

# The Juggling Act: Developing Autonomous Communication with Children who will need to Use Visual and/or Auditory Scanning Access Strategies

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## Introduction

### Who are we talking about?

Children who have complex communication needs and severe movement challenges

- Difficulty using direct pointing to access a speech generating device (SGD)
- Currently unable to or struggling to use switch scanning to access a SGD
- Currently have limited expressive language
- May also have limited understanding spoken language and/or cognitive challenges
- May have additional challenges such as sensory processing disorder, severe hearing impairment or cortical visual impairment.

Exploring the processes involved in learning to independently generate language to communicate genuine, self-determined messages.

### Clarifying the long-term destination

Being able to

"Say what I want to say, to whoever I want to talk to, whenever I want to say it".

### Aim of AAC intervention

*For the person to meet his/her varied communication requirements as intelligibly, specifically, efficiently, independently and in as socially valued a manner as possible in order to understand others and to be understood.* (Porter, 1997)

Communication requirements = all of the individual's communication needs in their life, range of purposes, varying social roles, etc.

### Communication competence for the individual who uses AAC (Light, 1989)

- "the quality or state of being *functionally adequate* in daily communication, or of having *sufficient knowledge, judgment, and skill* to communicate" (p. 138). .
- Sufficient **knowledge, judgment** and **skill** in four areas:
  - linguistic competence
  - operational competence
  - social competence (sociolinguistic & sociorelational aspects)
  - strategic competence.
- Requires the mastery and integration of sufficient linguistic and operational knowledge and skill to operate the AAC tools and sufficient social and strategic knowledge and judgment in interaction

### Communication Autonomy (von Tetzchner & Grove, 2003)

- Refers to where messages originate
- Able to express self in accordance with own communicative intentions.
- Few restrictions on what they can say
- Responsible for own language production

Communicative autonomy is not dependent on the individual's ability to independently operate their AAC system. Others may participate in the operation of an AAC system in a manner that supports the individual's autonomous communication. For example, a person who relies on a partner to turn pages in their communication book can maintain communication autonomy by the use of strategies to direct their partner to the page(s) they need to express their own messages.

**Autonomous communication may not be operationally independent**, e.g. using a partner-assisted light-tech AAC system.

**Operationally independent communication may not be autonomous**, e.g. using switch scanning on a SGD to independently select a preference from a limited range of partner determined options.

### **Long-term objective is for true independent, autonomous communication**

Truly independent communication requires more than just operational independence. Independence also involves self-determination, the ability to communicate according to the individual's own intentions, i.e. to say what they want to say, to whomever they want to say it, whenever they want to say it.

### Communication at any time

Autonomous communication also involves being able to express a message, "when I want to say it".

Communication is constantly occurring. At any time communication may be

- The primary goal
- A necessary component to achieve another goal
  - Severe physical challenges may result in communication being a necessary component for most activities
- An enhancing component
  - Communication is an enhancing component of most activities and all learning environments

Enabling communication to happen at any time, according to the individual's intentions, can be an issue when communication requires the use of an external aid or device. Where is the AAC system when the individual has something to say?

As people who have severe physical challenges typically require another person to set-up their AAC system it is vital that support personal develop **HABITS** to ensure the individual has access to their communication system **ALL THE TIME** so that the individual can select to use their AAC system to communicate **AT ANY TIME**.

Individual's who depend on access to their AAC systems to communicate need solutions that will work for them in all environments at any time. For individual's who have significant physical challenges this typically involves multiple AAC strategies to support access for autonomous communication in a range of physical positions for communication at any time.

High-tech - Speech generating device	Light-tech - Communication board/book
<ul style="list-style-type: none"> <li>Options to store larger vocabularies without adding size / weight (? memory)</li> </ul>	<ul style="list-style-type: none"> <li>Adding vocabulary adds size / weight / number of displays</li> </ul>
<ul style="list-style-type: none"> <li>Availability limited during charging time / breakdown</li> </ul>	<ul style="list-style-type: none"> <li>No charging / less breakdown</li> </ul>
<ul style="list-style-type: none"> <li>Speech and print output (understood by range of partners)</li> </ul>	<ul style="list-style-type: none"> <li>Partner needs to read the message</li> </ul>
<ul style="list-style-type: none"> <li>Independent operation using switch scanning</li> </ul>	<ul style="list-style-type: none"> <li>Operation requires partner participation (knowledge, skill) <ul style="list-style-type: none"> <li>Partner - assisted scanning</li> <li>Combination access</li> <li>Coded access</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>Computer operating system <ul style="list-style-type: none"> <li>Only responds to programming</li> <li>Requires specific, repeatable movements</li> <li>? cost of learning</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>"SMART PARTNER" operating system. Human partners can <ul style="list-style-type: none"> <li>observe and problem solve. respond to more varied movements</li> <li>extrapolate from key words the meaning of a message using contextual cues.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>Limited environments</li> <li>? Switch scanning set-up may limit use in a restricted range of physical positions</li> </ul>	<ul style="list-style-type: none"> <li>Able to be used in a wider range of environments and positions <ul style="list-style-type: none"> <li>May vary access method to suit different positions</li> </ul> </li> </ul>

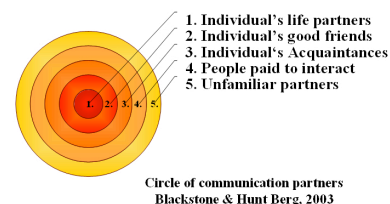
### Multi-modal communication.

Different forms of communication may be more or less effective to communicate

- different types of messages
- in different situations
- with different partners

Focus on the function and content of the communication, with the form of communication decided in relation to its effectiveness at transmitting the message in a given situation.

Circle of Communication Partners



*"an individual does not abandon simpler strategies in the march towards independence. Instead the individual acquires more and more sophisticated communication methods to add to an existing repertoire."*

*Blackstone & Hunt Berg, 2003. p. 15*

#### Communication form

Informal modes (non- language)

- Not directed to communication partner
- Directed to communication partner
- Using conventional / unconventional gestures

Language modes

- Whole word modes (e.g. sign, pictographs, whole written words)
- Sound / letter modes (e.g. spelling, fingerspelling, speech)

#### To meet individual's varied communication requirements as

- intelligibly
- specifically
- efficiently
- independently
- in as socially valued a manner as possible.

To understand others and to be understood.

