AAC – The components of:

Augmentative and Alternative Communication

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What is AAC ?

More

than

just

devices

Augmentative and Alternative Communication

- An area of research, clinical & educational practice.
- The study and compensation for:
  - temporary or permanent impairments
  - activity limitations
  - participation restrictions
- Focusing on persons with severe disorders of:
  - speech-language production
  - auditory comprehension
- Includes both spoken and written communication

▪ American Speech-Language & Hearing Association

Augmentative

- to supplement – add to.
  - Some speech coupled with:
    - Gestures
    - Communication board
    - Communication device

Alternative

- to substitute - to replace
  - Sign language of the deaf
  - Writing/typing instead of speaking
  - Communication device for non-verbal

Four components of AAC

- Symbols
- Aids (Devices)
- Strategies
- Techniques

Symbols

- What is a symbol ?
- Definition: A Symbol is:
- "something that stands for or represents something else"
  (Vanderheiden and Yoder, 1986)
  - Symbols are natural part of every day life.

Name that symbol?




Symbols

- Question:
- Y use

?

Answer:

- Short cuts

Non-spellers

Nike swish

Minnesota Twins

Santa Clara Vanguard

Virginia Commonwealth University

Tampa Bay Buccaneers

Head and Shoulders Shampoo

Symbol Systems

2 Types of Symbols used in AAC

- Unaided – No external device for production
- Aided – External device for production

Symbol Understanding

- Ability to perceive, interpret and understand pictures develops over first few years of life. (DeLoache, Pierroutsakos and colleagues, 1997)
  - Up to 18 months – children perceive pictures in the same way as objects – Attempt to grab and manipulate
  - By 24 months – children recognize pictures as 2-dimensional objects
  - By 30 months – children begin to understand that pictures can represent objects.

Unaided Symbols

- Gestural systems
  - Amer-Ind American Indian Hand Talk (Skelly, 1979)– 250 symbols – high iconicity
  - American Sign Language (ASL)
  - Signing Exact English (SEE)
  - Finger Spelling
- Vocalizations
  - "uh-huh" / "uh-uh" / "UH-uh"
  - Partner-assisted Auditory Scanning – "yes/ no response" (20 questions)

Aided Symbols

- Real Objects –

- Miniature Objects –

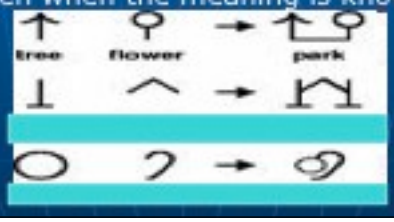
- Photographs -

- Symbol Sets -

Iconicity

- Transparent symbols – the meaning can be easily guessed

- Opaque symbols -No relationship is perceived (vague) even when the meaning is known.



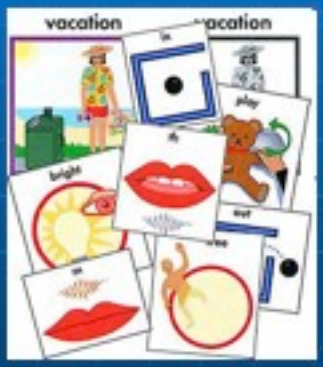
Picture Communication Symbols (PCS)

Single meaning symbols with words. Utilized on numerous communication boards and communication devices. Boardmaker software enables production of professional-looking overlays using PCS symbols.

DynaSyms symbol set

Static symbols as cut & paste stickers

Dynamic symbols on DynaVox products. (Carlson, 1982)



Minspeak symbols

- MINSPEAK (multi-meaning icons) – Baker (1982)

Used in PRC devices

1 2 3

Symbol 1 meanings:
Symbol 2 meanin
Symbol 3 meanings: Ac

Minspeak sequences (Semantic Compaction)

For rate enhancement

11 symbols selections compared to

39 keystrokes to spell this 9 word message (including spaces)

Can be completed in about 1/4 the time

Four components of AAC

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Aids (Devices)

- A device that can be either:
  non-electronic — Low Technology
  or electronic — High Technology
  for transmitting messages

Augmentative Communication through Time

- Moses: I have never been a skilled speaker. I speak slowly and can't find the best words.
- Lord: I will help you speak and I will teach you what to say.
- Moses: Please Lord. Send someone else.
- Lord: You will speak to Aaron and tell him what to say. I will help both of you to speak and will teach you what to do. Aaron will speak to the people for you.

