



# Access is the KEY to AAC: The Role of OT

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# Learning Objectives

- Participants will identify the benefits of a collaborative team approach to AAC assessments and interventions.
- Participants will identify multiple access related challenges for the child with complex communication needs.
- Participants will identify various switch sites, switches and mounting options.
- Participants will identify the 4 Stages of Switch Progression.

# Presentation Goals

This session will provide an in-depth look at OT's approach to the **physical access assessment** process for children with complex communication needs.

The targeted goal of efficient, independent access to active participation in communication, computer use, academics, mobility & leisure activities guides this approach.

# AAC TEAM ASSESSMENT



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# AAC Team Assessment

- Child and parents (or other primary care providers)
- Speech Language Pathologist
- Occupational Therapist
- Physical Therapist
- Medical doctors (neurology, orthopedics, ophthalmology)
- Educational staff
- Nursing staff



# AAC Team Assessment

In any setting, an AAC assessment should cover the following:

- present communication status,
- physical abilities and challenges,
- seating and positioning,
- visual-spatial- perceptual abilities and challenges,
- cognitive and language abilities and challenges
- literacy abilities/ limitations,
- the ability to use and understand symbols,
- environmental concerns,
- and how to implement the system.

# AAC Team Assessment

At the core of this assessment are four basic questions.

- What are the child's communication needs or goals?
- What are the child's strengths and abilities?
- What barriers are preventing the child from achieving his or her full communication/participation potential?
- What aids and adaptations (e.g. AAC devices or systems, environmental modifications) will best accomplish the child's goals given his or her strengths and abilities, and current circumstances?

# OT IN THE AAC ASSESSMENT



# OT in the AAC Assessment

As OTs we specialize in knowledge of....

- Fine motor skills
- Postural stability
- Self-care skills
- Oral-motor skills
- Visual-perceptual skills
- Visual-motor skills
- Bilateral hand coordination
- Sensory processing skills
- Motor planning, praxis, and organizational
- Overall strength/tone





# OT in the AAC Assessment

## “Physical Access”

- Means by which one physically selects choices:
  - AAC
  - Environmental control
  - Academics
  - Leisure

# OT in the AAC Assessment

AAC physical access options fall into two categories:

- Direct Selection
- Indirect Selection (switch)

# OT in the AAC Assessment

Identification of a **reliable functional non-fatiguing** motor response for direct or indirect access for intentional communication represents one of the biggest challenges of AAC.

# PHYSICAL ACCESS MODES

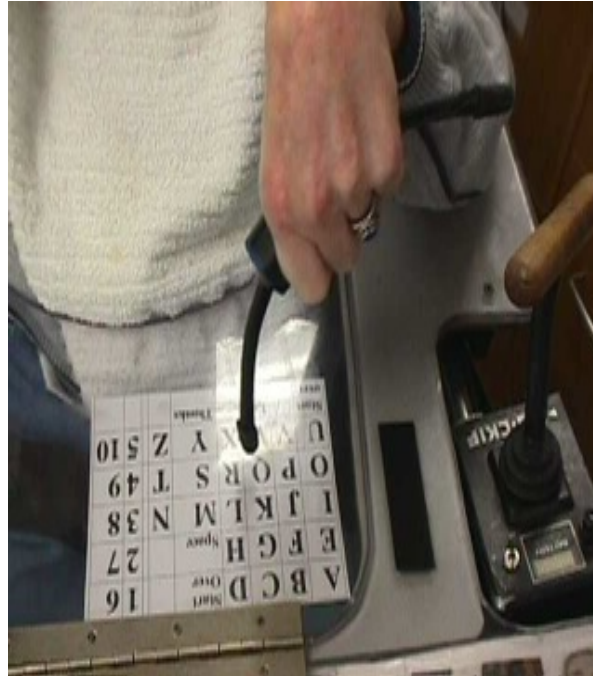




# Direct Selection

- Direct selection should always be targeted first, as it provides more direct, faster access to content
  - Any computer keyboard/mouse input
  - Isolated finger/thumb
  - Handheld pointer
  - Alternative pointers (e.g. headstick, mouthstick)
  - Alternative computer inputs (e.g. Head tracking, Eye tracking)

# Direct Selection



# Direct Selection



# Indirect Selection



In the absence of sufficient motor control for direct selection access, switch access (or indirect selection) needs to be explored.



# Indirect Selection

Scanning switches have been around for decades and will be for decades to come because they represent an effective means of alternative access for some users with physical impairments.

(Beukelman & Mirenda, 2005)

# Indirect Selection

## Switch Scanning:

An indirect access method that requires the child to wait while the device steps through various choices displayed in a matrix of sections. The child then activates a switch to indicate a choice.



# What is a Switch?

- a specialized piece of hardware designed to detect specific movements
- interface between child's movement and function.
- by itself, switch does nothing; it needs to be connected to a switch-compatible device.



# Variety of switches



# Variety of switches



# Switch Overview

<b>SWITCH TYPE</b>	<b>SOURCE OF ACTIVATION</b>
Jelly bean, Buddy, Spec, BIG RED, lever, rocking lever,	Physical contact made with switch.
Sip-puff	Change in air pressure related to slight sip and/or puff action.
Microlight switch	Small, very sensitive switch activated by slightest contact.

# Switch Overview

<b>SWITCH TYPE</b>	<b>SOURCE OF ACTIVATION</b>
Proximity (SCATIR, Candy corn,	Activated by body part coming within an adjustable range of movement.
Sensor	Wafer-thin disk, amount of pressure is adjustable. Detects electrical impulses from skin.
Sound/Voice Activated	Consistent sound/ noise is detected as input

# SWITCH SITE ASSESSMENT





# Goal of switch site assessment

To identify one (or more) potential switch sites for intensive motor development.

