

Make the Switch! Switch Access for AAC

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Objectives

- 1) Describe the difference between one and two switch scanning for AAC access.
- 2) List strategies for teaching two switch scanning.

“A student’s ability to successfully coordinate the motor and visual skills required for functional switch use is in large part dependent on the manner in which the child is positioned”

Goosens and Crain, Utilizing Switch Interfaces with Children Who Are Severely Challenged 1992.

Where to start?

- Assessment
 - WATI Student Guide Information
 - Questionnaire Inventories and Case Histories
 - What has worked or not worked and why?
 - Previous access methods?

WATI Guides: Wisconsin Assistive Technology Initiative www.wati.org

- GUIDES designed to gather information for all areas of Assistive Technology
- WATI free resources include: AT Laws for Schools, AT Consideration, AT Assessment Guides, Observation Guides, Referral Forms, AT Checklists, Transition Guides, as well as support resources for AT Multiple Challenges and AT for Autism Spectrum Disorder
- Forms available in Spanish as well!

Student Information Guides

- **Section 1 - Seating, Positioning and Mobility***
- **Section 2 – Communication***
- **Section 3 - Computer Access***
- Section 4 - Motor Aspects of Writing
- Section 5 - Composition of Written Material
- Section 6 – Reading*
- Section 7 – Mathematics*
- Section 8 – Organization**
- Section 9 - Recreation and Leisure
- **Section 10 - Vision**
- Section 11 - Hearing
- Section 12 - General

*changed 2009
**new 2009

Chapter 1 - Assistive Technology Assessment

WATI Student Information Guide

SECTION 2
Communication

I. Student's Present Means of Communication

(Check all that are used. Circle the primary method for student use.)

Change in handwriting pattern Hand position changes Eye-gaze assessment

Facial expressions Gestures Posture

Sign language expressions Sign language (Type) _____ # signs _____

combinations _____ # signs in a combination _____

Vocalizations, for example, for example, _____

Verbal, vocal combinations, for example, _____

Tongue clicks, for example, for example, _____

2-word utterances 3-word utterances _____

Text intelligible speech, various % intelligible _____

Communication board Touchline Picture Symbols Visual Icons

Computer-assisted words Words _____

Printed communication, for example, _____

In some created combinations - for example, _____

Computer track/track - number of pages in book/track _____

Does student compare to desired program usage independently? Yes No

Schedule (weekly) - for example, _____

Speech Generating Device(s) - please list _____

Multiple switches or devices - for example, _____

Posture Assisted Seating - please describe changes and communication system _____

Intelligible speech Writing Other _____

Comments about student's present means of communication _____

Purpose of Communication

Does the student communicate:

Visual/Handed - for example, _____

Social interactions - for example, _____

Social responses - for example, _____

Demands/requests - for example, _____

Shared information, including peer attention - for example, _____

Assessing Teacher: _____

Assessing Teacher: _____

More Questions

1. Medical status of hearing and vision (visual acuity, cortical vision impairment, etc.)
2. Assess positioning--Is current seating system meeting needs, are changes needed, availability of tilt feature, need for additional equipment to further stabilize/support individual?
3. Investigate prior access methods that have been trialed with individual--those that did not work and why not, those that did work and why?
4. Document all communication methods individual uses from no tech to high tech. What's working best?
5. Individual's interest in making a change if individual has a current system.
6. Evaluation is dynamic and on-going including extended trials, device demonstrations, and data collection.

Switch Assessments

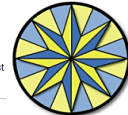
- Compass
- EvaluWare
- SSPT – Single Switch Performance Test (Free)
www.aac institute.org

SWITCH ASSESSMENT FOR COMPUTER ACCESS

Compass Assessment Software

Introduction

Compass is software that measures performance in skills needed for computer interaction. It includes eight skill tests, covering text entry, pointing device use, and switch use. Each test has many configuration options to customize testing as needed. Compass collects speed and accuracy data during test performance and reports the results.



News & Highlights

It's Here - Compass Version 1.1!

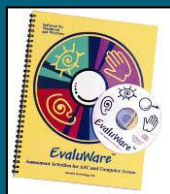
Compass now runs on Windows Vista, and includes an improved Switch test, the option for French test materials, and more!