Exodus: 4:10

History of AAC

- Early Humans used symbols (cave drawings) to communicate

Plato refers to signing by the deaf

AAC through the years

- Benedictine monks took vows of silence and communicated through manual signs. (1600's)

- Manual signs used in 1800's with individuals with cognitive impairments

Morse Code – 1890's

Early Communication Board 1940's-1950's

- The F. Hall Roe's communication board consisted of letters and words printed on Masonite, and it was the first available communication aid. These were used by individuals with cerebral palsy

Transistor - 1962

Bell Labs develops the transistor with first major application in the portable radio

Leads to development of the Speech Synthesizer

Apple II computer – 1970's

The Apple II computer was the first microprocessor designed specifically for home use.

Teaching sign language to chimps – 1970's

Gardner and Gardner, 1969

Premack and Premack, 1974

The Talking Brooch

"The Talking Brooch," a wearable communication aid, was designed for individuals who could not talk but could type on a keyboard held in the hand.

From Vanderheiden, G (2002)

Auto Com Communication Board

The Auto Monitoring Communication Board (AutoCom) was a user programmable communication & control aid designed to allow users with severe motor impairments to directly select words and phrases to communicate and write.

From Vanderheiden, G. (2002)

Voice Output Communication Aids (VOCA's) – 1980's

HandiVoice 120

PRC Light Talker

Augmentative Communication Devices (1990's)

Zygo Macaw Digitized Speech with Levels

DynaVox Original First Dynamic display Device

Speech Generating Devices (2000's)

Saltillo's ALT-Chat

PRC's ECO

mytobii C12

blinktwice TANGO

Words+ Say-It-Sam Handheld

DynaVox Xpress

AAC History – Legislation and Social Policy

- 1971 – UN Declaration of General and Specific Rights of the Mentally Handicapped
- 1975 – Education of All Handicapped Children Act
- 1988 – Technology Related Assistance for Individuals with Disabilities (Tech Act)
- 1990 Individuals with Disabilities Education Act (Mandated IEP's)
- 1990 – Americans with Disabilities Act
- 2001 – Medicare Funding of AAC Technology

Types of AAC Devices

1) basic picture-message fixed display

2) text-to-speech keyboard spelling

3) sophisticated symbolic coding-based devices.

Device Characteristics

- Physical Specifications
- Displays
- Speech Output
- Synthesizers
- Usability
- Mounting

Specifications of Devices

- Size (3"x5½") to (11"x13") Previous: (23"x16")
  Chat PC (iPhone) ECO (Deluxe laptop) Form-A-Phrase (Lap Tray)
- Weight Say-It-Sam Communicator (13.5 oz.) P-10 (11.7lbs.)
- Memory (recording time (seconds vs. minutes))
  (operating & storage space (MB or GB))

Speaker (number – size –mounting location - clarity)

Battery Life (hours 2 – 10)

Color (Black, Lime Green, Hot Pink, Sunset Orange, Vineyard Grape)

Displays

- FIXED - Overlay (paper)
- with pictures representing
- messages

- DYNAMIC–Computer screen
- with changing images
- (pictures or words).

Speech Output

- Digitized (Recorded)
  - Microphone for input of words or sentences
    - A close, but not perfect reproduction of speech based on frequency of sound sampling.
- Synthesized (Computer-Generated)
  - Keyboard for input of words or sentences through spelling or phonemes.
    - Text-to-Speech – Computer chip uses formulas to translate typed syllables into speech using rules of spelling & grammar.

