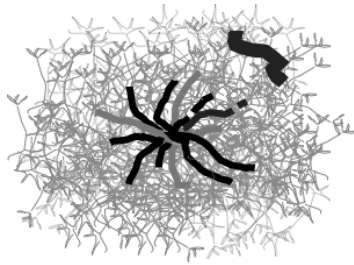


Two Switches for Success: Access for Children with Severe Physical and/or Multiple Challenges

How Do Children Learn?

- Learning is connecting intent with movement (movements can be a thought, sound, vocalization, reach, eye-gaze, head turn, deliberate breath, stabilizing)
- Learning is enhanced by attention to relevant components (visual, auditory or tactile)
- The child is born with billions of neurons and trillions of neurological connections
- Input that is relevant, reinforcing and/or meaningful helps strengthen and make neurological connections
- Through experience, children learn by creating/building/expanding sets of neurological connections known as a neural network or cognitive schema and they use these cognitive schema as the basis for understanding new experiences.
- "What Fires together, Wires Together"
- Learning is the process of strengthening connections, adding connections and discarding connections based on experience (The child's cognitive schema for a particular concept is strengthened, expanded and refined)
- "Use it or Lose it!"
- Neural Networks or Cognitive Schema represent understanding about a concept that is processed in many areas of the brain to give a rich representation of all the aspects of that concept. For example, neurological connections related to one concept may extend to areas of the brain that process: visual, auditory, tactile, kinesthetic, olfactory, gustatory, vestibular, proprioception, function, cultural considerations, context and other associated concepts.
- Once a neural network or cognitive schema is in place it operates unconsciously in the background until there is a reason to pay attention to it
- Attention to any aspect of that cognitive schema immediately gives the person access to everything connected to that concept
- Experiment with multiple modalities, presented simultaneously, sequentially or singly - based on child's responses and environmental conditions. Some children who have Cortical Visual Impairments, as well as some children on the autism spectrum, can not handle all multi-modal input at once, and may do better with input presented sequentially.
- It is critical to teach concepts within natural contexts so that neurological connections for a given concept will be "wired" together for access later
- Retrieval of memories is based heavily on context when information was learned and how it was associated with existing knowledge



Schematic Drawing of Neurological Cognitive Schema vs. Isolated Connections

How Can You Help Children Develop Rich Neural Networks and Cognitive Schemas?

- The brain looks for patterns and changes in patterns
- Memory is stored as patterns, not details. We don't have a video recording of all our past experiences
- Routines become patterns
- Patterns can be: Visual, Spatial, Auditory, Tactile, Kinesthetic, Temporal, Procedural, Cognitive, Linguistic, Multi-Modal, etc.
- Patterns are learned through experience - not isolated drills
- When we "See" a Difference in an Expected Pattern, We are Compelled to Attend to it and Process it!
- Learning Occurs When the Brain Compares an Incoming Pattern with an Expected Pattern and Detects a Difference
- Music, Rhythm, and Rhyme can be used to Emphasize Patterns
- Technology Can Emphasize Patterns and Comparisons
- Help children recognize a pattern and then change it moderately to maintain attention and encourage curiosity

The brain is pre-wired to look for patterns and make comparisons to what is known



Work towards Mastery Motivation:

Mastery Motivation: "a psychological force that originates without the need for extrinsic reward and leads an infant or young child to attempt to master tasks for the intrinsic feeling of efficacy rather than because of recurrent reward" (Morgan, MacTurk, & Hrnacir, 1995, p.6)

- Mastery Motivation is intrinsic motivation
- Children Need to See a Reason for Doing Something
- When a child wants to do something, her brain actually acts more efficiently and that task becomes easier for the child
- Being too helpful or rewarding dependency behaviors can reduce mastery motivation and lead to learned helplessness
- Role of teachers, therapists and para-professionals is to facilitate independence, active engagement, and support for problem solving

- Expectant wait time, without pressure, can allow the child time to process and respond with her own motivation. (Keep extraneous verbal clutter to a minimum)
- External rewards and reinforcers can reduce mastery motivation and shift child's attention away from task toward the reinforcer. It is more effective for the activity to have relevance and intrinsic motivation.
- Empty praise is NOT helpful. Praise a child for specific and active efforts. Constant cheer-leading, when the child hasn't done anything, can be confusing to the child and will make praise less effective. Well targeted praise, with clear feedback, helps the child recognize her own accomplishments
- Set up Problem Solving Opportunities
- Mistakes are an Important Part of Learning
- Provide strategic feedback instead of direct prompts
- Modeling or taking turns is an effective teaching strategy
- Peer modeling is even more effective
- Reducing the pressure of testing situation and using a play experience instead, can help the child make use of more skills and be more likely to practice them on his own
- Recognize the difference between Testing and Teaching
- Children learn by doing
- Emphasize Experience - not drills

Motivation for Learning:

- Nobody does anything without a reason that makes sense to them at the time - including young children and children who have severe and profound challenges
- Motivation for learning comes from within a person - It is different from just having fun or being entertained