To try-before-you-buy, [download a free 30-day trial](#). Or, go ahead and [buy Compass now](#). We think you'll be glad you did!

http://www.kpronline.com/com_pass-intro.html

Switch Assessment for AAC EvaluWare

- EvaluWare Software helps identify the best computer access methods and ideal AAC setups for users with special needs.
- Motor/access skills.
- Looking skills.
- Listening skills.
- Other related skills.



<http://www.assistivetech.com/corporate/products/evaluware.aspx>

SSPT – Single Switch Performance Test

- SSPT is software to facilitate measurement of the ability to activate a single switch.
- Measures the average time required to activate or release the switch (following visual and/or audio prompts)
- Measure the speed of repetitive activations.



www.aac institute.org

Switch Access

- Look for consistent, reliable physical movement
- Can student repeat the movement with minimal effort?
- Can student repeat the movement upon request?
- Is the activity motivating enough that he wants to turn it on with the switch?

Positioning: Leisure vs. Functional Sitting

LEISURE

- Person leans against the back support of chair
- Arms at rest
- Not a learning posture
- Most positioning in wheelchairs is designed for safety and transportation

FUNCTIONAL

- Leaning slightly forward from hips
- Shoulders and arms are free to move
- Used to perform an activity or learn

Types of Access

Direct Selection

- Use a finger, foot, elbow, head, head pointer, mouth stick, etc., to select, indicate or activate
- Low, Moderate, or High Cognitive Demand
- Low, Moderate, or High Physical Demand

Indirect Selection

- Use a switch to move through a series of potential items/toys/messages to select one
- Higher Cognitive Demand
- Low Physical Demand

Direct Access to AAC



Direct Access to AAC

- Eye Gaze Systems
 - Text or graphic symbols



Eye Link



Two-step Eye Gaze

Direct Access to AAC

- Eye Gaze Systems
 - A reflection from the eye is seen by camera. This tells the device where to move the mouse.

<http://www.tobii.com//default.asp?sid=553>

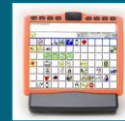
<http://www.eyeresponse.com/>

<http://www.dynavoxtech.com/products/eyemax/>

<http://store.prentrom.com/cgi-bin/store/E14-G.html?id=SMfTwmBT>

<http://www.frs->

[solutions.com/product_info.php/cPath/20_30/products_id/90?osCsid=1e0ed3bf3634f83d11738122019f5c6d](http://www.frs-solutions.com/product_info.php/cPath/20_30/products_id/90?osCsid=1e0ed3bf3634f83d11738122019f5c6d)



Direct Access to AAC

Electrical Signals from Muscles

- Cyberlink headband detects electrical signals from facial muscles, eye movements, and brainwaves.
- Brainfingers software decodes these signals into virtual fingers or Brainfingers which trigger mouse and keyboard events.
- Electrical Signals from Action Potentials
- Brain Computer Interface – a specific action potential spike makes the selection.



Indirect Access to AAC: Switches for Scanning



Types of Switches

- Touch – any contact with switch surface
- Pneumatic – air pressure change from a sip or puff
- Squeeze – air pressure change from a squeeze
- Movement – any specified movement
- Muscle/Neural – contraction/relaxation of a part of the body

Switch Considerations

- **Position** - position of individual (in chair, lying down, walking with mobility device, etc.)
- **Movement** – type of movement (squeeze hand, swipe finger, raise leg, blink eye, etc.)
- **Control Site** – where is the place they have most control – consistent control (finger, knee, eye blink)
- **Type of switch** – touch, pressure, pneumatic, matches up with type of movement and control site

Indirect Access

- Single Switch vs Two Switch
- Types of Scanning

Indirect Access: Partner Assisted Scanning

Partner Assisted Scanning

- For children who have complex disabilities
 - no reliable means of direct selection
 - language level exceeds physical access abilities
- Partner acts as the switch
- Partner is the voice output
- Prepares child for possible switch use
- Eliminates ACCESS difficulties while building communication and language competencies
- *Necessary skill needed for successful 2 step switch scanning**

INDIRECT ACCESS: PARTNER ASSISTED SCANNING

Partner Assisted Scanning

- Requires intensive communication partner participation
- Partner models how to use a device and system to communicate
- Partner receives input/message from the individual with disabilities

http://www.lburkhart.com/Isaac_instructional_06.pdf

http://www.lburkhart.com/Podd_Communication_books.pdf

<http://www.youtube.com/watch?v=pLb6-Oi3uR0>


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Partner Assisted Scanning (PAS) Demonstration

Switch Activation

- Touch
 - Activate upon touch with no requirement for pressure or movement
 - Pal Pad, Wafer, Star, Plate, Tongue Touch
- Pressure
 - Activate with varying amounts of pressure
 - Specs, Buddy Button, Micro Light, Cup, Mini Cup, Click, Wobble, Grasp, Pillow, Universal, Big Red, Ellipse, etc.