Intensive switch site intervention requires:

- **Equipment:** Switch+ switch mount + switch compatible device(s).
- **Personnel:** to assist with switch setup and training.
- **Practice:** lots of switch practice opportunities

# What is a switch site?

A switch site is the body part which provides the input/movement required for switch operation.

## EXAMPLES OF SWITCH SITES:

**HAND**

**HEAD**

**KNEE**

**EYE**

**FOOT**

# Switch Assessment

An in-depth look at each child's unique motor, sensory, vision, hearing, cognition, and behavior profile is essential.

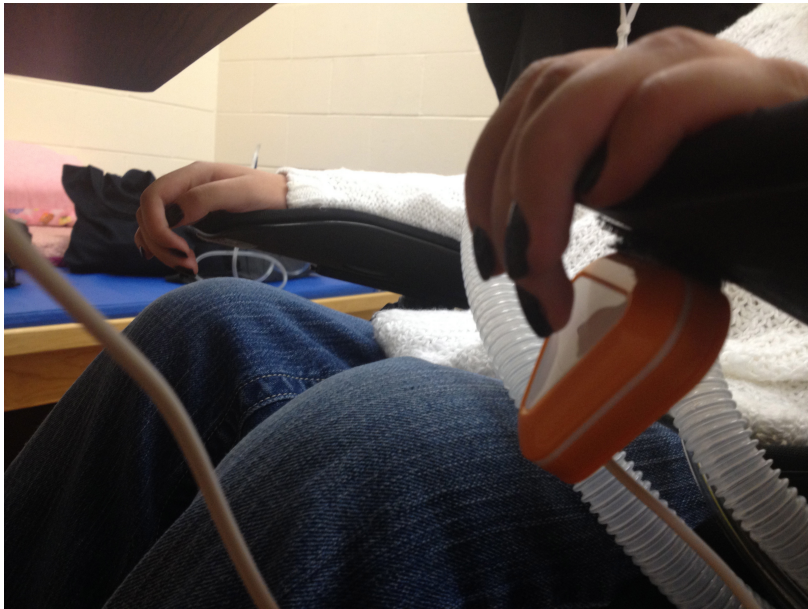
All of these factors impact decisions regarding physical access.

# Switch Assessment

A comprehensive motor assessment is required to:

- identify a reliable, consistent and repeatable movement that the child will be able to execute from their primary supported seating position(s).
- provide the foundation for identifying potential control sites.
- identify multiple control sites, to minimize over-fatiguing any one muscle group.

# Switch Site Assessment: Where does one start?



- **DIAGNOSIS**: related motor abilities and challenges.
- **OBSERVE**: watch how child moves
- **ASK**: Parents about child's movements
- **JUMP IN**: Try various switch placements

# Medical Diagnosis

Knowledge of child's underlying medical condition, sensory-motor profile and Associated system involvement is extremely beneficial information.

- **Cerebral palsy:** generic term describing an underlying movement challenge. Abnormal tone (spasticity, dystonia, athetosis) and involuntary reflexes may or may not adversely affect child's motor functioning.
- **Muscular dystrophies:** typically low muscle tone, very limited muscle strength and range of motion. Generally small, distal hand-finger movements are most functional. Motor fatigue can be a major issue.
- **Mitochondrial diseases:** generic term describing inefficiencies in cell Energy production. Voluntary movements can be very limited with fatigue being a major limiting factor.

# Customized Seating

- Minimizes adverse effects of residual reflexes and abnormal, involuntary tone.
- Provides proximal trunk-pelvic support for less effortful visual motor interactions.
- Facilitates trunk alignment for breathing/swallowing/food management.
- Ensures medical well-being and orthopedic integrity

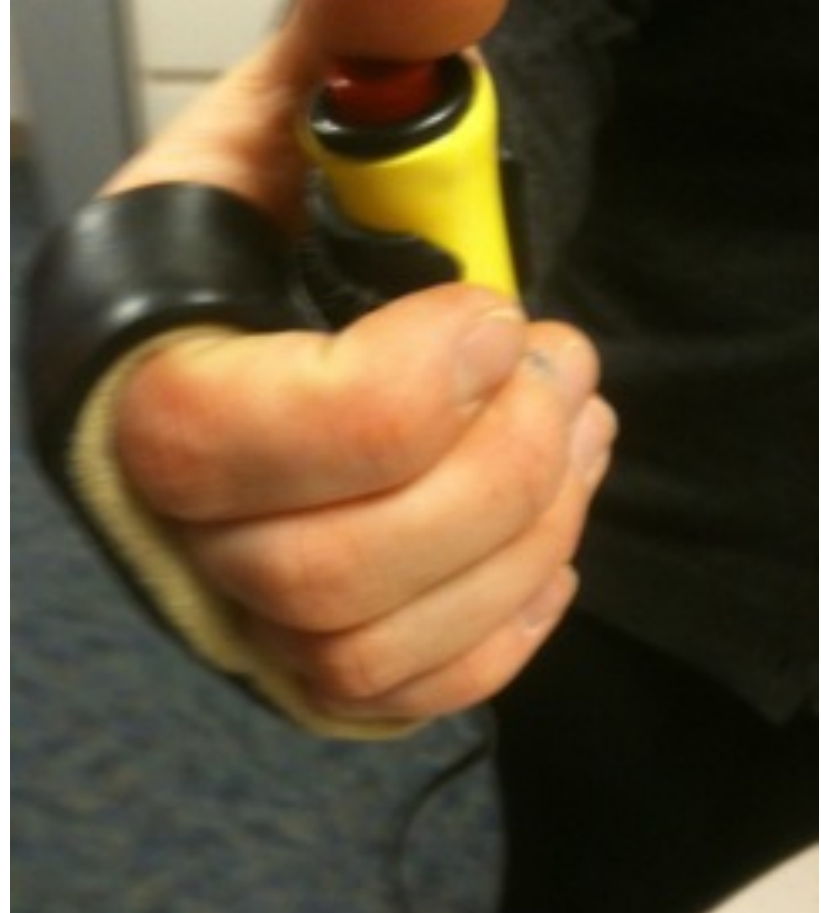
# Positioning for Switch Access

- Careful attention to customized seating and positioning is essential for providing body support, head support (so child can visually interact with others including communication choices) facilitating function. Specialized wheelchair has staff expertise and equipment knowledge to make best match between child's needs and options.
- First and foremost, supportive seating ensures orthopedic alignment and medical well-being.
- Secondly, seating and positioning accommodations can be added