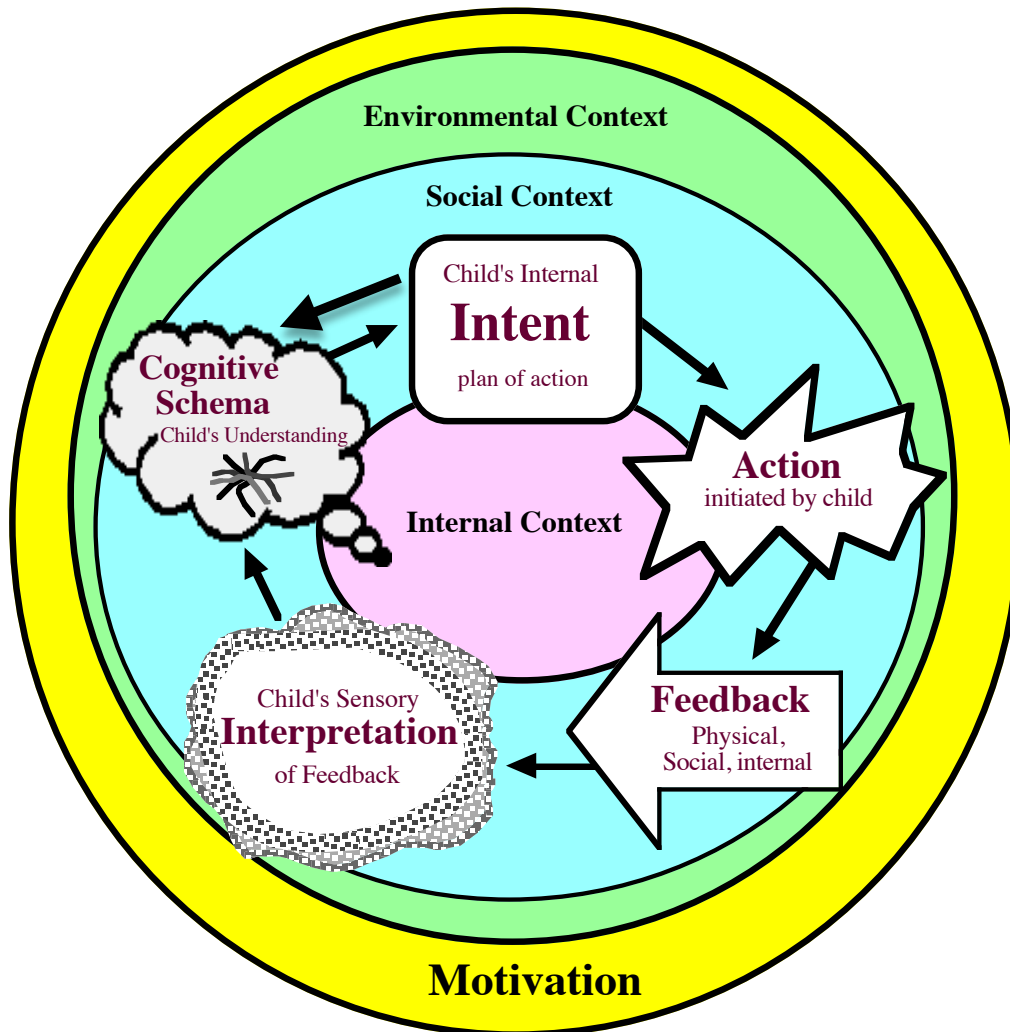
Inborn Drives:

- 1. Curiosity and Intrigue**
- 2. for Autonomy and Sense of Self**
- 3. Social Connection.**

Cognitive / Motor Active Learning Cycle

- **Intent** - internal to the child and starts with a plan of action based on cognitive schema, or what the child knows from past experiences
- **Action** - may be a movement, gesture, vocalization, word, symbol, etc.
- **Feedback** - the action results in feedback from the environment: social, physical, as well as internal
- **Child's interpretation of the Feedback** - based on sensory systems, processing skills, and integration of sensory input

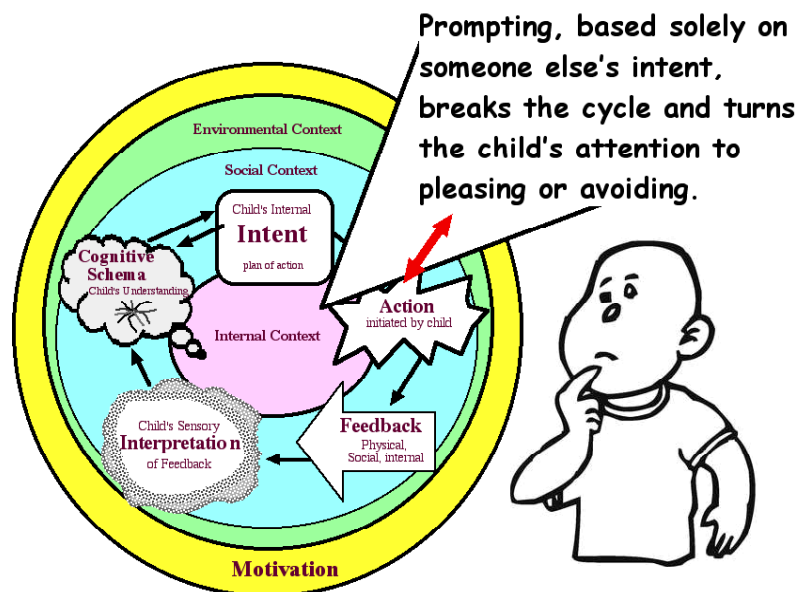
- **Cognitive Schema** - the child adds to, or modifies, the existing cognitive schema based on the relationship of this new understanding to known experiences
- All of this takes place within a **social, environmental** as well as **internal** context
- **Motivation** determines the child's intent. Motivation is key to keeping this cycle going and may come from the social, environmental, or internal context.



