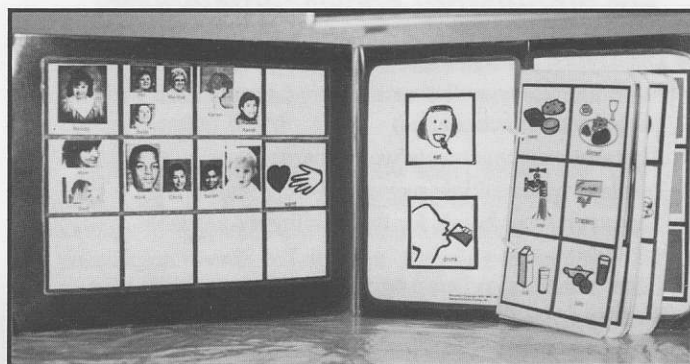Ina Kirstein, Michigan.

This board is for a 4 year old with a limited range of motion. Symbols are limited to 9, spaced 1" apart. A 1 1/2" symbol size was selected becasue she often uses 2 fingers to point. Each symbol was colored so she could use color cues to help her recognize the symbols. This swimming overlay was laminated and sewn to a styrofoam meat tray. A styrofoam grid was also sewn to the try. It floats!
Pam Mathy-Laikko and Carol West

Context specific displays

- Bathtub, swimming pool boards
- Engineering a classroom (see page 8 for specifics)
- Work site vocabulary arranged on person or at the work site.
- Topical Cans on sticks.

This idea of using Topical Cans comes from South Africa. It was being used in a class with autistic children, inside for grooming and outside for gardening. The children can select symbols by spinning the large cans to find the symbol.
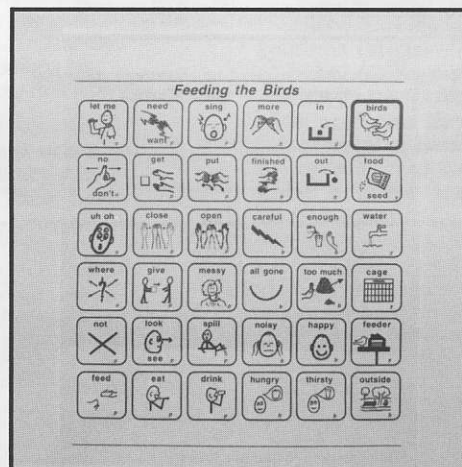Gail Van Tatenhove

Feeding the Birds is an overlay designed to be used with (or without) an electronic device, this display encourages interaction and symbol sequencing. It is arranged in a grammatical layout to make it easier to use multiple symbols during aided language stimulation.
Carol Goossens'

IDEA PAGE #2: Examples Of Communication Displays

For ambulatory adolescents/adults

- Displays on aprons, handkerchiefs, placemats, sleeves
- Adult literacy type dictionaries (e.g., English 2nd language picture dictionaries)
- Alphabetic arrangements/word boards
- Displays with multiple pages in 3-ring binders
- Yes/no on wrist bands for those without a readable response
- Carrier phrases, repair strategies, information about the user
- Core page of survival vocabulary attached to keychain (or wheelchair with a bungi cord)
- Displays folded in 3 sections with symbols on both sides so it is easy to carry in a purse of bag.
- Use contact paper to cover, rather than laminate so display is bendable
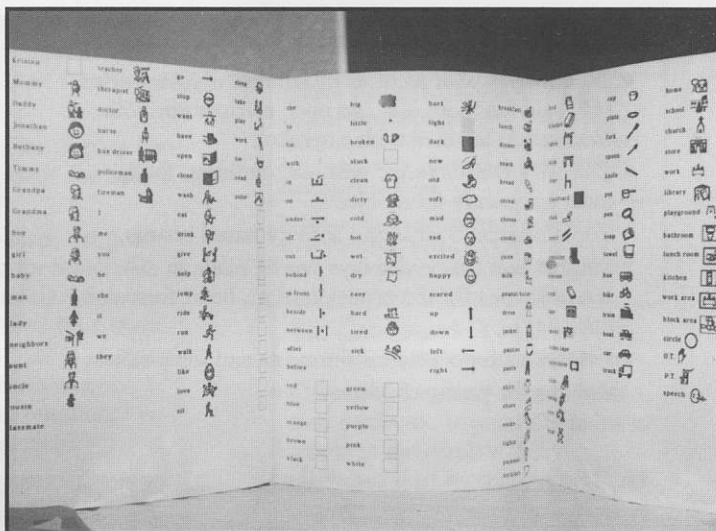