# Switch Site Assessment

- Initially identify a movement
- Identify switch(es) capable of detecting this movement.
- Identify mounting options making this switch accessible and easy for others to position.



# Switch Site Assessment:

## Hierarchy of Control Sites

**HANDS:** start with hands, proceed from gross to more finger/thumb movements.

Position switch in all planes of hand movement e.g. in front, to side, above, under..

**HEAD:** align switch vertically and position parallel to side of temple or jaw  
If head defaults to right, then this is indication to place switch to the left.

**KNEE:** align switch vertically and position parallel to outer/inner side of knee. If increased tone results in knee adduction, then reposition switch to lateral  
(outer) knee surface.

**FOOT:** position switch where child can activate it using foot action.  
(in front, to side of foot; behind heel, under heel or under foot)



# Switch Site: HANDS



Forward arm-hand movement



Upward hand movement



# Switch Site: **HANDS**





# Switch Site: **HANDS**



# Switch Site: **ARM**



Backward elbow movement (using modular hose flexible mount)



# Switch Site: THUMB



Isolated thumb action

Very sensitive  
microlight switch

Connected two  
microlight switches  
(with adapter\*) for  
increased surface area

# Switch Site: THUMB



Two microlight switches, anchored onto Veltex board



Sensor switch (velcroed onto band-aid)



# Switch Site: HEAD



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# Switch Site: CHIN



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# Switch Site: TONGUE



# Switch Site: **KNEE**



# Switch Site: FOOT



# SWITCH SELECTION



# Match child's unique needs with switch features

- **SIZE**
- **COLOR**
- **BUILT IN FEEDBACK (tactile, auditory)**
- **CONSTRUCTION**
- **DURABILITY**
- **DEVICE COMPATIBILITY**
- **MOUNTING OPTIONS**
- **EASE OF SETUP**



# Switch Assessment

“Functional switch user” requires the existence and demonstration of a purposeful, intentional motor response.

Children with complex communication needs often present with motor profiles best characterized as “consistently inconsistent”.





# “Functional switch use”

- To be considered a “functional switch user” child must demonstrate the ability to get ON the switch, get OFF the switch and REST targeted control site, without accidentally activating the switch, while simultaneously attending to device feedback.

# Considerations for Switch Placement

- Do not place switch in path of an involuntary/extraneous motor pattern.
- Switch placement should support ON-OFF-REST sequence for “functional switch use”
- Switch should be as small, low profile so others see the child first!
- Check out all switch sites!!