Synthesizers

- DecTalk – 9 voices (Perfect Paul, Whispering Wendy)
- VeriVox (Michael, Sarah)
- AT&T Natural Voices (Crystal, Rich)(Italian, German)
- Neospeech (male/female) Stephen Hawking's choice
- Acapela (Heather, Kenny) (British, Dutch, Norwegian)
- Real Speak (Samantha, Tom) (20 languages)
- Loquendo (French, Spanish)

AT&T voice demos

- http://www2.research.att.com/~ttsweb/tts/demo.php
- "Overwriting this demo confirms agreement with the policies and restrictions described below"
- Crystal, Charles, Reiner, Alain

Usability features

- Portability
- Operability
- Learnability

Mounting for access

- Types of mounts
  - Switch
  - Swing-Away
  - Folding
  - Table top
  - Rigid
  - Lap tray

Photos from AbleNet, Daessy, & Abledata websites

Four components of AAC

- Symbols
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- Strategies
- Techniques

Strategies

- To provide effective and efficient means of conveying messages
  - Convey intended messages
  - Grammatical formulation
  - Enhance communication rate
  - Message timing

Conveying intended

- Why do we communicate ?

Purpose of Communication Interactions

- 1. Convey Needs/wants
- 2. Information transfer
- 3. Social closeness
- 4. Social etiquette
- 5. Internal dialogue
  - From: Beukelman and Mirenda (2007)

Language Representation Methods

- Phonemes
- Letters
- Codes – (Morse, alpha-numeric)
- Words
- Single Picture symbols
- Multi-meaning symbols

Core Vocabulary

- The most common words used in communication
- Not NOUNS
- Pronouns, articles, prepositions,
- Combining these provides significant meaning for communication

Alphabetical List of 26 Most common Words used by Toddlers

1. a
2. all
3. done
4. finished
5. go
6. help
7. here
8. I
9. in
10. is
11. it
12. mine
13. more
14. my
15. no
16. off
17. on
18. out
19. some
20. that
21. the
22. want
23. what
24. yeah
25. yes
26. you

Gateway 60* Core words

- I can do it
- She will go with you
- They don't have it
- Can you help with this
- Can you eat with it
- Can I have a drink
- Will you stop it

- Joan Bruno

Comparing Mobility and Communication Rate Enhancement

- Walking → Powered Mobility

- Talking → Augmented Communicating

Rate/Speed

- Severe Mobility Impairment – 0 - 1 mph
  - Risk of fall
- Normal Mobility Speed (walking) – 3 mph^
- Power Mobility Speed 5 mph^^
  - 66% **above** normal with current technology
- Severe Communication Impairment 0 - 50 wpm
  - Risk of not being understood
- Normal Speaking Rate 200 wpm*
- Augmented Communicator Rate 2 – 15 wpm**
  - 10% **of** normal with current technology

  - ^Woollacott and Sumway-Cook, 1989
  - ^^
  - * Goldman - Eisler, 1986
  - ** Foulds, 1987

Message Timing

- 200 wpm vs. 15 words/minute
- Information transfer discrepancy
  - Natural-Natural 50% / 50%
  - Natural- AAC 92% / 8%
- Delayed initiation

"Please give me a minute to compose my answer"

Four components of AAC

- Symbols
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- Strategies
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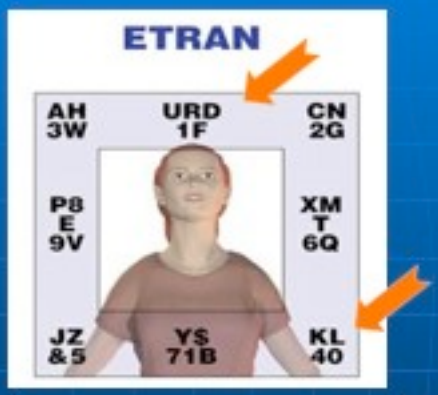
Techniques