Where things can go wrong?

- Limited cognitive schema (lack of learning from experiences) on which to construct intentional actions
- Lack of motivation: social, environmental, or internal
- Problems with motor planning, difficulty disassociating movements, or apraxia can limit the effectiveness of the child's action, in terms of the original intent.
- Distorted interpretation of feedback due to differences in sensory systems, processing or integration

- External physical and verbal prompting can interrupt the active learning cycle by prompting an action form the child that is not based on internal intent.
- Prompting, based solely on someone else's intent, breaks the cycle and turns the child's attention to pleasing or avoiding.
- Too much external prompting unrelated to the child's intent, doesn't reinforce cognitive schema, but instead focuses the child's intention on looking for cues from the prompter.
- More powerful to provide strategic, focused and personalized feedback to the child's actions



Providing Repetition with Moderate Differences:

- Start with Known Information and Build Systematically
- Cause and effect learning - baby scientists - Hanus Papousek (1969)
- Problem of habituation (Boredom develops with too much repetition that is not child-directed)
- Repetition is necessary for learning.
- Too much repetition can cause habituation
- Balance of Novel and Known
- Children learn by a process of gradually adding to what is known through comparisons and patterns.
- Help the child build associations and comparisons to known information
- Start with what the child understands. Patterns that make sense, and then provide repetition with moderate difference
- This taps intrinsic motivation and assists learning
- Helps the child relate new information to familiar information and build associations

- Personalize materials and use preferred items
- Set up activities for the child to use a combination of previous knowledge and trial and error to achieve success.
- Provide computer activities that allow the child to read with different voices to encourage repetition with variety

Active Participation and Active Learning

- Active learning is vastly more effective than passive participation.
- Children with significant challenges, may become passive learners when they have difficulty communicating, interacting and/or understanding what is going on around them.
- Sometimes these children cruise through the day as a passive passenger, never needing to pay attention to the road or even helping with navigation of where they are headed. (Guided Tour vs. Following a Map)
- Children who have significant disabilities are cared for and entertained regardless of their participation level.
- This happens sometimes in inclusive settings if the main objective is social exposure rather than real learning goals.
- It can happen in a self-contained setting, where the routine may be so structured and predictable that there is little room for change, surprise or problem solving
- The problem is that learning is less likely to take place when the child is in a passive role.
- Teachers and therapists need to think outside the box and create participation opportunities within activities.
 - Active participation is increased by providing opportunities for control and making choices that will effect the child's experiences.
 - Provide opportunities for control, by setting up child-directed activities and following the child's lead. Children need to see a reason for doing something
 - Provide adaptations and modifications to enable active participation
 - Prompt Least to Most to encourage initiation and active participation
 - Limit or eliminate hand-over-hand assistance - try to support movement initiated by the child, instead of prompting the initiation of that movement
 - Provide Strategic Feedback instead of Direct Prompts
- Children need to feel a sense of competence
 - Teachers and therapists can engineer opportunities for children to feel competent, by creating activities in which the child can easily relate his efforts to the success of the task.
 - A range of assistive Technology from Velcro™ to computers can provide a means for children to accomplish physical tasks.



Problem of Learned Helplessness and Passivity

- Children who have not experienced much control and/or many successes in their lives can develop passivity and learned helplessness.
- Over time, the child can begin to see herself as a passive participant who is not able to be actively involved in learning.
- The child may focus his/her efforts on pleasing others, and become prompt dependent
- Once children develop learned helplessness, it is very difficult for the child to change his or her self-image
- Active participation in the learning process helps child to begin to experience some control
- Multiple and ongoing successes with active participation are needed to rebuild a feeling of "I can do it!"

Engineer Choices and Control for the Child

- Provide multiple opportunities for meaningful choices and opportunities for control throughout the day - enable the child to feel "In Control"
- Choices must matter to the child and must be different enough from each other that they can be easily discriminated
- Provide children active experiences with early computer play where the child can direct the actions of the computer through simple choices and then observe and experiment with the results.
- Allow for self-directed repetition instead of adult directed repetition.
- Use anticipated wait time
- Provide strategic feedback, instead of prompting what to do
- Making choices helps to increase cognitive engagement and reduce passivity
- Provide appropriate means for learning to make choices: eye gaze, two hands, body touch points (Dale Gardner-Fox), talking switches, partner listing, etc.
- Use two switches with two different functions to allow the child to explore choosing each and observing the effect - Discovery learning / problem solving
- Set up choices for who, what when, where, how, and how many - within any activity
- Choose actions instead of just objects - actions can have a natural duration, that may lead to natural desire for repetition, objects have to be removed to be chosen again
- Remember that no choice is a choice
 - None of those
 - Something else
 - I don't know / I'm not sure
 - I don't understand the options

NOTE: Choice is powerful for active participation and increasing a sense of competence, but it should never be considered enough to be a child's communication system. Children who are non-speaking need a robust language system that they can learn and grow with over many years - one that will result in them being able to say what they want to say, when they want to say it. Language development involves having efficient access to sufficient vocabulary, with a variety of communicative functions. The child needs to be able to act upon an internal intent to communicate what really matters them at the time, not merely select one of several options presented to them, based on someone else's intent. Pragmatic Organization Dynamic Display or PODD (Gayle Porter, Melbourne, Australia) is an example of a language system that ranges from very early language levels through complex syntax and can be modified for multiple access methods.