# SWITCH MOUNTING



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# Switch mounting

## MOUNTING OPTIONS

- External

Mounting arm

Wheelchair or tray

- On person

Hand splint/wristband

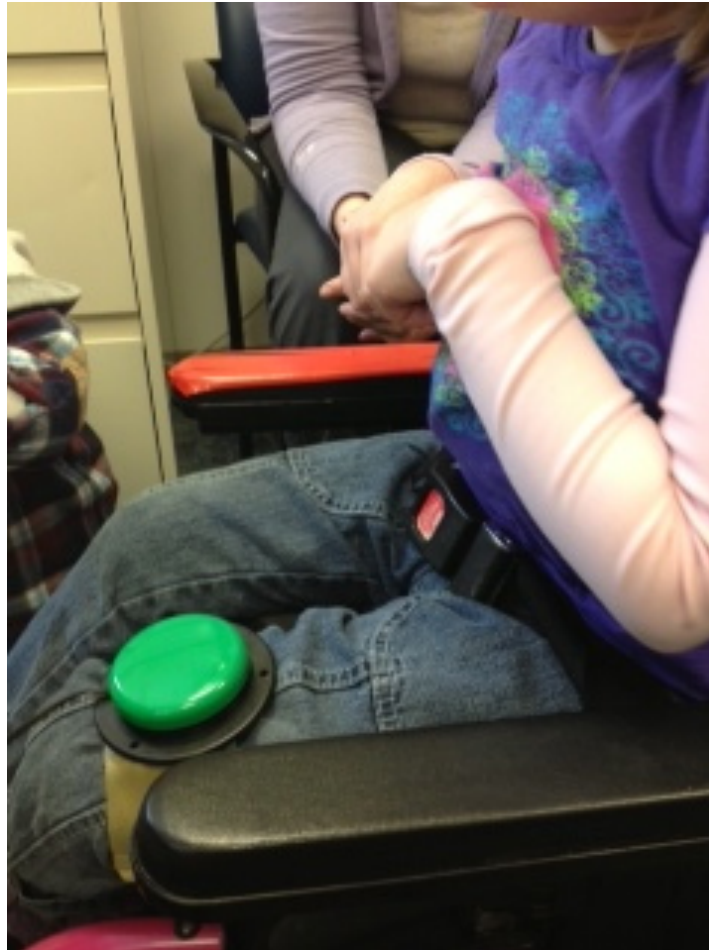
Ring/hair piece

Eyeglass mount

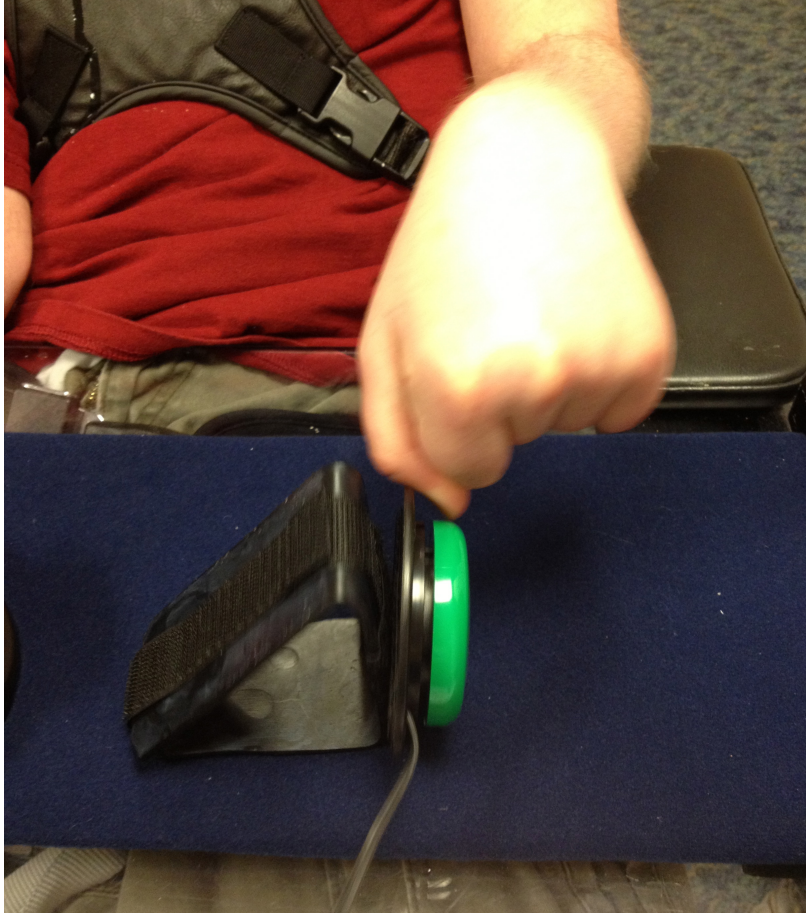
On trunk support



# Switch Mounting



# Switch Mounting

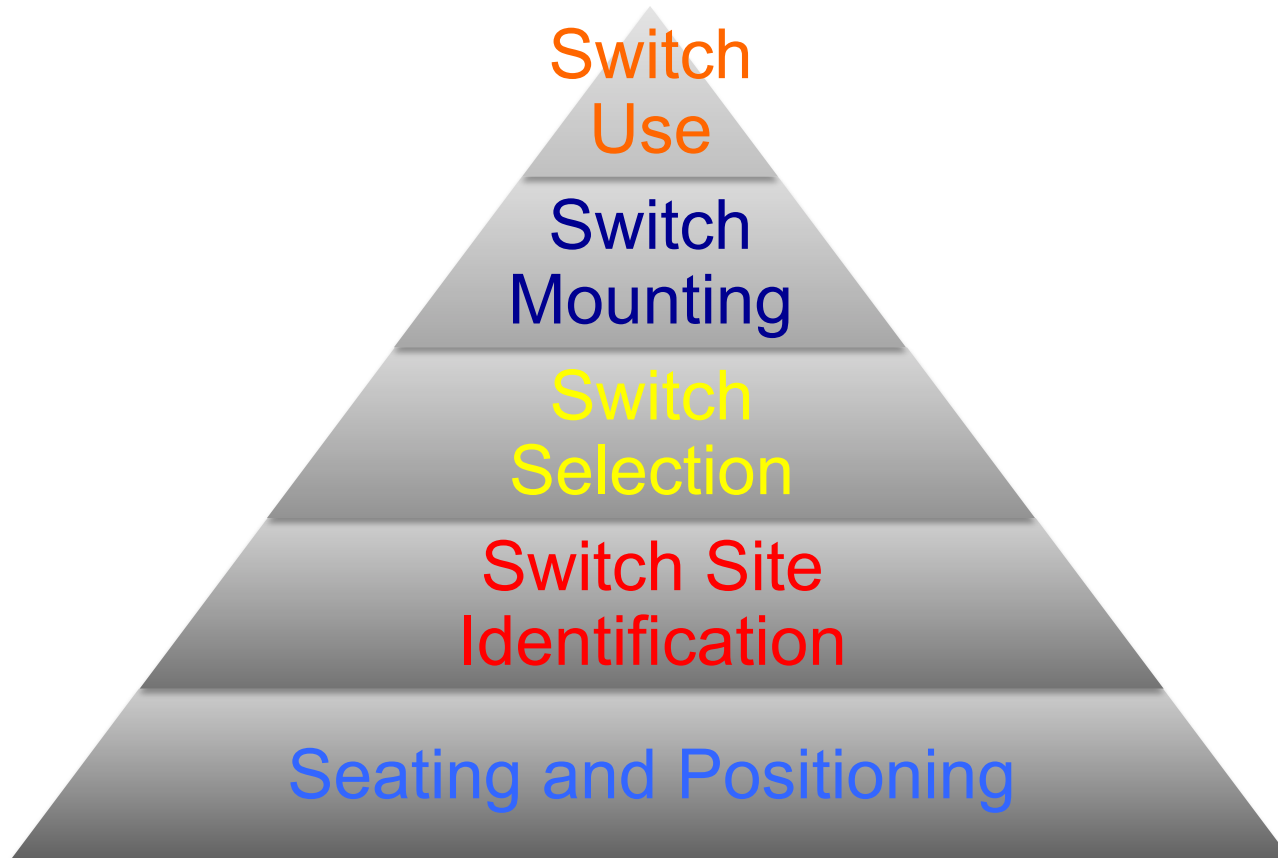




# Switch Mounting



# Foundations for Switch Access





# SWITCH MOTOR TRAINING



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# MOTOR TRAINING FOR SWITCH USE

Switch site training focuses heavily on developing new voluntary motor patterns, which takes a lot of TIME and PRACTICE.



