Access Methods in AAC

David Kay, M.Ed, OTR
Occupational Therapist, AAC Specialist
Prentke Romich Company

Introduction
- Today’s Demonstrations are on PRC Devices
- While settings are specific to PRC devices…
- Concepts can be generalized to other AAC devices and assistive technologies

Access Methods
- Touch
- Scanning
- Alternative Mouse/Joystick
- Headtracking
- Eyepointing
Access Methods in AAC

Helpful Terminology

- **Direct Selection**
  - Usually any type of access that isn't scanning

- **Indirect Selection**
  - Involves switches and scanning
  - More or less “Directive”
    - Also referred to as ‘degree of control’

Touch

- **Direct Selection with Touchscreen**
  - Acceptance time adjustment (mis-hit control)
  - Release time adjustment (multiple-hit control)
  - Keyguard
    - Helpful for coordination difficulties
    - Strength issues
    - Visual challenges

Scanning

- An indirect access method that requires the user to wait while the device steps through various choices that are displayed in a matrix of sections. The user then activates a switch to indicate a choice is being made.
- Auditory scanning requires the user to listen to auditory cues in order to follow the scanning pattern; visual scanning requires the operator to follow visual cues such as lights or highlights.
Scanning Types

- **Automatic Scanning:**
  - A switch activation starts the sequence, which then proceeds automatically. When the desired selection is highlighted a second switch activation selects that choice.
  - Least number of hits required
  - Largest timing requirement
    - Selections must be made within the pre-set time
  - Minor adjustments can impact timing requirement

---

Scanning Options

- **Scan direction**
  - Linear or Circular for smaller overlay
  - Row/Column or Quarter R/C for larger overlay

- **Scanning Speed**
  - Other options to help a scanner
    - Automatic restart
    - Acceptance & Release time (same as direct sel.)
    - Adding switch hits

- **Number of Re-scans**
  - Depends on timing and propensity for mis-hits

---

Switches & Scanning

- **Inverse Scanning**
  - A method of indirect selection in which the user must activate a switch to maintain movement of the scanner rather than the scanner moving automatically through the choices. Also called ‘hold scan’
    - Reduces timing requirement
    - Used when the release is the more coordinated action
      - When maintaining a position is easier than repeating it
      - Timing primary issue to consider
Switches & Scanning

- **Step Scanning**
  A method of indirect selection in which the user activates a switch each time he wants the system to move to the next selection.
  - Largest physical requirement
  - Need a consistent, repeatable movement
  - Consider Fatigue factor & type of muscle group
  - A second switch is often added to this method of scanning

Multiple Switch Scanning

- One switch for scanning, the other for selection
- Significant motor requirement
- Completely directive, less passive
- Minimal timing requirement
- 2 Switches may reduce cognitive load
  - Each switch has specific function
  
  Linda Burkhart: Two Switches for Success

Directed Scanning

- Direct Scan matches separate directional switches with moving the highlight across individual keys. These switches are used in a step or inverse fashion.
  - The directed scan is often controlled by a joystick
  - Requires solid switch skills or joystick control
  - Usually very efficient method
Considerations for Switches & Scanning

- Type of Scanning
  - Is there more than one access point for multiple switches
  - Repeatability, fatigue associated with movement(s)
  - Timing, attention

- Number of Switches
  - Generally more switches = more directive
  - More switches affects timing requirement
  - Two switches reduces cognitive load

Language Consideration for Indirect selectors

- “Communication is based on the use of the individual words of our language. True communication is spontaneous and novel. Therefore, communication systems cannot be based significantly on pre-stored sentences. Communication requires access to a vocabulary of individual words suitable to our needs that are multiple and subject to change. These words must be selected to form the sentences that we wish to say.”

Spelling

- Flexibility (generative power)
  - High
  - Low

- Speed
  - High
  - Low

**Pre Stored Sentences**

- Flexibility (generative power)
  - High
  - Low

- Speed
  - High
  - Low

---

**Words**

- Flexibility (generative power)
  - High
  - Low

- Speed
  - High
  - Low

---

**A Sensible use for Pre-stored Sentences?**

- Efficient for messages that are used repeatedly
- Use as a complement to a single word vocabulary
- Do Not use as a replacement for single word vocabulary

---

**Alternative Mouse**
- Direct Selection with external device
  - Mouse, Trackball, Joystick
  - Requires different Visuomotor skills than touchscreen
  - Dwell to reduce motor requirement
  - Manual selection can help with timing

**Headtracking**
- Direct Selection Headtracker – Infrared Sensing
  - Dwell or Manual for more directive selection
  - Hiding keys can help during early learning
  - Can accommodate for gross or fine head control
    - Horizontal and Vertical Speed
    - Averaging
    - Visual Feedback Options
    - Field of View

**Eye pointing**
- Also called Eye gaze (refers to the ‘gaze point’)
- Technical term is ‘oculography’
  - In assistive technology ‘video oculography’
  - Uses ‘point of regard’ method
  - Light source creates a reflection in the pupil
    - Allows camera to follow the pupil
Headtracking vs. Eyepointing

- Significant Cost difference
- Lighting requirements
- Hardware size
- Calibration requirements
- How tolerate positioning changes
- Fine Motor control (head and neck for HT-spasticity)
- ROM requirements vs. eye physiology
- Effectiveness of movement as user ages
- Fatigue
- Selection rate

Helpful Options in PRC Devices

- Modify what can be selected
- Pause access method
- Modify scanning patterns
- One touch to change access method or settings

Resources for Switch Users

- Introduction to Seating and Positioning Webcast
- Two switches for success
  - http://www.iburkhart.com/hand2sw4s.htm
- Introduction to Partner assisted scanning
- Help kids learn switch games (free)
- Switch learning software