Completely autonomous communication depends on the individual's ability to generate his or her own words (i.e. using sound / letter modes). For individual's who currently rely on whole word/symbol based

AAC systems, the degree of autonomy will be influenced by the size and diversity of the vocabulary pool available for self-expression. Larger vocabularies increase the likelihood that the word they are thinking will be available for them to select to express their message in their own words. AAC systems and vocabulary organisation systems that include strategies to provide the individual with control to collect additional words as they live in the world can further increase possibilities for autonomous communication. For example, Pragmatic Organisation Dynamic Display (PODD) communication books include LIST spaces to add additional words at any time. PODD page sets for SGD always include blank spaces in every section to add words at any time (children may also be taught how to program buttons so they can more independently collect whole words).

Competent, autonomous communication for individuals with severe physical challenges typically involves multi-modal communication, selecting the most efficient, appropriate method to suit different communication requirements with different partners in different environments.

- When in a physical position and environment that supports to the individuals use of switch scanning to access a Speech Generating Device (spelling and/or a large robust vocabulary) to support independent, autonomous communication with any partners who can understand speech/print output.
- Use of light-tech AAC systems (communication board/book) with trained partners in a varied range of positions and environments (including those not suited to using a SGD via switch scanning). Individuals may also choose to use this option with trained partners to increase speed of communication and/or maintain turn in social interactions.
- Use of informal modes for more efficient communication with familiar partners when this mode is specific enough (more predictable, less specific or abstract messages).

### **Communicative accessibility** (von Tetzchner & Grove, 2003)

There are people in the social environment who:

- Understand the alternative communication form
- Can scaffold it in the acquisition period
- Are able and willing to communicate in a manner that gives the person maximum communicative autonomy.

### **NEED**

- People in the individual's social networks developing sufficient knowledge, judgement and skills to be competent communication partners
- General community capacity building
- The development of HABITS which support the individual's autonomous communication.
  - Habits such as routinely ensuring the AAC system is carried and available for use in all situations and allowing time for the person to communicate their own message are likely to support autonomous communication.
- Influenced by beliefs and understanding of the purposes and critical importance of AAC to the individual with complex communication needs.

# **AARCH**

## **Communication**

- **Autonomy**
- **Accessibility**
- **Requirements**
- **Competence**
- **Habits - communication at any time**

## What is involved - Independent, autonomous communication using switch scanning to operate a SGD?

MOTOR

SENSORY

SOCIAL

COGNITIVE

LANGUAGE

### Sufficient knowledge, judgment and skill in four areas:

LINGUISTIC

OPERATIONAL

SOCIAL

STRATEGIC

## What does Research Say About What is Most Effective in Learning a Motor

### Task? (Adapted by Burkhart and Hanser)

- Initiation of intent comes 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)
- 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
- Stepping Stones to Switch Access (Burkhart)

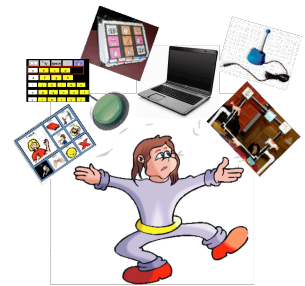
### Developing Automaticity

- 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
- Problem of available working memory - what to focus on? - Activate the switch? What did she just ask me? Hold up my head? Who just walked in the door? What was that noise? What do I know about this? How could I answer that? Why does my stomach hurt?
- Memory is stored as patterns not individual details and must contain some variety in order to be generalized to a broad number of situations
- Once a pattern is learned it becomes automatic and operates subconsciously, until there is a need to use it or change it
- If something is not automatic yet, it will occupy the child's working memory instead of operating in the background
- For many children who have severe multiple challenges, motor control requires cognitive attention and effort
- We need to be helping children to get to a point where cognitive efforts can be redirected from the motor skill to the content of the task
- Children need practice in natural contexts, utilizing repetition with moderate differences, intent and purpose

- Children should not be tested using systems that they have not mastered to a level of automaticity
- Developing Automaticity takes practice:
  - Thousands of Repetitions with Intent, Purpose, and Variation
  - Motivation Provides Intent
  - Natural Context Provides Purpose and Variation
- Determine the purpose or goal of an activity from the adult's and child's perspective - Why am I doing this?
- Teaching vs. Testing
- Testing Provides None of the Needed Components that Facilitate Use of Automaticity
  - Intent
  - Purpose
  - Variation
- Imagine driving someplace in another town where you have gone for years
- Now imagine taking a test on the directions to get there:
  - How many cross streets before your second left?
  - Name of all the streets
  - What is on all four corners of your 4th right hand turn
- Being able to do something in context is different then taking a test about it
- Children Learn by Doing
- Emphasize Experience - Not Drills

### The Juggling Act

- 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, literacy
  - **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 cannot 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

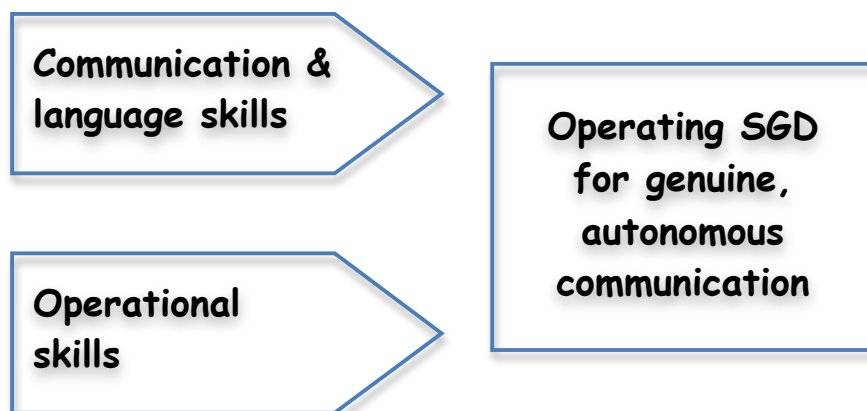


### Parallel Programming

- 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 her at a time
  - 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
- Child needs to experience success with at least one component at a time - engineer activities so this is possible
- The task should not be so difficult that the child doesn't experience some sense of success, nor too boring as to not be worth the effort
- Provide a variety of these types of activities throughout the day - to challenge the child in all areas of development, but mainly just one at a time.
- Teachers and therapists need to provide a coordinated set of supports and scaffolds to enable as much active engagement and interaction as possible, while working in parallel to develop the motor skills needed for switch access
- Plan as a team to make sure individual skills are moving in a coordinated direction and will eventually be able to be integrated into meaningful tasks
- Help the child make associations see the relationships between skills that she is developing
- Model component skills as well as integrated skills, so the child can see how things will eventually work together
- Balance Communication, Cognitive and Motor Difficulty
  - Erickson: RED, YELLOW, GREEN planning - Balance things that are
    - Difficult - New learning
    - Intermediate (easier-newer, harder-familiar)
    - Easy - Automatic
- Juggling multiple sensory, cognitive, language and motor demands: ASK?
  - What's easy for me?
  - What's difficult for me?
  - What's new?
  - What's automatic?
  - What requires undivided attention?
  - What requires self-talk /thought to control/plan/problem-solve?
- Team Planning and coordination is necessary for consistency and to allow for development of automatic skills