Engineer a Sense of Control

- Create a feeling of competence - "I can do it!"
 - Start with what the child can do successfully and build on that
 - Provide Scaffolds and Strategic Feedback instead of Direct Prompts
 - No one likes to be told what to do
 - Limit or eliminate hand-over-hand assistance - try to support movement initiated by the child, instead of prompting the initiation of that movement
 - Helping too Much Can Lead to Passivity
- Children Need to See a Reason for Doing Something
- Set up options for problem solving "Failure Free with Feedback" (Karen Erickson)
 - Use two switches with two different functions to allow the child to explore choosing each and observing the effect - Discovery learning / problem solving -
 - Two switches create cognitive engagement and problem solving - one switch is just a task - only choice is to do it or not do it

Getting Past Prompt Dependency:

- Learned helplessness and prompt dependency can be major barriers to learning
- Prompting, based solely on someone else's intent, breaks the internal learning cycle and turns the child's attention to pleasing or avoiding. The child may then look to others for cues instead of trying to figure things out for himself.
- Model what you would like the child to do, take a turn as a participant, not an instructor.
- Use clear multi-modal but simple **feedback** for the child's intent, instead of giving complex instructions
- Engineer environment for student initiation - Use sabotage and plan problems to solve. Assist the child, once her intent is clear, but when the action is too difficult.
- Follow a prompt hierarchy of least to most: (unless child's behavior is dangerous to self or others)

- pause, pause, pause
- environmental cue
- expectant delay
- gesture or point
- model
- indirect verbal cue
- verbal prompt
- partial physical prompt (following the child's intent - allow child to finish movement and respect child's sensory processing differences)
- full physical prompt (Use sparingly - physical prompts can actually interrupt intention and cause more problems because of tactile/kinesthetic processing differences and distraction from intent)
- Provide opportunities for self-directed repetition within a carefully scaffolded environment - provide supports that allow for trial and error with good feedback
 - Adult directed: habituation, boredom, anger, frustration, feeling of powerlessness. (difference between getting bored with something and assimilating something)
 - Child directed: as needed to assimilate concepts, to practice new skills, to feel a sense of "I can do it" and show someone else their accomplishments (share the joy)

Motor Cognitive Learning

What does Research Say About What is Most Effective in Learning a Motor Task? (Adapted by Burkhart and Hanser)

- Initiation of intent from within the child - often generated in response to the environment or social context. (This is not passive participation or hand-over-hand.)
- Problem solving opportunities for trial and error and child-initiated correction or adjustment to errors.
- Practice and repetition with a purpose. (Studies show increased motor accuracy and ease when there is a purpose)
- Thousands of repetitions with variation (moderate differences)
- In the past we went on a 'switch hunt', trying to find the perfect switch and the perfect site to position the switch
- Myth: "We just have to find the perfect switch placement."
- Reality: We have to find some good possible switch placements and provide opportunities for the child to learn how to use them.
- Its Not About Finding the "Perfect Switch Site"

- Its About Finding the Best Switch Sites to Learn to Use
- Work with PT and OT to find the optimal position for a child, to give enough stability with allowing some movement
- Stepping Stones to Switch Access (Burkhart)

The Juggling Act

- Working Memory can only deal with a limited amount of information at a time
- Cognitive attention is needed to focus on anything that is not automatic
- To be able to communicate effectively, many individual components must be coordinated. For example:
 - **Sensory-motor demands:** motivation, strength, motor planning, muscle tone, endurance, motor automaticity, auditory filtering, auditory processing, tactile processing, proprioceptive processing, reaction time, visual discrimination, visual scanning/memory, visual tracking, integrating multiple sensory inputs.
 - **Cognitive demands:** motivation, cause/effect, initiating, discriminating purpose and function, developing cognitive schemas, making active choices, trial and error, problem solving, memory
 - **Language components:** motivation, processing of language in activity, relationship to and monitoring of the communication partner, pragmatics, processing of questions, auditory filtering, processing of symbol set, syntax/grammar, attention to task, memory
- Juggling means that the child may only have some of the 'balls in the air' at any given time, and having all the 'balls in the air' will be rare. **This explains why performance is so inconsistent and can not always be predictably repeated**
- We need to take successes and move on, as opposed to requiring repetition of the task over a given number of trials - Meaningless repetition produces boredom and habituation and thus produces inconsistent test results
- Provide opportunities for repetition/practice within natural contexts without pressure. Use variation and natural motivation



Developing Automaticity

- Automaticity is the ability to perform a particular task without thinking - which allows you to focus on other things
- Problem of available working memory - what to focus on?
- Getting to a point where cognitive efforts can be redirected from the motor skill to the content of the task
- Team Planning and coordination for consistency
- Practice and repetition with moderate differences and purpose

Parallel Programming

- If we wait for everything to develop in a coordinated fashion, you will be waiting forever
- We don't want to hold the child back in one area because of deficits or difficulties in other areas
- We need to be careful that we continue to develop rich cognitive schemas and not just splinter skills
- The answer to this problem is to work on individual components in parallel. Use functional and natural contexts to give the child opportunities to develop skills, where only one component is cognitively challenging them at a time. Provide a variety of these types of activities that challenge the child in all areas of development, but mainly just one at a time. Help the child make associations see the relationships between skills that she is developing. Agree as a team on long term direction
- Focus on one component or skill with each activity
- Reduce motor load for difficult cognitive or language tasks
- Reduce cognitive load for motor learning tasks
- Red / yellow / green - balance the (motor/cognitive) difficulty requirements of each components of any task. Only have one red component for any activity (Karen Erickson)