**TENNIS**



**PIANO**



**SWITCH USE**

Whenever possible, work simultaneously on developing two (2) switch sites.  
Examples: Hand and head; head and knee, hand and knee

# STAGES OF SWITCH PROGRESSION

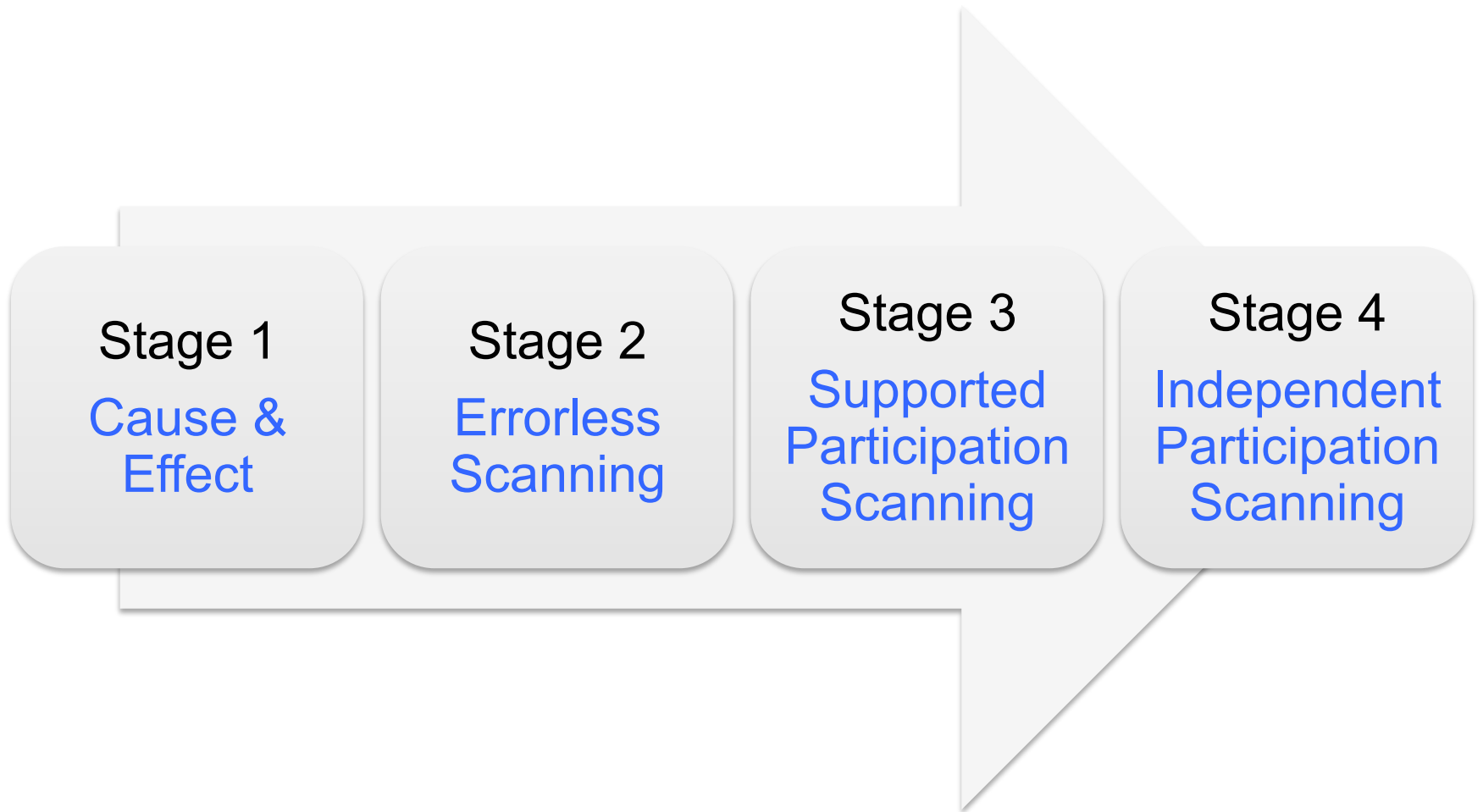


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# Stages of Switch Progression



# STAGE 1 CAUSE & EFFECT



	Cause & Effect	Errorless Scanning	Supported Participation Scanning	Independent Participation Scanning
Adult Supports and Scaffolding	Maximum – More backward chaining, external supports and feedback	Moderate – More scaffolding within a scanning system to facilitate success	Minimal – Scaffolding external supports are decreased and the child is able to make mistakes and adjust	None – Switch motor pattern is automatic and is no longer at a conscious level; therefore can focus on content
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# Stage 1 Cause & Effect

## Cause & Effect?

- ‘Simply put, developing cause and effect means helping a child understand that they are able to extend influence and control, over their immediate environment; that an action on their part can cause a response, either from other people, or from objects around them.’ (Bean, 2011)

# Stage 1 Cause & Effect

Here Lucy is using a switch of any kind for the first time during her initial AAC Assessment. We have positioned a blue buddy button at her head and positioned her in a tomato chair. The switch is connected to the MiniBeamer and we have it set on a timer. She enjoys the fan and instantly identified that her action of hitting the switch with her head activated the fan; she is motivated by this and although she initially fails to activate the switch she perseveres and is successful and satisfied with her new control.