### Long-term planning for parallel learning



1. Learn and practice aspects of a multi-faceted complex task with many "difficult for me to learn and do" components separately in different activities - in parallel.
  - Start learning and practicing all elements NOW in different activities
2. As skill and automaticity develop elements are joined together into whole activities
  - For successful use of the complex task

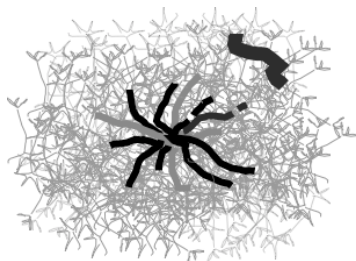
Important to help child and his/her partners and team to understand purpose, connection / association between what they are doing now and the longer term aim.

This is a team process. The whole team needs to understand the long-term planning process in order to

- provide all of the teaching-learning opportunities required to build the knowledge, judgment and skills needed for the child to learn to independently operate a SGD for genuine autonomous communication
- select strategies that are consistent with the eventual aim to operate a SGD in all of their daily environments
  - NOTE: plan for a switch setup that works for self-initiated communication AT ANY TIME.

### **How Do Children Learn? How Can Adaptations Help?**

- The child is born with billions of neurons and trillions of neurological connections
- Through experience, children learn by creating/building/expanding and discarding sets of neurological connections known as neural networks, or cognitive schema and they use these cognitive schema as the basis for understanding new experiences.
- "What Fires together, Wires Together"
- "Use it or Loose it!"
- 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.
- Interaction is critical for strengthening and building connections that form the basis for learning language (Second Language Infant Studies - Patricia Kuhl 2003)
- Once a 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
- Teaching should activate current connections and then build on them, instead of trying to create new - irrelevant connections
- Teaching through multiple modalities and natural contexts builds stronger, and more richly connected, neural networks.
- Experiment with multiple modalities, presented simultaneously, sequentially or singly - based on child's responses and environmental conditions.



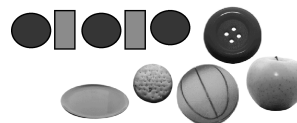
Schematic Drawing of Neurological Cognitive Schema vs. Isolated Connections



## How Can You Help Children Develop Rich Neuronal Networks?

- The brain looks for patterns and changes in patterns
- Memory is stored as patterns, not details
- 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 in context to maintain attention and encourage curiosity
  - Hold attention through cognitive engagement and curiosity
  - Relate all activities to child's experience, knowledge base and relevance to increase the formation of connections
  - Teach in natural contexts
  - Allow for cognitive processing time with anticipatory pauses
  - Set up Problem Solving Opportunities
  - Mistakes are an Important Part of Learning
- Create communication displays: 'light tech' or 'high tech' that systematically arrange vocabulary, so the child can take advantage of the pattern and focus on the conversation, instead of searching for vocabulary
- Very Young Children Can Understand **Abstract** Symbols As Long as they are Presented in a Consistent, Meaningful Pattern - Speech is Abstract
- The critical feature for selection of symbols to be used to represent language is how well the child perceives and discriminates those symbols in order to be able to discover the pattern of how they are used. Learning to use them as language depends upon the child's extensive experiences and interaction with competent language users of those symbols. Children will build neurological patterns for understanding the function and use of those symbols in the same way they would learn speech.

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



## 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
- Need to 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
- This taps intrinsic motivation and assists learning
- Start with what the child understands. Patterns that make sense, and then provide repetition with moderate differences. Note: research shows that moderate differences are more easily connected with known information, than are small or large differences
- Helps the child relate new information to familiar information and build associations
- Personalize materials and use preferred items to increase associations
- Set up activities for the child to use a combination of previous knowledge and trial and error to achieve success.
- Engineer the environment to prevent sensory and information overload, so the child will be more likely to be in a receptive state for learning

Learning involves more than just doing an action. The child must learn to connect a cognitive intent with the necessary body movements to achieve that intent. This is achieved when the intent automatically produces the movement without additional cognitive effort. The child may have motivation to do something but may not yet have connected with how to achieve it. For example: I see the drink, I want the drink, but when I think "get drink" the right set of movements doesn't happen - head turns away and arm pulls back - wrong patterns were sent to the muscles. Success requires: comprehension, motivation, intent, activity (context) and achievement with feedback that can be clearly perceived and processed by the child.



### Competency = Knowledge, judgement and skill

- Active problem solving develops knowledge and judgement, not just skill.
- Active problem solving
  - Child directed, rather than adult directed.
  - No external right or wrong
  - Child evaluates - what worked / didn't work according to their own intention.

### Learning movements for communication when you have CP

(adapted from Cotter, Carter & Porter, 2008)

Expressive communication requires movement of some type. Intelligible expressive communication is dependent on some degree of motor control.

A number of key issues may limit the acquisition and use of movements for children who have cerebral palsy. Many of these issues relate to the child's underlying sensory and motor challenges, but may also involve cognitive and social-emotional issues such as understanding of movement, emotional state affecting muscle tone and motor control.

Common movement issues affecting participation and learning for children with cerebral palsy include

- atypical muscle tone
- set patterns of movement
- associated movements
- asymmetry
- weightbearing
- weightshift
- affects of gravity
- stability
- range and grading of movement
- delayed initiation of movement
- fatigue

Some children who are diagnosed with a physical impairment also exhibit a range of behaviours which indicate sensory processing disorders.