A large vocabulary board which highlights word, as well as provides symbols. This display has 6 panels (you see 3). It folds ut and is carried using velcro and straps.
Joan Bruno
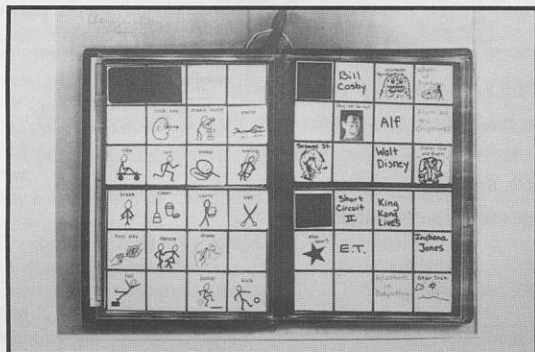
A wallet type of device designed to encourage conversation about current events.   Anne Warrick

To support literacy development

- Use enlarged text above graphics
- Gradually shift emphasis. Initially use large pictures/ small words. Then use small pictures/large words
- For preschoolers, arrange alphabet in order. For direct selection typers, arrange in QWERTY. For scanners, arrange in frequency of occurrence array.
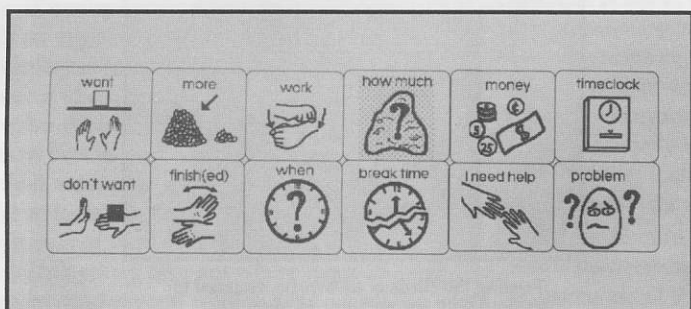
This is a board worn on the sleeve. It was copied directly on the persons sleeve and is used at his place of work.
Gail VanTatenhove.
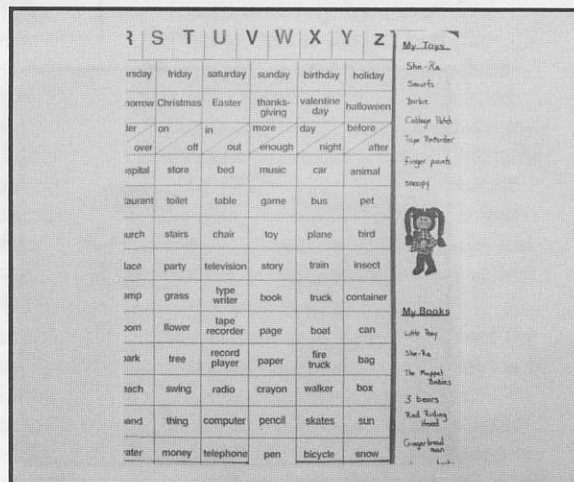
Shown here is a portion of a word board. Also notice that a taxonomic arrangement is included on this display, personalizing it.
Anne Warrick

Governmental

Cost effectiveness of low tech displays.

Funding issues in AAC always involve Governments. Our focus has almost exclusively been on funding electronic devices and/or funding services. To date, little information exists about the cost of low tech devices. In most cases, the cost of low tech displays and communication boards is included as part of clinical services. But, what is the true cost of materials, time, and implication of low tech devices?

Ellen Kravitz[10] conducted a Time Study several years ago in her facility. She found that speech-language pathologists were spending approximately 12 hours developing miniboards from start to finish (i.e,. observing the individual in communication context, developing vocabulary, selecting symbols, designing boards, making boards). They were spending between 40 and 80 hours developing large vocabulary communication notebooks.

Vanderheiden and Lloyd[11] pointed out in 1985 that in considering the relative cost of low tech devices, one variable to factor in is the cost for an assistant to aid an individual with a nonindependent technique, such as a manual communication board.

Obviously, the notion that low tech displays are "low dost items" is erroneous. We can, however, find many cost savings mechanisms and continue to provide quality communication boards and displays. By using technology tools (as described in the **Equipment** section on page 8), by implementing strategies for ogranizing symbol sets and developing displays that can be used by more than one individual in a classroom or at a worksite (as described below), the cost effectiveness of low tech devices can be shown.