# Stage 1 Cause & Effect

Here Lucy is requesting more as we are playing with her. She enjoys the light up balls and the singing and she is able to request more to help control her environment. When the Lucy activates the switch (the action) she elicit a response from people around her (the reaction) and we continue to sing and play with the light up balls with Lucy. The key skill here is that the she is aware that she made the effect happen by pressing the switch. We say “more music”, rather than “press the switch.” to help her make that connection.

# Stage 1 Cause & Effect

Cause and effect is not something that can be taught directly, rather our students develop their understanding through experiencing it in a range of different contexts.

Understanding cause and effect is one of the foundation stones upon which all future learning is built.

Once Cause & Effect skills have been established the child can be introduced to Switch Scanning – or a child may jump right to this step in the process

## SWITCH SCANNING OPTIONS



# Switch 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 / start from last scanned
- Acceptance & Release time
- Ignore repeated switch hits
- Number of Loops

# Switch Scanning Options

## Automatic scanning

- Least number of hits required
- Largest timing requirement
- Selections made within the pre-set time

## 2 switch step scanning

- Significant motor requirement
- Completely directive, less passive
- Minimal timing requirement

## Inverse scanning

- Reduces timing requirement
- Used when the release is the more coordinated action
- When maintaining a position is easier than repeating it



# Activity Modifications

- layout (color number of icons)
- feedback (auditory preview, magnify selection, speak at section)
- language presentation



# STAGE 2 ERRORLESS SCANNING

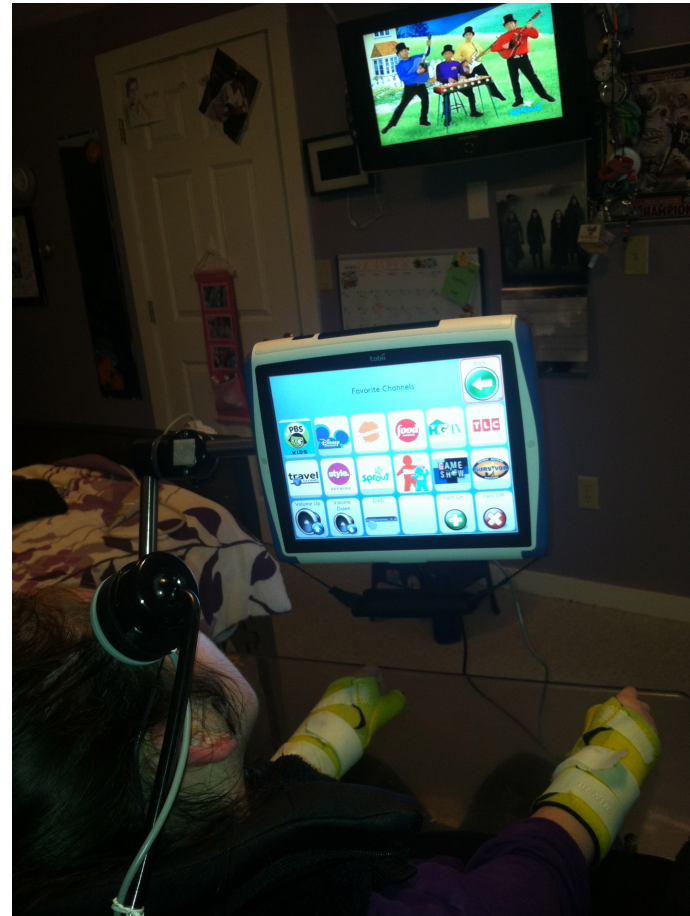


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# Stage 2 Errorless Scanning

- Errorless opportunities provide a judgment free time where students are exposed to and explore new concepts.
- The concepts can range based on the individuals current skill level
- No wrong answers or all preferred choices
- May only have one choice (the right choice) as others are foils
- Move navigation supports build within to facilitate success



# Stage 2 Errorless Scanning

Pick and Play

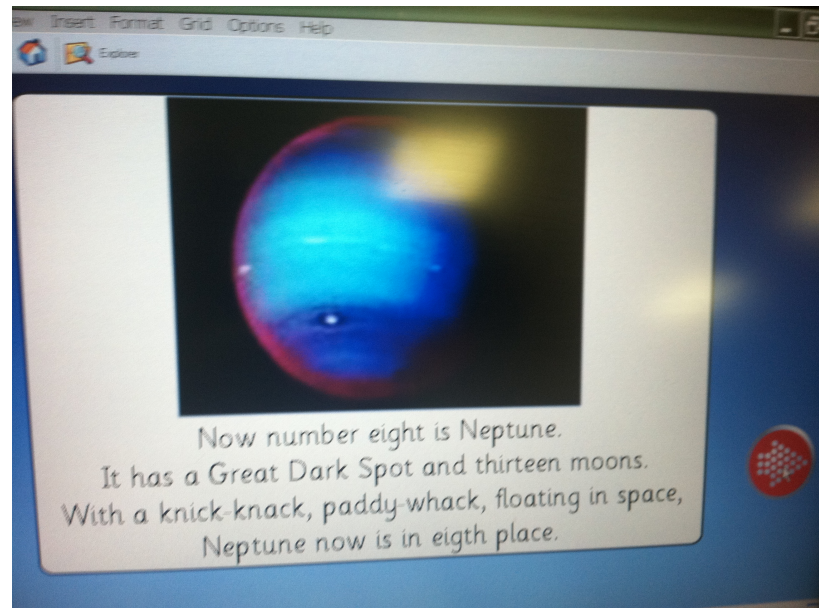


# Stage 2 Errorless Scanning

Here Amanda is using the buddy button switch at her head to be able to control “Listen” button in the Clicker 6 activity about the planets. As she hits the switch the book is read aloud to her and then the page turns. She must wait to hit the switch again until the page turns. She is motivated by both the activity which has a sing song rhythm as well as being videoed! 😊

# Stage 2 Errorless Scanning

We ensure that we keep the learner's concentration focused on the process of choosing, and avoid over-complicating the activity by requiring the learner to answer questions also.