Juggling Explains Inconsistency of Performance

- Need to take successes and move on, as opposed to requiring repetition of the task over a given number of trials
- We need to be careful not to get stuck trying to 'prove' mastery
- Provide opportunities for repetition/practice within natural contexts without pressure. Use variation and natural motivation
- Myth: Children Who Face Severe Challenges Need a lot of Physical and Verbal Prompting.
 - Reality: It is more effective to provide strategic feedback than to prompt.
 - Reality: Prompts can interrupt the thinking process.
 - Reality: Modeling in Context is more powerful than prompting

Stepping Stones to Switch Access

Stepping Stone Process

- Sequence of skills - fluid not rigid
- Child may use several steps during one activity: starting at one level to warm up and get oriented to the location of switch(es) then move to a higher level for practice at current learning level, but also explore some higher levels when doing well and within the context of some extra modeling. Then, the child might move back down to a comfort level when fatigue starts to set in, so the child can end on a feeling of success and accomplishment. (The adult observes the child throughout and moves them up and down as needed)
- The higher cognitive demands of an activity the lower the Stepping Stone may need to be for that activity
- The lower cognitive demands in combination with increased motivation of an activity, may allow the child to work on a higher Stepping Stone.

Step 1: Single Switch - Cause and Effect

- Child begins to associate an intentional movement with the ability to cause something to happen
- Children often have difficulty learning cause and effect through prompting.
- Cause and effect is learned through experience, not teaching, so our job is to create adapted meaningful experiences for them to learn cause and effect.
- Begin with accidental switch activation using an existing motor pattern
- Place switch in a location where the child can independently experiment with the concept of cause and effect using existing motor patterns
- Learning a new motor pattern and learning cause and effect at the same time is often too much new
- Once the child understands cause and effect, new motor patterns can be shaped and facilitated - using the cognitive understanding of "why move" as a motivator
- Use momentary/direct activation to get started so the child can easily learn to associate her movements with the effect (Switch Accessible Boombox - Judy Lynn, Rad Sounds - RJ Cooper, Everybody Has Feet - Marblesoft / Simtech)
- Do not use a delay-timer until it is clear that the child understands the cause and effect of the switch. Then, use a delay timer if needed to make the results worth the effort. (You may want to begin sessions with a few minutes of direct activation and then moved to timed activation)
- Short timed segments for more active engagement (Software that plays for longer than 6- 10 seconds after switch activation is not good for cause and effect learning. That software may be good for recreational and leisure activities instead.)

Step 2: Single Switch - Multiple Locations and Multiple Functions

- At this step, child understands simple cause and effect but needs practice intending and executing a movement for different purposes or with different body parts, or when a switch is moved to a new location or used for a new function.
- Practice activating a switch in multiple locations with a variety of body parts
- **NOTE:** Having options of more than one switch access point is better for long term orthopedic integrity and to prevent repetitive motion disorders later in life
- Develop some motor control and beginning motor automaticity, through repetition with moderate differences - without the stress of timing
- Focus on general social and pragmatic timing - instead of motor timing: reduce pressure for timed control - allowing problem solving to occur in the motor learning of switch activation
- Use a switch for multiple clear intents
- Give battery operated toys a mission - Help the child see a meaningful purpose in activating a switch
 - Battery powered doll pushing a push toy to deliver snack
 - Battery powered pig knocking over blocks
 - Battery powered penguin kicking a ball to a friend
- Create and use co-planned sequenced social scripts with the child, for switch
- Operate a battery powered spinner to play a game
- Practice with variation, control and intent in natural contexts

Note: Strive to achieve a balance between leaving a switch in one place long enough for the child to accommodate to it, and experimenting with moving the switch to alternate places for the child to learn to use.

Step 3: Two Switches - Two Functions

- At this level the child is learning to understand that two switches do two different things. (developing cognitive skills of discrimination and memory)
- Increase motivation by increasing cognitive engagement and control
- Two switches introduces the element of meaningful choices instead of 'do it or don't'
- Two switches trial and error (One works, one doesn't) (Inclusive TLC Software - Switch-it Series)
- Two switches positionally related to function - Object Permanence (Left Right Switch Activities on Two Switches to Success CD) (Inclusive TLC Software - Switch Skills for Two - Set 1)
- Two switches social turn talking
- Two switches / two functions (See Stepping Stone 3: Early Songs and Play CD)

- Two switches for related objects or two functions on one object (Switch Skills for Two - Inclusive TLC, and Learning to Two switch step scan - Judy Lynn)
- Appropriate pragmatic use of each function during an activity
- One switch activating toy, computer story, or song and one making social comments

· **Examples of Two Switches - Two Functions:**

· **Light Tech:**

- One switch toy and one voice-output device (single message or step by step)
 - pig knocks down blocks - voice output: "build it up!"
 - penguin kicks ball - voice output: "throw it back to me"
 - spin art - voice output "ask me what color I want" or "look at this!"
 - battery powered bubble blower / "More bubble stuff"
- Two toys that bump into each other or interact in some way (race)
- Game spinner switch and voice output comments
- Two voice-output devices with different functions