## Sensory processing

- the tactile sense - the ability to modulate touch sensations through the skin and to discriminate the properties of objects by touching them
- The vestibular sense - to adjust one's body to changes in gravity and body positions and feel comfortable moving through space (inner ear)
- the proprioceptive sense - to be aware of one's body parts and position to move one's muscles and limbs in a coordinated way (muscles, joints & ligaments)

With optimal processing of all the senses, the child then has the ability

- to interact successfully with the environment
- to plan, organize and carry out a sequence of unfamiliar actions (MOTOR PLANNING, PRAXIS)

Behaviours which may indicate sensory processing challenges include:

- more difficulty staying upright and in the midline, moving and using the hands to perform simple functional daily life activities than can be attributed to other key issues affecting the child's movement
- sensory seeking or avoidance behaviours

These behaviours create challenges for the child's production of movements for communication, particularly gestural modes. Interpretation of the child's communication and intent is complicated as they appear to have more movement available to them than they are effectively able to use for function.

**Current AAC operational capabilities assessment-intervention** for people who have physical challenges typically focus on finding AAC access possibilities and maximizing operational competence given the individual's **current sensory-motor function**.

- Evaluating the operational requirements of different AAC modes and access techniques in relation to the person's current movement capabilities
- Positional supports to maximize an individual's control of movement
- Finding a method the person can use to access AAC system
- Strategies to teach access methodologies

## **Sensory-motor control for communication**

**Learning movements for Speech** - Developing oral motor control for articulation

- Speed, range, accuracy, strength, grading, co-ordination and rhythm of movement
- Dependent on oral sensory feedback

**Likewise for AAC** - Developing movement control

- Speed, range, accuracy, strength, grading, co-ordination and rhythm of movement
- Dependent on sensory feedback

## **Typical speech development**

- Begins with sounds and word approximations
- Typically only understood by primary caretaker at first
- Gradually, articulation improves as child has practice trying to speak with a broader range of partners and receives feedback, guidance and encouragement
- Takes many years

### **Likewise for AAC**

- Children will need time, maybe over many years, to learn the sensory-motor control required to produce intelligible gross / fine motor movements for communication.
- Time to Explore, Babble, Improve intelligibility, and Learn more sophisticated / complex forms
  - Only a few people understand sometimes in context
  - Primary caregiver may interpret for others
  - People who know me well understand me
  - Intelligibility may deteriorate when trying out new language forms

## **Typical speech development**

- Copious models of speech articulation

- What it should sound like
- How people make sounds
- Copious opportunities to practice - by self and to others
  - Vocalise, babble, imitate, speak
- Natural feedback
  - Partner's assume they are communicating
    - respond to anything as meaningful
  - Shaping toward adult form
  - Respond with more mature models in expansion of message
  - Encourage imitation of correct form
  - Problem solve - what worked what didn't

**Children with complex communication needs and sensory motor challenges need the same types of learning opportunities using methods of communication then can learn to use.**

### **Problems with speech intelligibility**

- Articulation therapy
- Oral sensory - motor challenges
  - Sensory - motor program

### **? Likewise for AAC**

- Some children will require additional learning opportunities to develop the sensory-motor control for intelligible use of AAC
  - Programs to learn motor control
  - Sensory programs
  - Opportunities to learn new movements for communication
  - Opportunities to learn operational processes
- These learning opportunities are in addition to sensory and positioning strategies and accommodations to maximise operational performance.

**Assessment - intervention** to support children who have cerebral palsy to develop and use more efficient and intelligible movements (operation) to communicate needs to include strategies to:

- Identification of key issues limiting a child's movements for intelligible communication
  - Provides information to support the planning of appropriate interventions.
  - Supports partner's to develop a greater understanding of the child's movements to more accurately interpret their communication.
- Develop underlying capabilities for posture and motor control, e.g. learn to move one part of the body without associated movements in other body parts (disassociation).
- Stimulate the developmental process, e.g. providing meaningful feedback to possibly communicative, spontaneous movements (behaviours).
- Teach specific movements for communication.
- Accommodate for current sensory, postural and movement challenges.

### **Create opportunities for the child to learn motor control; learn to manage their key issues for participation and learning.**

Graded tasks and activities are created to provide opportunities for the child to learn and practice sensory-motor control (address their key issues for participation and learning). These learning opportunities need to be

- Meaningful to the child (practice with intent, purpose and variation)
- Taught in a manner that activates the child's active participation and problem-solving to control movement to achieve a specified goal.

A range of equipment, interpersonal, and physical facilitations may be used to scaffold the child's successful achievement of this goal.

- Facilitations are always evaluated and selected in terms of how they support the child's learning to control their own movement.
- Include strategies to support the child's learning to use self talk to regulate (problem-solve) their own movement. The language cues (self talk) learned to support motor control within these tasks can be applied by the child and partners to produce movements for communication.

### **Provide opportunities for the child to develop intelligible movements for communication**

Models and use in communicative contexts

- initially accept any attempt
- gradually require more specific intelligible movements over time
  - Movements agreed upon with the child

Provide strategic feedback

- Our interpretations of the child's attempts to communicate can sometimes be confusing due to reduced sensory feedback and/or associated reactions.
- Verbal referencing (saying out loud what you observed and how you interpreted this) is a useful strategy to more specifically provide the child with feedback to understand their partner's response and perhaps attempt a clearer movement to clarify their meaning.
- A more experienced partner stating their observations and interpretations out loud also assists new partners to learn to observe and appropriately interpret the child's communicative movements.

Strategies to accommodate for postural, sensory and motor challenges, e.g.

- equipment, interpersonal, sensory and physical facilitations,
- introduced into the child's daily environments as required to maximize the movements available for communication.

### **Teach specific movements for communication**

- Model possible movements during genuine communication interactions
- Create activities to learn and practice these movements (outside of communicative context)
  - Practice with intent, purpose and variation
  - Use a range of facilitations to support successful production of movement
  - Teaching the child to use self-talk to control movement and learn sequences of movements
- Providing natural feedback on intelligibility of movement during genuine communication interactions
- Assistance to problem-solve more effective movements

## **Initial learning opportunities – communication & language**

**Building competence, accessibility and habits to enable the individual to meet their varied, autonomous communication requirements**

### **Need opportunities to learn communication and language skills**

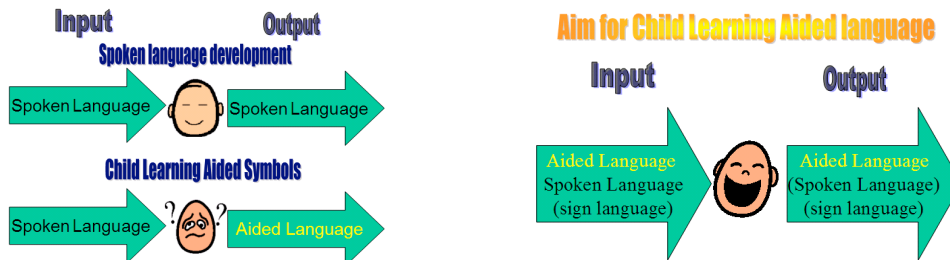
- Aided language learning opportunities
  - Vocabulary available for genuine communication
  - Models of AAC
  - Opportunity to explore and practice communicating using AAC
- Smart partner operating system
  - Reduce motor demands
- Learning operational processes via partner-assisted scanning

"A child who uses speech will independently select the words she wishes to use from the vast array of words she hears/sees used everyday.