- The way messages are transmitted (Selection technique & Output)

Selection Techniques

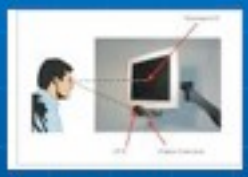
- Direct Selection (pointing)
  - Finger
  - Head stick
  - Mouth stick
  - Laser pointer
  - Eye gaze
  - Reflective dot pointing
  - Brain controlled interfaces



- Eye gaze communication board.
  - Image created by University of Pittsburgh

Selection Techniques

- Eye gaze



- Brain Controlled Interface

Pointing controls

- Touch enter
- Touch exit
- Delayed activation / Dwell
- Drag & Drop
- Multi-touch finger gestures*

*Apple iTouch

Selection Techniques

- Scanning
  - Linear
  - Row-Column
  - Column-Row
  - Group

Directed Scanning Devices

- Joystick

- Mouse

- Trackball

utput

- Speech
- Sounds "ding-dong"
- Printed words

- Symbol display

10 Intervention Issues*

- 1. Family desire to work on speech production instead of AAC approach
- 2. Difficulty with acceptance of AAC alternatives
- 3. Medical (stimulation) model versus participation model in therapy settings
- 4. Premature discontinuation of AAC therapy
- 5. Poor match between AAC device and communicators' capabilities

10 Intervention Issues

- 6. Limited availability of personalized messages
- 7. Lack of practice in contextual situations
- 8. Lack of available communication partners for partner-supported comm.
- 9. Inadequate support network for message selection
- 10. Lack of communication opportunities

* Beukelman and Mirenda (2003)

Communicative Competence with AAC (Light, 1989)

- Linguistic Competence
  - Receptive and expressive language skills
- Operational Competence
  - Technical skills to use the system efficiently
- Social Competence
  - Initiate, maintain and terminate conversations
  - Give and take turns
  - Communicate requests – reject suggestions
  - Engage others with coherent interactions
- Strategic Competence
  - Interacting with persons unfamiliar with AAC
  - Resolve communication breakdowns

Challenges for Augmented Communicators

- Rate of communication
- Artificial speech
- Pragmatic communication problems
- Acceptance of use of SGD
- Coding of messages
- Access techniques
- Cognitive load

Disability Types benefiting from AAC

- 1. TBI 2. SCI
- 3. ALS 4. Progressive(MS,PPA,Dementia)
- 5. CVA 6. Developmental(CP,MR,Autism)
- 7. Head/Neck CA 8. Brainstem CVA
- 9. Deafness 10. I.C.U.

- Beukelman, Garrett, Yorkston, Augmentative Communication Strategies, 2007)

AAC Practice Guidelines

American Speech-Language and Hearing Association

Augmentative and Alternative Communication:

Knowledge and Skills for Service Delivery (2002).
Technical Report (2004).

Position Statement (2005).

Veterans Administration Prosthetics and Sensory Aids Service

Speech Devices AAC Systems (with Attachments) (2004)

UPMC CAT AAC Assessment

- Initial Evaluation procedures

- **1. Case History** Interaction - Motivation
- **2. Physical Exam–** UE, Head, Eye, Foot
- **3. Visual –** Acuity, Range, Tracking
- **4. Cognition –** Alertness, Memory, Problem-Solving
- **5. Verbal –** Speech, Language, Communication
- **6. Reading –** Letter, Word, Sentence
- **7. Writing / Typing –** Legibility, Keyboard array
- **8. Spelling –** Accuracy - Vocabulary

Based on requirements set forth by Medicare (2001)

9. Assessment with Devices

Device Demonstration

- Selection based on physical exam
- 3 – 5 devices (varying manufacturers)
- Access considerations
- Software options
- Feature demonstrations

Assessment Trial

Device Loan

- 10. Client (Family/ S.O.) selects 1 device
- 11. Obtain Loan, Borrow, Rent
- 12. Train (customize – program) trial device
- 13. Practice –further training during loan
- 14. Return loan – Decide
  - (return to Step 10 or move to Step 15).