· **High Tech:**

- One switch computer, one switch related toy or voice-output device
- Classroom Suite, IntelliPics Activities - two switches two functions from an overlay. (Use Overlay maker to define switches from any overlay. Copy and paste Key Content from existing buttons on the overlay to Switch Content for any switch)
- Classroom Suite, PowerPoint, IntelliPics Studio, Online storybooks with cursor placed on next page button, or other computer software stories that advance with one switch. The second switch can be a voice-output device for a repeated line, sound effect, or to comment about the story.
- Two separate but related activities on the screen in a computer activity (Switch Skills for Two - Inclusive TLC; Learning to Two switch step scan - Judy Lynn; Two Switches to Success & Early Songs and Play - Burkhart)

Types of Scanning - to increase choices and control

- Automatic Scanning
- Inverse Scanning
- Step Scanning with a Delay
- 2 Switch Step Scanning
- Morse Code

Why Two Switch Step Scanning?

- Eliminate need for Timing
- Requires less Concentration / Allows for more Distraction
- Allows Time for Cognitive Processing
- 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 that don't require some type of timing

Different Cognitive Levels:

- Some children have difficulty moving to two switch step scanning because they do not yet understand the cognitive task. The goal for these students is to provide them with graduated experiences so they can experience success in learning the task of two switch step scanning. These students will go on to Stepping Stone 4.
- Some Children will understand the concept of 2 Switch Step Scanning, as soon as they are shown how it works. They may require additional practice to develop the automaticity of motor skills. These students will go on to Stepping Stone 5.
- Some children have difficulty moving to two switch step scanning because of the motor component, even though they cognitively understand the task. The goal for these students is developing and refining the motor skills while maintaining motivation for continued success, so they can use two switch step scanning to learn a variety of curricular content. Go to Step 5 or 6.
- Some children have difficulty moving to two switch step scanning because of passivity and learned helplessness. For these students it is especially important to provide purposeful activities with which they can experience control and success. Refer to motivational factors discussed earlier in this handout.
- Some children have a combination of motor and cognitive challenges and it may be difficult to know if they understand the task or if the motor component is too difficult. The goal is to find motivating activities, tied to what they do understand and relate to, and then add moderate challenges to gradually increase their skills. These children may benefit from working on Stepping Stone 4 activities.

Step 4: Learning to Two Switch Step Scan (For children who don't understand Two Switch Step Scanning)

- Move, move, move, get: The focus here is understanding that one switch moves something along a path (by repetitive activations) and the other switch selects or "gets it" based on the moved item arriving at a given destination. (Note: children

who do cognitively understand this process, but simply need more practice to develop motor automaticity, should skip this step and move on to step 5.)

- One switch is the "mover" or "lister" and one switch is the "get it" or "selector" switch
- Children who don't understand the concept of two switch step scanning, may need this intermediate step to experience one switch as the mover and one switch as the selector.
- These children may appear to activate the two switches randomly and without discrimination of function.
- Use battery powered toys to move to a location for a play purpose. Use a delay timer that moves the toy a short distance for each activation. (rotating plate)
- Provide experiences where one switch moves something on the computer screen and the second switch activates something in relation to where the item has moved. Allow only one switch to work at a time, so that if the child tries the other switch, the natural lack of feedback will direct her back to the first switch. This is in contrast to typical two switch step scanning where the movement on the screen or display is simulated by a light or highlight showing one item after the next. Some children may have trouble seeing this as movement.
- 'Move - Get' activities on the computer (Switch Skills for Two - Inclusive TLC; Learning to Two switch step scan - Judy Lynn; Two Switches to Success & Early Songs and Play - Burkhart; Step 5 and 6 in two switch mode of Access Ability - SoftTouch)

Step 4a: Side Step: Single Switch with Timing

Note: Following this step may lead to variations of steps 5-8 for automatic scanning, inverse scanning or step scan with a delay

- Some children develop an ease of activating a switch that indicates they will be able to activate a switch in a timed mode. This implies that activation of the switch is now automatic, and the child can focus on the activity vs. the switch. For these children, you may want to probe this ability by presenting simple single switch activities that require timing. Experiment with automatic scanning, inverse scanning and single switch step scanning with a delay
- Observe these children closely to make sure they are successful enough to stay actively involved. If they get discouraged, consider going back to two switch step scanning.
- Motor fatigue is a factor to consider with 2 switch step scanning. However, if the child has not achieved automaticity of switch access, increased active involvement and control of 2 switch step scanning may outweigh the downside of fatigue. Consult the child's OT and PT for help with positioning and switch placement that will reduce fatigue and work to build endurance over time.

- Automatic scanning may require less motor effort for some children, but is often cognitively more fatiguing because of higher demands on concentration, holding attention to task, and timing of motor movements
- If a child hasn't yet developed enough automaticity for switch activation, you may want to keep them on the path of two switch step scanning, until if and when, they can be more successful with timed activation.
- Children who have good timing skills may follow a similar sequence to steps 5-8, but with the access of single switch automatic scanning, inverse scanning or step scan with a delay.
- Other children may not be ready for a timed form of scanning until step 8, at which time, they may have developed enough motor automaticity with a switch to be successful with timed scanning.
- Some children may always be faster with two switch scanning and never use a timed scanning. Other children may eventually do better with single switch scanning - even if they don't start there.
- At this step, it is helpful to be modeling actual step scanning when choosing an activity to use with the child. For example, use a launcher or a menu of games with the child's switches, to select one activity for the child to play with. The strategy of slow motion or pausing before the second switch is also effective here, to encourage active involvement during the modeling.
- *Avoid direct verbal prompts such as "get this switch" and use more nonverbal, natural cues and slightly delayed feedback: "You moved it", "it is almost there", "it's there", "you got it!"