Switch Activation

- Movement
 - Activate by sensing movement with no physical contact
 - SCATIR, Proximity, Movement Sensor, Mercury, IST
- EMG
 - Activate by sensing muscle movement or contraction
 - Piezo-electric  and twitch

Switch Activation

- Temperature
 - Activate by sensing changes in temperature
 - P-switch
- Sound
 - Activate by sound or vocalization
 - Sound-activated, voice-activated

Switch Activation

- Pneumatic
 - Activate by puff of air
 - Often are dual switches (sip/puff)
 - Sip and Puff, Quad Puff, Grip and Puff, Soft Switch

Switch Scanning

- Basic Scanning Parameters
 - Pattern
 - Speed
 - Type of scan
 - Feedback

SELECTION/SCANNINGTYPE	DESCRIPTION
Direct Selection	Use a finger, head pointer, mouth stick, or eye gaze to select and/or activate the desired item, toy, or message.
In-Direct Selection	Person or switch is used for scanning.
Step scanning (one switch)	The switch is activated to move the *highlight from one item, toy, or message to the next, stopping on the desired one.
Linear scanning (one switch)	Initial switch activation begins a continuously moving *highlight from one item/toy/message to the next. When the desired item/toy/message is highlighted, the switch is activated again to activate the desired one.
Inverse Scanning (one switch)	While the switch is continuously activated, the highlight pauses at each item for a preset time. Item/toy/message selection occurs when switch is released.

*Note: "highlighting" can refer to visual or auditory (beeps or voice output) notifications.

SELECTION/SCANNINGTYPE	DESCRIPTION
Row-Column Scanning (one switch)	Initial activation of the switch highlights one row of items, toys, or messages at a time. The second activation of the switch begins highlighting of one individual message at a time in the last row highlighted. A third activation of the switch activates the message that is highlighted.
Block Scanning	Initial activation of the switch highlights one-fourth of items, or messages at a time. The second activation of the switch begins row-column scanning within the selected block. A third activation of the switch activates the message that is highlighted.
Two-Switch Scanning	Activation of one switch begins a continual movement of the *highlight from one message to the next. When the desired message is highlighted, activation of the second switch activates the desired message.

Trouble Shooting Access

Problem	Solution
Switch slides	Try Dycem, nonskid shelf liner or placemat material, double-sided foam tape, Velcro.
Misses switch	Move switch around for easiest activation, try different types of switches such as one with larger surface, easier activation, audible sound, texture, etc.; try different body part to activate switch; consider ongoing assessment.
Inadequate force to activate switch	Try more sensitive switch, change angle or height of switch, change angle or size of work surface, place switch closer to body or other adaptation to decrease type or strength of movement; try a switch timer or latch.

Scanning demo:

http://faculty.washington.edu/dowden/tcollab_aac_files/aac_module_scanning/aac_scanning_about_intro.htm#demo

Trouble Shooting Access

Problem	Solution
Does not seem to fully understand that you must push the switch to get a "favorite" item	Model pushing the switch to get desired toy or item, give verbal prompt for the desired outcome (e.g., play the music, go doggie, turn on the blender, etc.), help child access the switch and he must repeat to do it again, try different switch (e.g., with a bigger surface, different color, texture, audible sound); use a more visible body site; consider a more concrete switch such as a vibrating or music switch (or other switch that contains a desired action).
Does not seem to want to touch the switch	Change the texture of the switch surface, color, shape; try a proximity switch; ensure outcome is one the child really likes; make the activity fun and take turns.
Fatigues easily	Try switches with various body parts, switch activation sensitivity, surface area; try placing switch closer to the user or try other adaptation decrease movement needed; try a switch timer or latch; determine times of day that are better and more difficult- match switches to those times of day, change switch angle or height.