Assessment – Recommendation

Documentation and Follow-Up

- 15. Evaluation Report (LMN)
- 16. Quote
- 17. Physician Script
- 18. Submit to manufacturer
- 19. Insurance decision - Obtain /Appeal
- 20. Training / Therapy

Communication Disorders of Individuals with TBI

- 1. Language Impairment effected by Cognitive deficits
- 2. Language Impairment due to damage to specific language areas
  - 30% of TBI present with Aphasia
- 3. Speech impairment due to damage to the motor strip
  - 34% of TBI patients have dysarthria up to 5 years post on-set

Low Tech AAC approaches for Dysarthria

- Portable amplification
- Topic supplementation – Communication board
- Alphabet supplementation
  - Alphabet board for 1st letter
- Alphabet Board (ABC vs. QWERTY)

Dedicated High Tech Devices for Dysarthria

- Speaking Language Master (Franklin)
- LINK (AMDI)
- SpeakOut (Permobil)
- LightWriter (tobiiATI)
- DynaWrite (DynaVox)

Integrating AT Solutions for AAC devices - Mounts

- 1. Mounting and Positioning
  - Table Top
  - Table Mount
  - Over the Bed table
  - Over the Bed Floor mount
- 2. Wheelchair
  - Lap tray - Adaptations
  - Bar Mounts
    - Rigid - Swing Away - Folding
- 3. Switch mounts
  - Finger - Elbow - Foot - Knee - Chin - Head

Integrating AT Solutions for AAC devices - Electronics

- Controllers
  - Joystick
  - Switches
  - Blue tooth
  - Phone
  - Internet access
  - Wheelchair Battery
  - Wheelchair Auxillary Module

Socio-Relational Skills for Augmented Communicators

- Positive Self-Image
- Interest in Others
- Desire to Communicate
- Responsive to Interactions
- Puts Interactors at Ease
  - Light, 1988

AAC Operational Competencies for SLP ATP's

- 1. Vocabulary Update
- 2. Update Overlays/Displays
- 3. Protect Hardware
- 4. Update Operating System
- 5. Make Hard/Software Repairs
- 6 Plan for Future Needs
- 7. Maintain Access

Intervention Approaches

- Training
  - Face 2 face
  - On-line
  - Remote
- Therapy
  - Individual
  - Group
  - Intensive
- Tutoring / Coaching
- Mentoring

In Conclusion

- 2 thoughts:
  - - Rick Creech, M.A. Speech-Language pathologist and Paravocal communicator
  - The closest simile as to how people treat non-speech people is how they treat pet dogs... think about that for a minute. How much difference is there? People take good care of pet dogs. They give them love, food, warm homes, attention when they are not busy. And people don't expect much out of their pet dogs. Just affection and obedience. This is the sad part. People just don't expect much from non-speech people.

Resources

- Book: Beukelman, D. and Mirenda P Augmentative and Alternative Communication (2007) Baltimore: Paul H. Brookes Publishing Co.
- Articles:
- Light, J (1989) Toward a definition of communicative competence for individuals using augmentative and alternative communication systems. *Augmentative and Alternative Communication* 5, 137-144
- Vanderheiden, G (2002) A journey through early augmentative communication and computer access. *Jrnl of Rehab Research & Development* Vol. 39 No. 6, Pages 39-53
- Papers:
- Roles and Responsibilities of Speech-Language Pathologists With Respect to Augmentative and Alternative Communication: Position Statement (2005)
- Roles and Responsibilities of Speech-Language Pathologists With Respect to Augmentative and Alternative Communication: Technical Report (2004).
- Augmentative and Alternative Communication: Knowledge and Skills for Service Delivery ASHA AAC Special Interest Division guidelines (2002).

Thank you.

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