Step 5: Two Switch Step Scan Errorless Learning - any choice works

Note: The term "Errorless Learning" has recently been used in research and products for a very different meaning. Some people are using the term to describe a teaching method that eliminates any problem solving or mistakes and only allows the child to indicate a correct answer. This is not what I am talking about here! Karen Erickson, recently used a better term for describing what I am trying to convey. She uses: "Failure Free with Feedback"

- At this level the child may be learning to understand how two switch step scanning works and/or if they may already know how it works, but they are continuing to work on automaticity for switch activation as well as develop automaticity for the motor coordination of the process of step scanning
- This type of activity offers the child a variety of choices through two switch step scanning, but any response is accepted as the child plays or creates a story, rhyme or errorless letter. (IntelliTools Classroom Suite - a wide range of possible activities on the Activity Exchange; Two Switches to Success, Early Songs and Play

- Burkhart; SoftTouch - My Own Bookshelf, Songs I Sing in Preschool, Wheels on the Bus; Inclusive TLC - Choose and Tell Nursery Rhymes, Legends; Clicker - Errorless writing with a closed set of whole words (sentence starters, etc.) - Crick; Boardmaker Plus and Studio; Learning to Two Switch Step Scan, Pick and Choose, and Story Builder - Judy Lynn. Many augmentative communication devices set up in step scan access mode for two switches)
- This form of "Errorless Learning" should not be confused with the notion that some Vendors call "errorless learning" that implies that the child is not allowed to make mistakes. Mistakes or unwanted choices with clear strategic feedback and opportunities for problem solving from an intrinsic drive, are critical learning tools in learning two switch step scanning.
- Rotating plate activities (select art materials, cooking ingredients, Mr. Potato head parts, etc.) with a second switch connected to a voice-output device (single message or sequence) "that's the one I want", "I'll take that one", "that's it", etc.
- One switch connected to voice-out put sequence device to list choices / Second switch connected to voice-output to say "That's it"
- Choose a song, story, rhyme, video, or any other activity (Burkhart- Classroom Suite) (Inclusive TLC) (SoftTouch) (SimTech - Mablessoft) (Judy Lynn)
- Choose verses of a song to be sung in any order.
- Have the child can use a series of communication displays to direct the action of another person in a play activity script
- The child can "scribble" with a talking word processor with a limited set of letters or the whole alphabet
- The child can use different computer voices to listen to a selected tongue twister or silly saying. (Two Switches to Success - Burkhart) (Raps - Caroline Musselwhite)
- The child can use a communication device to direct action in a game such as follow the leader or draw a face, with options that all make sense
- Pragmatic Organization Dynamic Display Communication Books (PODD) (Gayle Porter, Melbourne, Australia) Arrangement of PODD for partner-assisted scanning (visual, auditory or visual plus auditory) Vocabulary is presented in an organized pattern and can be used for communication with partner-assisted scanning by using a yes/no response for each item.
 - more info at: <http://www.lburkhart.com> and www.cpec.com.au or podd@cpec.com.au
 - Aided Language Stimulation: use visual and/or auditory partner assisted scan mode receptively to talk to the child
 - Communication partner models generating novel thoughts and comments through the same pattern used in step scanning: no, no, no, yes!
- Try adapting two switch step scanning access to commercially available mouse activated software games that respond to a child's choices. These are great for practice and motivation. (Envoy and Discover Pro - Madentec) (Assistiveware -

- Complete Mac Access) (Applied Human Factors - Scan Budy) (mouse emulating switch interfaces) (RJ Cooper - Cross Scanner) (some websites use tab and enter)
- Use popular, un-adapted software and websites: Give the child one switch connected to a voice-output device that says "next", and a second switch connected to a mouse click on the screen. A partner moves the mouse to the next item on the screen when directed by the child. The child can use the second switch to select that item or direct the partner to move to the next item. Note: it may be helpful to use a large or fancy cursor, and name each item as an auditory cue as the mouse is placed on it. (Try specially designed Kid browsers when surfing the web)
 - **Note:** If the child appears very intentional in step 5, move on to step 6.

Step 6: Two Switch Step Scan to a Single Target - Activities for Increasing Accuracy and Cognitive Engagement

- Child is now given one exciting or interesting target to aim for. All other items are neutral
- Insert some blanks in the array of choices with a communication display or software activity.
- Use a word like "click" or "nothing" repeatedly and have the child listen/look for a target word such as: "read", "sing", or "show me!"
- Once the student has had enough practice at the errorless level, you can introduce some activities that require them to reach a specific target. This step is often used when the child appears to continue selecting items randomly and doesn't appear to be trying to select a specific item based upon their intent. (Note this is something that you have to observe by the child's attention, responses, interests, social reactions, and patterns of switch activation)
- Have at least 3 or 4 items in every list, and limit the target item from being the first in the list (two items is not a list, and may be confusing to the child)
- When the child selects one of these blank or neutral items, the feedback shows that it is somehow not logical or not reinforcing. Hopefully, the child will select those items less often over time, and pay more attention to selecting a fun or appropriate choice.
- Try social interaction, sensory play or movement activities as motivating items to scan to in a list of blanks or nonsense sounds
- Use partner assisted scanning and model self-talk, "hmm, no, no, yes, that's it"
- The number of blanks or clicks before a target item, should be varied to prevent the child from just learning a motor pattern, instead of staying cognitively engaged to make a clear selection. (Switch to toolbar in Classroom Suite - see Burkhart - Two Switches to Success)
- MODEL self talk as you take your turn: "hmm, no, no, yes- that's it"