Switch Scanning

- Type of scan
 - Automatic (interrupted)
 - Directed (inverse)
 - Stepped

Directed (Inverse) Scan

- 1 switch
 - Moves at set speed
 - Hold switch to start scan
 - User releases switch to select desired item
- 2 switch
 - Moves at set speed
 - Hold switch 1 to start scan
 - User releases switch 1 and hits switch 2 to select desired item

Directed Scan

- Joystick
 - User controls movement in all directions
 - Select via dwell or “fire” button

Stepped Scan

- 1 switch
 - Switch moves scan.
 - Must hit switch repeatedly. One push of the switch moves the indicator one step.
 - User holds switch for protracted amount of time or dwells for a set time to select .

Stepped Scan

- 2 switch
 - Switch 1 moves scan
 - Must hit switch repeatedly to move indicator
 - Switch 2 selects target

Single Switch vs. 2-Switch Step Scanning

Single-Switch Scanning

- Requires more visual concentration and cognitive focus
- Must have good timing
- May take longer for user to select

2-Switch Step Scanning

- Active control
- Less concentration
- Timing isn't critical
- Few options available for single-switch user
- Requires two control sites on body

Why 2-Switch Step Scanning?

- Eliminate need for timing
- Concentration / Distraction
- Allows for more appropriate social skills and pragmatics
- Active vs. Passive Control
- Separate function for each switch: Simple cognitive map
- One switch advances scan with each activation, the second switch selects the item
- Very few options are available for a single switch user beyond cause and effect

Two-Switch Scanning

- Use any two switches
- User pushes switch 1 to move the indicator and pushes switch 2 to select the message
- Most motivating method of scanning due to increased cognitive engagement
- Allows child to control time needed to process visual and/or auditory information

Levels of 2-Switch Scanning

- Errorless learning
- Two clear choices
- Two choices that interact with each other
- Multiple choices with stepping –no “wrong answer”
- Multiple choices with stepping –correct vs. incorrect choices

Increasing Accuracy with 2-Switch Step Scanning

- Try activities with some correct and some incorrect answers.
- Add slightly negative or illogical items in the array of choices, or simply “no” and repeat what to listen/look for.
- For communication, select vocabulary items that have different pragmatic intents, so that the responses provide clear feedback for the child’s comments.
- Use errorless activities that allow the child to be creative and generative (i.e. errorless letters).
- Provide emerging literacy activities for creating stories, playing with sounds and letters, or constructing a rhyme or sentence.
- Keep motivation high and customized for the child.
- With successful and motivating practice, the child will be developing more motor automaticity, and integration of cognitive and motor tasks.

“The most versatile tool for teaching the user to scan is a computer with appropriate software. Trying to teach scanning with a communication device is more difficult than with a computer for several reasons. The setup required to match the user’s interests and level is more intensive than with software. Also, a communication device requires that another person always be present to provide reinforcement when the user makes a choice.”

*“Teaching switch users with multiple disabilities to scan: A software guide”.
By Rob Koch, Closing The Gap, December 06-January 07
www.closingthegap.com*

Computer Software for 2-Switch Scanning

- Intellitools Classroom Suite
www.intellitools.com/
- Dynavox Mayer Johnson – Boardmaker
www.mayer-johnson.com/products/boardmaker-plus/
- Judy Lynn Software
www.judylynn.com/
- SoftTouch
www.softtouch.com/switchbasicshybrid.aspx
- Inclusive TLC
www.inclusivetlc.com/Products/BrowseSection.aspx?psid=147&pid=4
- MarbleSoft-Simtech
www.marblesoft.com/products.php?group=2

Advanced Scanning Parameters for AAC

- Hold Time or Acceptance time
– The amount of time needed to maintain switch closure before it activates
- Release time
– The amount of time needed following switch release for the device to recognize the closure

Resources

- Linda Burkhart <http://www.lburkhart.com/hand2sw4s.htm>
- Scanning - University of Washington
http://faculty.washington.edu/dowden/tcollab_aac_files/aac_module_scanning/aac_scanning_about_intro.htm
- Two switch scanning demo
http://www.blitt.org/switch/ani_tss.htm
- Types of Two switch scanning access
<http://www.customtyping.com/tutorials/at/switches/types%20of%20switch%20access.htm>
- Switch access
<http://callcentre.education.ed.ac.uk/satbook/satbook125-150.pdf#two>
- Two switch scanning
<http://www.spectronicsinoz.com/downloads/demo/lindab/tss-What-is-on-this-CD.pdf>
- AAC Feature Comparison Grid (2005) of 12 high tech and 28 low tech augmentative communication devices
http://www.setbc.org/setbc/communication/communication_aac_feature_comparison_grid.html