Engineering the Preschool Environment[12]

This book is a *must have*. With 202 pages of creative ideas and detailed instructions, it tells how to design, make, construct, and teach the use of displays to children in preschool environments. Written by *Carol Goossens, Sharon Crain, and Pamela Elder,* chapters included are:

- The Need for a Master Plan (system design and system training issues.)
- Designing the Preschool Environment (delineating and prioritizing classroom activities, generating concentrated message pools, determining selection technique and display format, creating communication display(s) for each target activity, incorporating supplemental symbols, making displays and supplemental symbols readily accessible within the classroom environment.
- Training spontaneous, generative use (receptive and expressive training)
- Funding an Engineered Classroom
- References (15 appendixes that tell you more "How To's."

Preschool is a time for children to gain experiences with technology and for professionals to "figure out" how to provide access to language and communication across environments. Goossens feels that preschool classrooms should have 100's of activity-based displays; and in the book, they tell you just how to accomplish this task. Examples of specifics for designing core and supplemental, non-electronic and electronic displays are included for Matrix Displays (16, 32, 36 Locations); Horseshoe Eye-Point Displays, Rotary Scanner Displays; Eye-point Vests; and Music Displays. Among the many ideas they share are:

1. Be consistent with the location of vocabulary items that are often repeated, (e.g., more, all gone, finished, in, on, off). If item occurs on more than 50% of displays, it get s assigned a permanent location. Note: Can assign template locations on Boardmaker, making this easy!

2. After vocabulary is selected for each activity, rank order items. #1 = vocabulary you can't live without. Then, begin to organize display using all top ranked items Note: they often work with displays containing 36 locations and expose/uncover symbols over time to cut down on # of displays you need to make. Note: Many display are developed for use on commercially available high tech devices and expanded keyboards.

3. Group items within categories and assign spots on the display. Put most frequently used toward top of display. Note: with word-based displays, they use Fitzgerald key/grammatical organizations. With phrase/sentence based-displays, they use a key concept/symbol and arrange accordingly, e.g., phrase = Put it in; Key concept = In. They also use temporal arrangements for small scripted conversations containing 8 or 9 symbols.

4. Make figure (symbols) white and color background according to grammatical categories. When figure is colored, it creates a swirl of color.

5. If you use a cut and paste method, reformat the Symbol Set you use, as follows:
   a) Photo copy each page of book, laminate each page, and cut symbols apart.
   b) Label 26 cups A to Z. Sort symbols (alphabetically).
   c) Label (using a permanent marker) each pocket of each slide protector sheet with a different symbol name sequentially derived from the Index. Label both the front and back of each page.
   d) Starting with the A's, place each symbol in a pocket of a slide protector sheet. Use a 3" thick, three-ring binder and Use alphabetical page dividers.
   e) Insert at least 5 blank slide protector sheets in front to assist in organizing symbols to be placed on the photocopier when creating communication displays.
   f) Return each laminated master symbol to its respective pocked in the modified book after developing each display.

Equipment

Technology: Constraints and enhancements

Low tech or light tech communication aids are not just "back up systems" to be pulled out when a high tech system fails. They are important components of an individual's communication system. Some communicative tasks are better accomplished with electronic devices and others with manual systems. For example, a speech output device is uniquely better at getting attention, telling jokes, giving speeches, and putting some listeners at ease; but many users find low tech devices more effective during conversations and in certain environments, e.g., beach, home. With familiar partners, the rate of communication using low tech devices can be faster. Also, because low tech displays can be any size or shape, they are potentially, more portable.

Manufacturers, researchers, teachers, families and clinicians have struggled for years to provide people who have difficulty speaking with access to as much language as possible. Currently "hardware" seems to be dictating the size and shape of displays to a greater extent than previously.[13] This is particularly obvious when the low tech systems of users with 200-500 vocabulary items are compared to available high tech systems. To access that much vocabulary on a device means the user must spell, use prediction, coding, levels, or some combination of these techniques. Hardware constraints exist for both high and low tech devices. Time for a Pop Quiz!

1. *Why do you suppose high tech devices display only 128 symbols simultaneously?*

a) Because research has shown people with severe speech impairments generate language most efficiently using square or rectangular shaped casings with 2,4,8,16,32,64, or 128 switches?

→ b) Because computers deal in base 2 (binary) and engineers like to work with powers of 8, 16,32, 128 switches?