A child who uses AAC will independently select the words she wishes to use from the vocabulary other people have chosen to model and, for aided symbols, made available for her to use."

Porter & Kirkland, 1995, p.93-94

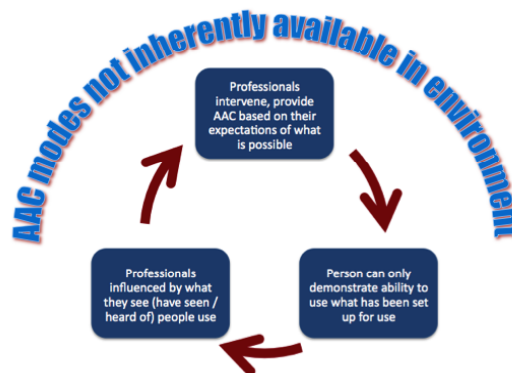
All theories of language acquisition assume that children are in an environment of people using the language they are learning.



### "Catch 22" in aided language acquisition

- Aided language does not naturally exist in the environment:
  - The child cannot spontaneously uptake something that is not there.
  - Professionals intervene - provide aided language based on their expectations of what's possible.
- The child can only demonstrate ability to use what has been set up for use:
  - Uptake may be influenced by a variety of factors.
- Others can only be influenced by the child's use of what has been set up to use.
  - The different communication behaviours of some children who have complex communication needs, and movement patterns of children with significant physical challenges, may further influence the input naturally provided by others.

### Catch 22 - opportunities to learn language!



#### Circular expectations

- See what we expected to see
- Our current knowledge is based on what we have previously tried

#### An initial focus on receptive input provides

- children with opportunities to learn, over time, how aided symbols are used to communicate.
- parents and professionals with opportunities to observe the child's response to this mode of communication and discover, over time, the strategies which will enable the child to communicate more effectively.

Applying typical language stimulation principles, children learning to use AAC need to

1. see **models** of their system of communication used interactively by other people to communicate real messages in real situations

2. have multiple **opportunities to practice** communicating real messages in real situations - with appropriate **scaffolds** as required for successful communication
3. **receive natural feedback** as to the effectiveness of their communication
4. have their messages **expanded** by other people using modes of communication they will be able to use to communicate more effectively.

## Creating an aided language learning environment

### Providing vocabulary

- For learning
- Adult to model
- Child to use
- Express a range of meanings
- Throughout the day
- For a range of functional purposes
- To stimulate language development
- Enable child to (learn to) meet their varied communication requirements
- Support the development of communication autonomy, accessibility, habits, competence

### Whole word / graphic symbol vocabulary

- Vocabulary needs to be presented spatially in a 'hard copy' physical form.
- Limitations on the number of items that can be included on one page.
  - The complexity increases when physical and/or sensory impairments limit the number of items which can be presented at one time.
- Need appropriate strategies to organise vocabulary in aided systems to provide the child and their communication partners with easy access to the broad range of vocabulary items they require to communicate.

### Evaluate AAC options and strategies in relation to desired long-term outcomes

- AARCH - Communication Autonomy, Accessibility, Requirements, Competence, Habits for communication at any time.
- What messages may our interventions be (inadvertently) sending about the purpose of AAC to children who have complex communication needs, their families, educators and social networks?
- How may we more effectively support the development of habits for autonomous communication at any time?
- What strategies are most likely to build communication communities, which understand and support children to grow up to be competent, autonomous communicators?

### Different aids for different purposes

- Choice-making displays to express a preference from a limited number of options selected by others
- Multiple activity / topic displays
  - Include a range of words to express a range of communication functions related to the targeted activity/topic.
  - Can increase the efficiency (speed) of communication during the targeted activity/topic
  - Displays engineered spatially in the environment
  - Does not include vocabulary to say messages that were not predicted as part of that activity/topic.
    - Doesn't support topic introduction or change
    - Reduced initiation of less predictable messages
  - Limited access to the vocabulary on these displays at other times,

- Not able to independently retrieve the display or access the display when in a different environment
  - Vocabulary may appear and disappear at the discretion of others
  - Reduced initiation of communication
- A changing presentation of symbols may complicate and slow the learning process for children who have complex learning requirements

A systematic approach to present vocabulary that doesn't disappear and can be built upon, instead of replaced, will more effectively support learning because:

- The brain builds understanding based upon patterns
- Working memory can only deal with a limited amount of information at a time
- Routine placement and availability of symbols assists to develop automaticity for more efficient location of vocabulary.
- Reduces cognitive load as the child can initiate according to own intentions (when they already have a thought of something to say) rather than try to think up something to say given the currently available options (communicating according to another person's agenda).

On the surface it appears a sensible to introduce AAC using single level displays for common daily routine and play activities

- To provide partners with something simple they can frequently use to learn how to model
- Enjoyable play activities naturally maximize the number and repetition of messages that may be modeled in a short period of time and provide motivation for the child to participate..

However, looked at from a different perspective, are we also inadvertently sending messages such as

- AAC is used some of the time - in the activities we decide.
- AAC is a play activity. You need to sit down with your child, have highly motivating toys and intensively communicate using AAC (just like we modeled). AAC may be seen as another activity to fit into the day.
- You need to get their child to "perform" using AAC at defined times (talk during the activities with no AAC strategies provided for communication at other times!)

Use of AAC only in a restricted range of specific activities is unlikely to support learning that AAC is a strategy that has the potential to support the child to more effectively communicate his/her genuine messages. (After all we did not actually provide any AAC strategies to support them to resolve genuine communication challenges, for example to work out why their child was upset at other times.)