- Move-Get" activities on the computer (Inclusive TLC: Switch Skills for Two - Set 2 ('move and get' - difficult level. For example, moving spotlight across stage to reveal musician or passing basket ball to the player who shoots the ball) (Learning to Two Switch Step Scan Judy Lynn - level where you move to a target, but can also move past target and come around again) (Two Switches to Success - Burkhart - left right activities such as hats to Kyle)

Step 7: Practice for Increasing Accuracy with Two Switch Step Scanning

- At this step, the child is developing the ability to integrate the motor component of step scanning with the cognitive component of selecting an item for a particular reason or purpose. With more than one target in the array, the cognitive load to select desired targets requires more engagement of cognition as the child refines automaticity of the motor skill
- There are an endless variety of activities that can be set up to give children experience with two switch step scanning using authoring programs and communication devices.
- Add slightly negative or illogical items in the array of choices, or simply "no" and repeat what to listen/look for.
- Try activities with some correct answers and some incorrect answers
- For communication displays, select vocabulary items that have different pragmatic intents, so that the responses from the listeners provide clear feedback for the child's comments.
- Once the child understands the process, then two switch scanning can provide an access strategy to many curricular applications as well as a means of communication (Stepping Stone 8)
- Music, animation, and logical or humorous sequences are often a good starting place.
- Use some of the same errorless activities, like step 5, however, now create them with options that allow the student to make choices that are more logical, or show more personal opinion than others. At this step, the child will be putting more conscious effort into creating and generating his or her own ideas with these errorless activities. Include the child in determining which choices to include in these activities, such as errorless letters.
- Provide emerging literacy activities for creating stories, playing with sounds and letters, or constructing a rhyme or sentence. (Classroom Suite, Clicker, Clicker Paint, Scan and Paint, Story Builder)
- Activities with correct answers and feedback (Judy Lynn -Virtual motor Skills, Listen and Respond) (Laureate Learning Systems) (MarbleSoft) (Primary Skill Builders - Classroom Suite) (Learning Magic)
- 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.

Step 8: Two Switch Step Scan - Reducing Time for Success and Demonstrating Knowledge

Note: This step is for children who understand the process of two switch step scanning, and have developed some motor automaticity for the task. They can now use the access strategy to focus solely on the cognitive content of the activity

- Present a limited array at appropriate times to increase efficiency (combining letters with word endings)
- If the child is just spelling out a controlled set of words, it may be faster for the child to be presented with only the possible letters instead of the whole alphabet array.
- If the child is creating sentences, selected words can be offered, instead of the child having to spell out each word.
- Make use of sentence starters, endings and phrases.
- Use the feature of natural branching to present a limited number of choices at each logical step of a discussion, sequence of activity, composition or story. (For example: the next logical vocabulary needed in a sequenced type activity, automatically appears, instead of having to be navigated to from the main page.)
- Set up the array so that incorrect pictures or items disappear after one selection.
- Provide practice for rehearsing or studying for a test in a child-controlled flash card format.
- Provide multiple choice instead of fill in the blank activities.
- Provide feedback within the computer activity in the form of a voice-output/written explanation for illogical choices.
- Utilize electronic "Word Walls" and "Word Banks" to provide access to frequently used words.
- Consider using word prediction or picture/word prediction.
- Consider using encoded alphabet displays for spelling. (faster access to individual letters via group/item scanning or choosing color/number code)
- Explore other switch access strategies, such as Morse Code.

Additional Multi-Modal Strategies to Enhance Attention, Perception, and Cognitive Processing:

- Use scanning magnification when available to clarify scan and simulate movement
- Allow time for cognitive processing - step scanning - computer waits for input
- Use one voice for scanning and another voice for text or speech
- Opportunity for multi-sensory interactive learning vs. worksheets

- Go beyond single switch or single click (read next page books are not very interactive) (Look for activities with multiple functions such as read / show me / turn the page / back / done, etc.)
- Errorless activities for practice and motivation
- Repetition with moderate differences - keep motivation high
- Make a launcher for play activities - For example: so the child can explore Classroom Suite activities independently and make choices about what to open and when to be done with an activity (Autonomy and Control - see Launcher instructions on Two Switches to Success)
- Need for enhanced presentation and enhanced feedback for easier processing
 - Screen design and layout can be critical for the scanner and children who have visual perceptual problems - simplify and enhance
 - Use the Action: "Switch to Toolbar" to keep visual and cognitive task simple
 - Use multiple modalities for increased auditory and visual feedback:
 - Make buttons visually distinct
 - Use space between buttons in toolbars.
 - Use sounds to represent visual screen actions
 - Simplify graphics on screen
 - Attend to size and spacing of text
- Add "Click to Start" - helps get the child ready to attend and locates both switches
- Use animation or IntelliMation to focus attention on what is important
- Record auditory prompt for clarity when needed (Sound and Key Word for Each Letter / Phoneme) (attributes tab in Suite - button must include action insert picture or name for this to work)