2. *Why are so many low tech displays rectangular, measure 8 1/2 by 11 inches (or some variation), and have 1" or 2" square grids?*

a) Because research shows that these dimensions are ideal for users re: # of symbols available, access, vocabulary requirements, and portability?

→ b) Because the "hardware" of low tech systems is paper, and that's how it is sold.

→ c) Because grids are available commercially in these dimensions.

You guessed right! However, with research lacking on the "best ways" to display language in space for AAC users, it is expedient to work with what is available and convenient. The constraints of today will disappear over time as technology becomes more sophisticated. So, in the interim, we should remain vigilant in our attempts to discover the "best ways."

Even now, technology is available to remove existing constraints and improve both the quality and the quantity of our low tech displays. Examples are:

Neighborhood printing services: Can change the size of displays (e.g., make a 4' x 8' on an easel for classroom circle time), provide high quality colored copies, and color laser printers. Can mount and laminate (also try sign making companies.)

Computer-assisted tools. Those interviewed feel computer aided tools are making a huge difference in both the quality and quantity of displays they provide individuals. Drawing programs, graphic library programs, and scanners can assist anyone to make graphic displays. Several products are already on the market.

Access Bliss. This program makes Blissymbols readily accessible on the Macintosh computer using Hypercard stacks. It is also available for use with other programs (e.g., StoryBliss).
For further information contact Kathryn Seybold, Blissymbolics Communication International, 250 Ferrand drive, Suite 200, Don Mills, Ontario, Canada M3C 3P2.

Boardmaker (international): 1993 version. $399 US + a drawing program. This tool is changing how we do what we do. It is the Mayer

Table III. Using Boardmaker	
Positives	Negatives
1. **Saves money** because it saves time. 2. **Quality** of displays is better. 3. If have color printer, can get color. 4. **Flexibility.** Can mix symbol sets, combine symbols, make text changes easily, change size of text visa vi size of symbols 5. Increases **productivity**...can generate more boards an update boards more easily.	1. Must **learn how** to use (Board Maker program 1 hour. Drawing program 4 to 5 hours.) 2.Costs $319 for Board Maker, $150 for drawing program. Requires Macintosh Plus or greater with 2 megs of RAM and a hard disk. 3. **Computers** are great when everything works...they can drive you nuts when they don't.

Johnson graphic symbol database. Currently the software is available for the Macintosh computer. An IBM Windows version of Boardmaker is coming out in the Fall. Boardmaker now has 3000 Mayer Johnson Picture Communication Symbols (Books I,II and III.) Each symbol is translated into ten languages (English, Spanish, French (Canadian), Portuguese, Danish, Swedish, German, Dutch, Norwegian, Italian). You can use two languages with each symbol. Text now can be manipulated separately from the symbols. At my request, Terry Johnson provided a list of positive and negative features shared with him by clinicians. See Table III. He says, most people learn to use the program in approximately 5 to 6 hours. Then they can select symbols, make them any size and chose any spacing, copy them to a clipboard and paste them using MacDraw/SuperPaint, or other desktop publishing program to draw grids and import symbols. The program can be used with *Speaking Dynamically* software $299 turning the Mac into a communication display with speech output.
Registered owners of former Boardmaker can upgrade for $100. Contact Mayer Johnson for details.

Board Builder. $169. Requires HyperCard. Symbol size, spacing and display sizes are limited. Two languages are available.
For more information, write or call Mayer-Johnson Co. P.O. Box 1579, Solana Beach, CA 92075-1579. (619) 481-2489 Phone (619) 259-5726. Telefax.

University & Research
AAC Activities at Penn State University

Penn State University in University Park, Pennsylvania has an increasingly active AAC curriculum and research program. Four courses are offered at the undergraduate and graduate level to students in Communication Disorders, Special Education, Therapeutic Leisure Studies, and other departments: Introduction to AAC, Assessment and Intervention in AAC, Special Topics in AAC, and a transdisciplinary course, taught in conjunction with the Pennsylvania Assistive Technology Center (PATC) in Harrisburg, during which students develop leisure programs that incorporate opportunities for social interaction. In addition to coursework, a clinical component is available within the Communication Disorders Department. Using primarily a community-based model, the Augmentative Communication Center provides assessment and intervention to adults and children. Clinic staff include Kelly Webb, Clinic Coordinator, Gail Schifano and Barbara Roberts.