**Strategies to support learning habits to competently meet varied communication requirements at any time, autonomy and accessibility include:**

- Provide aids which include vocabulary for "all the time / between activity" communication (in addition to activity specific vocabulary).
- Establish methods for the child to initiate communication
- Ensure AAC systems have sufficient size and diversity of vocabulary for self-expression and organizational strategies that allows the child to control their access to the vocabulary they require for autonomous communication.
- Stress the need to have the AAC systems available, all the time. Problem-solve how this can happen in the real world.
- Model the use of AAC to communicate genuine messages in naturally occurring contexts. Ensure that there is sufficient diversity in those contexts. Support people to problem-solve how AAC can be integrated within a busy class or family life.
- Talk about the purpose of AAC to enable someone to meet their varied communication requirements.
- Reflect on the current use in terms of how it will or will not build communication competence, autonomy and accessibility.



- Accept that teaching-learning is not a one-time event. Be prepared to re-visit the same important concepts in multiple ways.

#### Core vocabulary / general interaction displays

- Provide general vocabulary to communicate across a range of activities & between activities.
- Say a LITTLE AT ANY TIME
- Limited vocabulary
  - Used alongside activity / topic displays.
  - Use of hinting strategies extends possible messages - partner guesses more specific words
- Can be used as introduction to dynamic displays.

#### Comprehensive personal communication aids

- Always with the person
- Contain core and fringe (extended), general and individual specific vocabulary
- Designed to allow expression of a range of communication functions, messages and topics
  - May not include vocabulary to intensively communicate about a specific topic or in a specific situation
- Require movement through multiple levels / use of a code to access vocabulary.

#### Organisation of vocabulary across multiple levels

- Taxonomic - organised according to categories
- Schematic - organised according to events or activities
- Visual scene (high-tech only) - language concepts embedded within objects and activities represented in a contextual scene
- Topic - organised according to topics
- Anecdote / social interaction - chunking of information to relate scripted stories/anecdotes, socially interact.

#### Common issues using multi-level communication books / dynamic display SGDs have been

- Teaching the child and communication partners how to move between levels (pages) to locate the required vocabulary to communicate:
  - a range of messages
  - for a variety of communication functions
  - in a range of situations.
- The speed of communication:
  - number of level changes required to communicate a message
  - ease of combining words for different messages.
- Enabling quicker access to predictable messages and access to a broad vocabulary for spontaneous, unpredicted messages.

#### **Different vocabulary organisations suit different types of messages**

#### **Pragmatic Organisation Dynamic Displays (PODD)**

- PODD provides a way to make aided symbols available in daily environments
  - PODD communication books
  - PODD page sets for speech generating devices
  - Vocabulary to interact for a variety of functions ALL the time
  - Vocabulary engineered (vertically) within the organisation of the communication book
  - Goes EVERYWHERE with you!
- Designed with consideration to supporting autonomy, accessibility, varied communication requirements, habits for communication at any time.
- Pragmatic organisation
  - Vocabulary is organised according to the individual's communication function and conversational discourse requirements

- Efficiency to meet communication requirements is the overriding factor determining the organisation and placement of vocabulary.
- Partner-powered level changes
  - Support autonomy as child can direct which page to go to (navigate around communication book)
  - Support accessibility (follow the numbers and instructions)
- The routine placement and availability of vocabulary assists to develop automaticity, language learning and initiation.
- Individual requirements (skills and lifestyle) are taken into account in the design.
  - Style of PODD communication book. One page-opening, two page opening, two page opening with a side panel
  - Range of access methodologies and visual presentations including direct access, eye-gaze, pick up and give/show, partner-assisted scanning (visual, auditory, visual plus auditory), combination, coded.
- Aided language development is supported through the provision of multiple page sets (communication books) from early functions to complex syntax.
  - The range of page sets reflects a developmental process as reported in the literature on both typical and aided language development.
  - Page sets are selected to enable the use of aided language stimulation that leads the child's development.
- Strategies are available to:
  - Scaffold the child's inclusion of sufficient information to enable partner understanding
  - Compensate for AAC system limitations.
- Strategies to manage the limitations of aided language and to scaffold communication include:
  - Pragmatic branches
  - Predictive links
  - Tense clues
  - Yes/no question marker
  - Information chunking for anecdotes (narrative)
  - Vocabulary to manage interaction - provide feedback to partner (OOOPS)
  - Hinting to extend vocabulary
  - LISTS
- Strategies to support more efficient communication
  - Sections in PODD - different types of organisation to suit different requirements
    - Pragmatic function
    - Semantic associations
    - Part of speech
    - Activity specific pages
    - Topic pages
    - Anecdote pages
  - Predictably associated vocabulary (and word morphology)
  - Page layout
  - Location of main navigation indexes (different styles of PODD)
  - Predictive links (links worded where possible to be part of conversation)

A number of features of PODD communication books support the use of a broader range of vocabulary for children at earlier stages of communication and language development. These features include:

- The pragmatic branches using natural wordings with predictive links assist children to locate vocabulary in the communication book.
  - The child only needs to respond to the items presented at each level and relevant options appear automatically
  - A partner can suggest a pathway to assist the child to get to page they require.

- The vertical presentation of vocabulary on different pages allows for larger vocabularies to be readily accessible to the child and partner when the child can only manage a more limited number of items on each page.
  - More vocabulary can be available to provide receptive input (model or assist understanding) "hidden" in the vertical arrangement of the communication book on pages the child does not access when expressively communicating.
- Routine placement and availability of vocabulary may
  - Assist children to learn symbol meanings
  - Allow some children to use placement cues to support their communication.
  - Assist some children to manage more items on a page.
  - Support the child's learning to initiate

### **Considerations for Starting out - Creating an aided language-learning environment**

- Do not have to know everything before you begin providing receptive input (learn what the child needs from how they respond)
- Use generic displays to provide receptive input. Try out and Observe
  - Attention to different symbol presentations
  - How child is attempting to indicate items on the displays, e.g. direct pointing, eye-gaze, partner-assisted scanning (auditory / visual)
- Consider possible future options for SGD when selecting symbol sets and vocabulary organisation.
- Consider future options for expanding language, literacy
- Can begin modelling using a PODD communication book on Day 1.
- May initially provide new partners with single level general interaction/ core vocabulary display and activity displays to practice pointing and talking
- From day 1 emphasise Habits for "communication at any time"
  - Make connection that this will be the child's "VOICE".
  - First step: Problem-solve and practice having the child's book / core vocabulary / general interaction display with the child and readily available for use at ALL TIMES, EVERYWHERE.
- Model using the communication aid during ongoing interactions
  - All types of messages, boring as well as the interesting - IMPORTANT THAT AAC IS NOT JUST USED DURING PLAY ACTIVITIES
  - Range of communication intents
  - Model "Kid talk"
- Modeling more than "This Pictograph Means This". Also model important concepts such as:
  - "Oh I can say that using...."
  - "This is the type of context I can say it in"
  - "That's how I go about taking up my turn to say that in this situation"
  - This way of communicating is valued and responded to by others.
- Model the Whole Process of Communicating Using a PODD
  - initiation
  - always begin on front page
  - use branches and operational commands
  - use lists (partner assisted scanning)
  - multi-modal communication
  - use child's access method (sometimes)
- Indicating the symbols
  - What helps the child to attend to the communication?
  - What access method are they learning to use?
  - May point to the symbols with your finger, use a small torch to highlight the symbols, pick up and show individual symbol cards, use the alternative access technique a child is learning

in order to specifically model how they can indicate symbols on the display (sometimes).  
Practically may use different methods at different times.