# STAGE 3 SUPPORTED PARTICIPATION SCANNING



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# Stage 3 Supported Participation Scanning

- Supported participation is an activity in which the student needs and requires assistance to engage
- The supports takes away certain demand
- This type of activity allows a successful exposure to more advanced concepts

# Stage 3 Supported Participation Scanning

- Here Becca uses the iPad screen as her switch to scan thru the Predictable AAC app. She is well supported by the easy navigation into the phrase boards and how it is organized by category. The language and cognitive demands are at her functional level as we introduced this new switch activation for her.

# Stage 3 Supported Participation Scanning

- Here Mateo is using the red buddy button to scan thru preferred music activities, his selections magnify and have auditory preview; as he selects his choice “Lets sing a song on my step by step” he then uses a Step by Step switch to play his mother’s recording of his favorite song, which is very motivating for him.
- Here Mateo is using the red buddy button to scan thru preferred music activities, his selections magnify and have auditory preview; as he selects his choice “Lets sing a song on my step by step” he then uses a Step by Step switch to play his mother’s recording of his favorite song, which is very motivating for him.

# STAGE 4 INDEPENDENT PARTICIPATION SCANNING



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# Stage 4 Independent Participation

## Scanning

- Independent opportunities allow for the student to actively engage, initiate and direct.
- These opportunities require very little (if any) support from a clinician/educator/parent.
- In these types of opportunities, the modifications to the task and technology allow independent opportunities foster active participation and confidence.

# Stage 4 Independent Participation Scanning

Here Carolina a high functioning high school student, who typically uses eye gaze interaction on her SGD; uses her new candy corn proximity switch to scan thru her iPad using the new switch access in iOS7 to access class handouts and open them in her preferred Notes app



# Stage 4 Independent Participation Scanning

Here Devon uses a buddy button at her head to activate the cross scanner software to type her friend Chloe's name on an onscreen keyboard. She is motivated to be typing like her peers and continues even after she makes a mistake is very proud of herself when she completes her word.

If learners are working at this level, their scanning skills are already well developed. The aim here is to begin to embed the use of switch scanning into daily classroom teaching and communication. Always a compromise between the motor demand and access to language.

# 2 SWITCH SCANNING



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## 2 Switch Scanning

In this example Milan is being introduced to a new chin switch and is at the stage 1 cause and effect level...whereas, he has been a skilled switch user using his left foot and is at the stage 3 supported participation

The higher the motor demands (ie, his new switch learning) the lower the cognitive demands (i.e fun motivating activities such as rolling the dice to play a game)

# CASE STUDY



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# Case Study: Reese

11 year old boy in the 5<sup>th</sup> grade; general education setting with academic support and therapies

Lives with his parents, his typically developing twin brother and 2 other siblings

Likes watching and listening to sports, skiing, swimming, family



# Case Study: Reese

- Dystonic cerebral palsy
- Constantly changing, dystonic and extraneous movements
- Severe dysarthria
- Usually 4 extremities are strapped down to provide stability for head control and safety

# Case Study: Reese

As an outcome of the initial switch assessment, tongue and right thumb movements were identified as primary control sites.



# Case Study: Reese

Due to his constantly fluctuating, variable and involuntary movements externally mounted switches were trialed but then ruled out

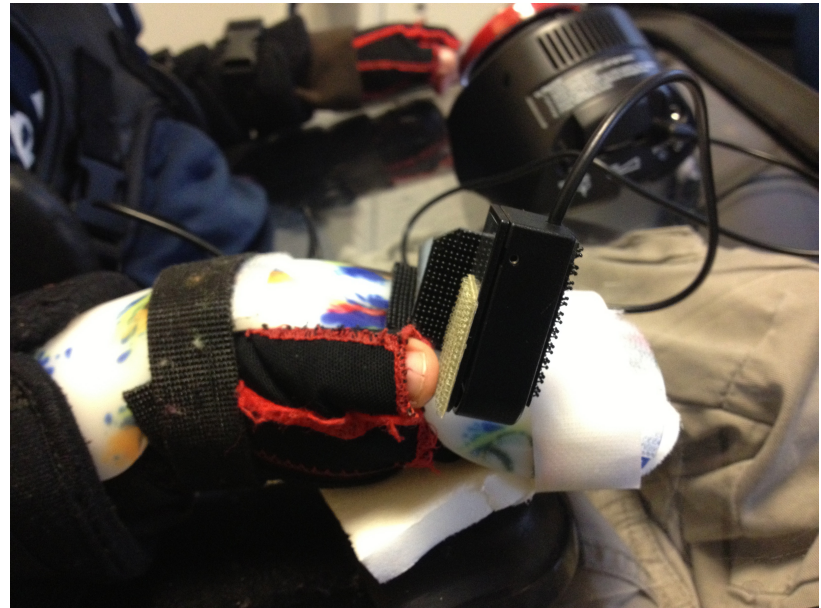
Need to go with “on-person” switch mount

Close assessment of all voluntary movement abilities—tongue, thumb action



# Matching switch features with Reese's profile

- **Size**- consistent with identified voluntary movement
- **Color**-not major factor
- **Built in feedback**- auditory click
- **Wire or wireless**- prefer wireless
- **Mounting options**