Research Activities in AAC

Clinically grounded research activities are underway. Among current projects in the areas of interaction, literacy, vocabulary usage and intervention strategies are:

1. *Exemplary practices: Developing the communicative competence of students who use augmentative and alternative communication*. Dr. Janice Light in conjunction with the PATC. Student investigators: Dana Adkins, Jeff Brown, Lynn Buchert, Kathy Dolan, Nina Greiner, Judy Jordan, Britt Livelsberger, Lori Lombard, Lisa Nailer. A 3 year project (1993-1996) funded by the U.S. Department of Education with goals to better identify skills contributing to communicative competence in school-aged students who use AAC. Researchers will investigate skills that may (or may not) contribute to communicative competence. Then, they will develop instructional techniques shown to contribute and evaluate the efficacy of these techniques. Finally, staff will develop and disseminate instructional modules based on their findings.

2. *Literacy learning in students who use AAC systems*. Drs. Janice Light and David Koppenhaver of the Carolina Literacy Center at the University of North Carolina in conjunction with the Augmentative Communication Service at the Hugh MacMillan Center in Toronto, Ontario and the PATC. Students investigators: Karen Guggenheim, Elayne Lee, Linda Riffle. A survey of parents and teachers of students (ages 4-22 years) who use AAC across the Commonwealth of PA and the province of Ontario, Canada. Researchers will determine: a) what the expectations are for literacy in students who use AAC? b) what the student's current reading experiences and instruction are? c) what the student's current writing experience and instruction entail? and d) what support is available for literacy learning?

3. *Investigation of the effect of two spelling instruction techniques on the spelling performance of adults who use AAC.* David McNaughton and Jim Tawney. Investigators are comparing the effects of 2 spelling instructional techniques (with each other and with a no instruction condition). The efficacy of these techniques with adults with congenital disabilities who use AAC will be described.

4. *Story reading interactions between mothers and AAC preschoolers.* Janice Light with Alison Kelford Smith at McMaster University Medical Center. Student investigators Cathy Binger, Maureen Monahn This study will describe turn taking patterns, the focus of interaction, and specific communicative behaviors mothers and children produce in their story reading interactions. In addition, question asking patterns of mothers and response types of children will be analyzed.

5. *Vocabulary usage by nondisabled preschoolers.* Janice Light and Karen Fallon. This project will replicate the Beukelman, Jones, and Rowan's study[14] and look at the frequency and commonality of word usage in preschoolers. Staff will then develop an assessment tool based on semantic/syntactic categories to provide additional guidance for vocabulary selection.

6. *Investigation of effects of repeated listening experiences on intelligibility of synthesized speech.* David McNaughton, Karin Falon, Julie Tod, Fred Weiner, Jack Neisworth. Researchers are determining if adults and children improve across repeated listening experiences with DecTalk and Echo speech synthesizers. If so, they will determine if subjects are extracting phonological rules and applying them to novel words.

7. *Successful models of community-based employment for AAC users.* Janice Light, Betty Stoltz, David McNaughton. Goals are to describe the skills of employed AAC users, the nature of their employment situations, and the barriers, communicative demands, and strategies used to overcome employment barriers. This effort will assist vocational education programs to prepare AAC users for the job market.

8. *Patterns of vocabulary usage in data entry jobs*. Janice Light. Student investigators Stacy Brearley, Kathy Simpson. The project will collect and analyze vocabulary used by non-disabled workers in data entry jobs.

9. *Efficacy of interaction strategies to facilitate interaction between adult peers who use AAC.* Janice Light and Kathy Johnston. Student investigators: Lisa Lordo, Michele Rourke, and Mary Ann Schober. A pilot study demonstrated a lack of contingency between AAC users when no one with more developed interaction skills was available to provide scaffolding. This study used a prompting hierarchy to teach 2 adults with cerebral palsy who use AAC techniques to enhance interaction and independence during functional tasks, i.e,. menu planning in their group home. The efficacy of the intervention strategy is being evaluated.

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YOUR RESOURCES

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Patrick Demasco, Center for Applied Science and Engineering Laboratories in Rehabilitation-Applied Science and Engineering Laboaratories, A.I. DuPont, P.O. Box 269, Wilmington, DE 19810. (302) 651-6830.

Carol Goossens', Room 817, 20 West 22nd Street, New York, NY 10010. (212) 229-1862.

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Carol West, University of Nebraska Medical Center, Meyer Rehabilitation Institute, 600 South 42nd Street, Omaha, NE 68198. (402) 559-6460.

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