- Do not need a clear access method or YES /NO before beginning aided language stimulation
- Learning a method to accept/reject options for partner-assisted scanning
  - May use one movement to accept, only respond to selected options with a timed pause for the scan
  - May use two movements to accept/reject responding to every scanned item
  - Initially respond to any behaviour that may indicate acceptance of the scanned option.
    - Clear, consistent, intelligible movements to communicate develop over time
  - Scanning is more predictable and simpler than answering random YES/NO questions
  - A smile does not work for all meanings of YES. Spontaneous smiling can be confusing during scanning
  - Explore options to discover possible ways for the child to indicate Yes/No and initiate communication.
  - Verbally reference (say out loud) the movement you observed and the meaning you assigned to this movement.
    - provides the child with feedback to understand your response
    - may stimulate attempts to produce clearer movements
    - assists other partners to observe what you are responding to and learn to interpret the child's movements.
  - After a period of exploration it is then necessary to agree on a particular manner for the child to communicate YES and NO that is known and used by all communication partners.
  - Initially accept less intelligible movements, gradually requiring more intelligible movements over time (shaping)
  - Implement sensory motor programs to develop motor control and learn specific movements for communication.
- Focus on interacting using AAC - two people actively trying to understand the other person.
- Provide natural opportunities for communication (context & pause) during genuine interactions without requiring the child to take up the opportunity.
  - Avoid changing the natural pragmatic cues
  - Limit direct questions, Increase pause
- **For some children receptive input and general opportunities are all that's required to stimulate spontaneous generative expressive communication**
  - Receptive Input
  - Opportunities to communicate
    - Vocabulary available
    - Someone to communicate with
    - Allowing time
    - Using language that encourages child's communication
    - Reasons to communicate
  - Natural feedback
- **Other children require additional teaching - learning strategies to stimulate expressive use of aided systems within ongoing interactions**
  - See Porter (2007, 2008) for more specific prompts and cues.
- **How much receptive input before expressive use?**
  - Two main developmental paths depending on current understanding of speech
    1. Based on the comprehension of speech. Map AAC form onto currently understood meanings. Similar to second language learning.
    2. Very limited or no comprehension of spoken language and need to acquire a communication system without reference to speech. Independent creation of a meaning system with AAC language forms. (similar to first language learning). Will

require additional, varied models of language use in the AAC to work out meanings "from scratch".

## **Initial Learning - How I Can Operate Technology**

### **Stepping Stones to Switch Access:** (Burkhart, 2004)

- This is a motor/cognitive hierarchy - The child is developing automaticity with both the cognitive and motor aspects of using switches
- Play activities and tasks with reduced cognitive-demand, are used so child can focus on the motor/cognitive aspects of learning, without having to focus on requirements or "getting it right"
- These steps are intended to be a general guide, not a fixed hierarchy.
- Children move up and down within these steps, even in a single session
- Sometimes an activity on a lower step is used to "prime the pump" - give the child a sense of where the switches are, orient their attention and motor skills and build a sense of control and success. This may only take a few minutes
- Then the child may quickly move to higher steps or back down to lower steps - as confidence increases or wanes, or if fatigue starts impacting performance

### **Step #1: Cause and Effect - Understanding Contingency**

- 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 with a movement that is already in the child's repertoire
- 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 and may disconnect from the child's intent
- 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
- 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 for motor practice to make the results worth the effort. (You may want to begin sessions with a few minutes of direct activation to establish the motor pattern and then move to timed activation when needed)
- Use 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 with a purpose - Multiple Locations and Multiple Functions**

- Cause and effect understanding often happens fairly quickly, and it is important to move on to keep the child cognitively engaged. Remember that you are only looking for a sense that the child has made the cognitive connection of cause and effect and not the refinement of the motor skill at this level (sometimes only a few minutes is needed before moving on to stepping stone 2)
- Frequently, people keep the child at stepping stone one too long and boredom sets in, which leads to inconsistent responses and apathy from the child
- Practice activating switch in multiple locations with a variety of body parts
- 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, with the child participating in the creation of the script to use on a step-by-step (Burkhart & Musslewhite, 2002,4) Make sure to involve the child in creating the messages recorded on the step devices.
- Operate a battery powered spinner to play a game
- Practice use of a switch with variation, control, purpose and intent in natural contexts

### Adapted Games

Adapted spinners

Inclusive activity - everyone loves to use the adapted spinner

Turn taking

Individual game boards: BINGO, pizza game, face game

Group game boards on carpet squares - car race

Social interaction and commenting on step talker during games

**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 - Discrimination and Problem Solving: Two Switches - Two Functions

Two switches 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)

Two switches positionally related to function - Object Permanence (Left Right Switch Activities - Hide and Find, on Two Switches to Success CD)

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

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!")
- Rotating plate activities and voice-output device (single message or step by step) (that's the one I want)
- Game spinner switch and voice output comments
- Two voice-output devices with different functions
- One step by step to list choices, one voice-output to say "That's it"

##### **High Tech:**

- One switch - computer, one switch related toy or voice-output device
- IntelliTools Classroom Suite - two switches two functions from overlay

- Intellitools Classroom Suite, PowerPoint, or other computer story with one switch, and the other switch can be a voice-output device for 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)
- Inclusive TLC - Switch Skills for Two
- iTunes with Intellikeys: music on and off / next song
  - Mac: [Space][Command]+[Non Repeating] and [Command]r[Right Arrow]r[Non Repeating]
  - Windows: [Space][Control]+[Non Repeating] and [Command]r[Right Arrow]r[Non Repeating]
  - Select one playlist and set it to repeat songs (Classic visuals selected)

### 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
- May increase motor fatigue, but reduces cognitive fatigue - practice can often improve endurance

### 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 will be able 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)

- 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 or walking toy)
- 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 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. For these children, you may want to periodically 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
- If a child hasn't yet developed enough automaticity for timed 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. This can be started at any of these steps if appropriate to the child
- Some children may always be faster with two switch scanning and never use a timed scanning.