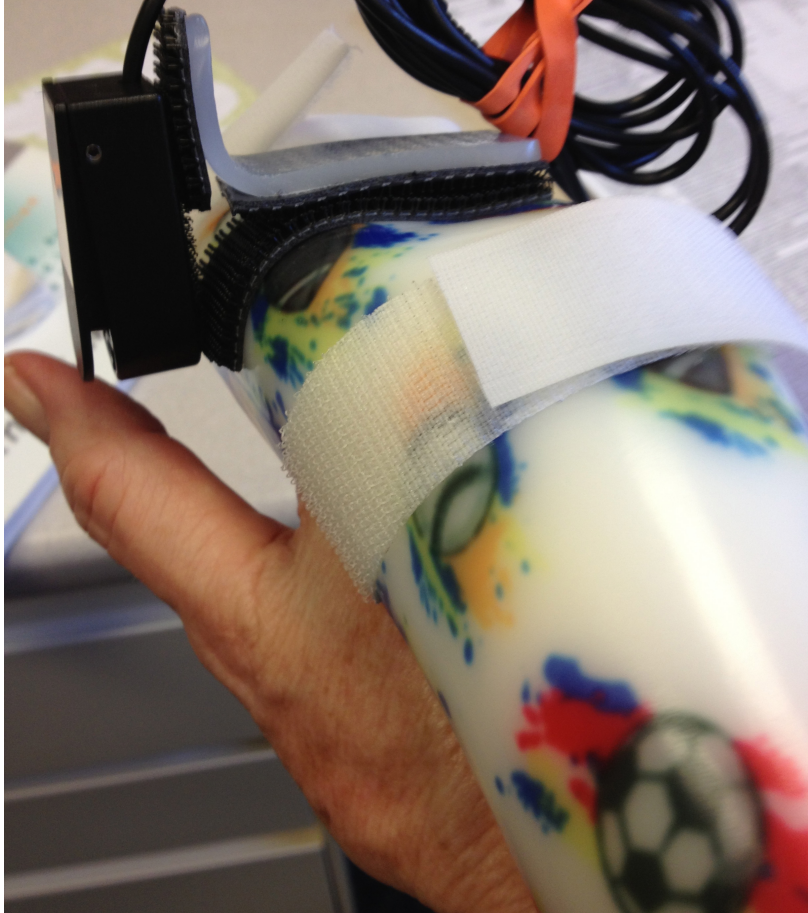
# Case Study: Reese



## Switch Assessments

- Buddy button at knee for abduction
- Buddy Button mounted under tray at knee for hip flexion
- Microlight mounted for tongue activation
- Infrared switch mounted on goggles for tongue activation

# Case Study: Reese



Prolonged trials with thumb activated switch

- Switch compatible with slight finger-thumb action
- Fabricate hand splint as stable foundation for switch placement
- Started at Stage 1 Cause & Effect to build competence

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# Case Study: Reese

## Stage 1: Cause & Effect

- In this example Reese is newly being introduced to using his thumb to activate a microlight switch mounted onto his custom splint to activate a step by step switch.

	Cause and Effect	Errorless Scanning	Supported Participation Scanning	Independent Scanning
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# Case Study: Reese

## Stage 2: Errorless Participation

In this example Reese continues to use the thumb switch after a few weeks of inconsistent success at school and in the clinic; he is using the thumb switch to activate the “listen “ button in to have the book Polar Express read aloud to him using the Clicker 6 multimedia software program. As you will see in the video he requires increased adult support and scaffolding within the clicker 6 activity to experience success.

# Case Study: Reese

- After a few months of right thumb switch access in Stages 1&2, we identified that Reese was getting frustrated with his inconsistent ability to activate the thumb switch independently.
- We reassessed switch sites, and determined that sip n puff may be another option to try.

	Cause and Effect	Errorless Scanning	Supported Participation Scanning	Independent Scanning
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# Case Study: Reese

## Stage 3 Supported Participation

Here Reese is now using his new sip n puff switch with sip as the single switch activation for scanning. He is doing a multiple choice activity from the website helpkidzlearn on a SMART Board in which there is only one correct answer and 2 incorrect answers; he is motivated by the instant auditory and visual feedback.

	<b>Cause and Effect</b>	<b>Errorless Scanning</b>	<b>Supported Participation Scanning</b>	<b>Independent Scanning</b>
<b>Adult Supports and Scaffolding</b>	Maximum – More backward chaining, external supports and feedback	Moderate – More scaffolding within a scanning system to facilitate success	Minimal – Scaffolding external supports are decreased and the child is able to make mistakes and adjust	None – Switch motor pattern is automatic and is no longer at a conscious level; therefore can focus on content
<b>Content</b>	Highly motivating activities	Fun & motivating activities	Higher cognitive & language demands	Highest cognitive & language demands
<b>Activities</b>	Toys, music, EADLs	Multiple choice on computer, preferred & errorless choices	AAC device and/or computer	AAC device and/or computer





# Case Study: Reese

## Stage 3-4 Supported/Independent Participation

Here Reese is using his sip n puff switch for his first trial of a Tobii I12 SGD in his classroom setting. The activity is scaffolded for him as He requires adult support and cuing to navigate to the correct button in a field of 15 only 6 active buttons but is able to independently use his switch which he has mastered

# Case Study: Reese

## Stage 4 Independent Participation

Here Reese has improved his switch mastery and we were able to increase the cognitive and language load as he uses the Clicker 6 program to write a paper about himself.

# Case Study: Reese

## Current Update:

- Ongoing AAC device assessment & trials
- Developing switch mastery skills thru single switch 'sip' scanning for computer access and video gaming
- Introducing 'puff' as a 2<sup>nd</sup> switch access site for 2 switch scanning
- We are continuing to assess the best SGD option for him now that he is a stage 4 independent switch scanner.
- Reese is currently developing his switch mastery using his sipnpuff switch for an adapted video game controller and his computer, using only the sip function for switch scanning;. We are now introducing a second switch access using the puff function as well to allow for trials of 2 switch scanning

# References

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# Thank you!

## Keep in touch!

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