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

- 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, Two switch skills, Clicker - Errorless writing, Clicker Paint - Crick; Cause effect Amusement Park and Story Maker - 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.

- Choose a song, story, rhyme, or any other activity
- 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
- Use different computer voices to listen to a selected tongue twister or silly saying
- 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)
- Flip through TV stations through environmental control on a device
- Run infrared battery toys through device through a list of possible actions (Robosapien)
- 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 (more detail below in Learning to operate a SGD to generate language for communication)

#### Step #6: Two Switch Step Scan for Clear Choices - 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!"
- Have at least 3 or 4 items in every list, and limit the target item from being the first in the list (two items are 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.

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

- 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 one item of 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. Music, animation, and logical or humorous sequences are often a good starting place.
- Use 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)
- 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

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 for an assignment, 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.
- Explore other switch access strategies, such as Morse Code.

### Expanding language communication

- Communication system always needs to be big enough to grow into.
- Enable partners to model and expand to provide child with opportunities for learning
- Stimulate language developmental process
- Expanding pragmatics, semantics, syntax, word morphology
- Changing communication requirements and social roles (age, environments)
- Alter vocabulary organization to suit more sophisticated language skills
  - With syntactical development no longer need strategies such as pragmatic branch starters, yes/no question markers, tense clues.
- Consider more efficient access options such as column-row scanning, combination, coded access (made possible by development)
- If possible increase number of items on a page to increase efficiency of producing sentences without the need to turn pages
- Ongoing development of intelligibility

## Learning to operate a SGD to generate language for communication

- As children begin to learn how to use switches, they can begin to use Speech Generating Devices while still refining access skills
  - This will give them a sense of the power of voice
  - Provide opportunities to learn operational skills
    - Including device functions such as CLEAR, DELETE, SPEAK MESSAGE
    - Practice for ongoing development and refining of motor/ switching skills
  - Help them begin to integrate access with communication
- Similarities between light-tech and high-tech language and organizational systems
  - Increased similarity reduces new learning
- While still learning access skills - simpler vocabulary sets and activities may be used on the SGD, while more extensive language systems are use in a light tech format
  - Co-Planned Sequenced social scripts (step through sequence)
  - Relating anecdotes prepared ahead of time (different parts to tell on different buttons)
  - Babbling and scribbling with the alphabet and whole words (writing/spelling without standards) with print output
  - Writing with prepared pages
    - Vocabulary generated by child using communication book put on a page of the device for child to produce a printed copy of their writing or to email a friend.
    - Selecting from a limited, or closed set, of words and possibly sentence starters to explore (play with) writing for different purposes such as: poems, rhymes, stories, lists, signs, letters, email, etc.
  - Directing group actions - follow the leader
  - Calling people from across the room - initiating attention and interaction
  - Comments to go along with calling - For example: Come here, Look at this, What ya doing? Can I see? Can I do it? Where are you going? Can I go too? How long will this take? Hey, help me please, etc.
  - Partial PODD with quick words and pragmatic intents and messages that provide more power with speech output.
    - May further reduce complexity of each display by repeating branches in separate home talk and school talk branches.
  - Positive, negative and neutral comments during story reading or other activities
- Provide access to robust vocabulary to explore without pressure or demands
- Work with the child to create a variety of highly motivating messages to make a point - Example of Kim nagging her Dad to buy her a dog
- Provide opportunities for mass practice of exploration at the child's direction - without someone close by telling the child what to say (For example when parents are busy with other things)

## Putting it all together

- As operational, interaction and language skills become more efficient and automatic the child will begin to be able to juggle all the balls required to use a language program on their SGD with a similar complexity to their light-tech communication system.
- Familiarity between vocabulary organisations on light-tech and device make this transition easier
  - This does not mean exactly the same.
- Differences between paper books and Dynamic Displays on SGD
  - Different real estate
  - Size and shape of the device
  - Different materials - different functionality
  - Paper need a physical page turn away from current page to get to another page

- Devices can have popups or automatic page back to directly return to the previous page
- Smart-partner operating system versus computer operating system
  - Need additional programming to teach computer to do what smart partner will automatically do.
  - Speech output automatically "fixed" to adult form by partner.
  - High tech-tech chunking of information efficiently

### **Need to apply PODD principles Organization of vocabulary in PODD**

- Vocabulary is organized according to the individual's communication function and discourse requirements.
- Efficiency to meet communication requirements is the overriding factor determining the organization and placement of vocabulary.

### **Tips for Success:**

- Work as a team and re-evaluate progress periodically to make sure everyone is working to desired long term goals of communication autonomy, accessibility, competence while also making sure to meet the individual's learning requirements and establish appropriate habits. (it is easy to get side tracked - always ask: Why are we doing this?)
- Work both for success now and more efficiency in the future
- Understand the motivation is neurologically essential for the child to succeed, it is not just that "she only does what she wants to do"
- Consciously plan as a team for which activities will focus on specific motor, cognitive or language skills, and how you will reduce other demands
- Provide mass practice opportunities that allow the child to "babble" and play errorlessly with a wide range of activities that are intrinsically motivating
- Make sure that communication always makes pragmatic sense to the child and is never used for meaningless tasks or drills - especially at the emerging language levels
- The more similarities between light tech and high tech communication systems the quicker the child will learn to use the SGD - Pay attention to the design of early "light tech" systems, with the thought to how they can grow with the child over time
- Re-evaluate specific access strategies periodically as child's skills increase - consider combination access and coded strategies to increase access to a larger vocabulary
- Consider beginning with limited or powerful vocabulary on SGD as access skills develop and then work towards independent use of SGD with robust vocabulary to communicate in daily life within context of multi-modal communication
- Always keep light tech communication system available for when SGD is not working or for environments when its use is not feasible - it is not an either or decision. Child can learn to decide, over time, which systems to use for different situations and messages as her strategic competence improves
- Multi-modal strategies are always appropriate - encourage the child to use whatever works to get the specific message across efficiently in that situation
- Provide interactive emerging literacy experiences as early as possible
- Work toward independent spelling skills and rate enhancement techniques such as word prediction

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