

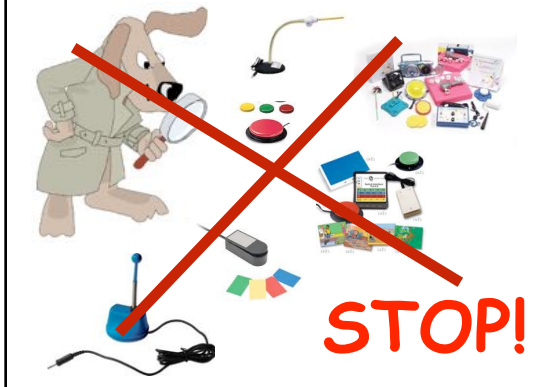
**Motor Cognitive Learning:  
Facilitating Autonomy, Independence  
and Access for Children with  
Significant Motor Challenges**

Linda Burkhart  
Dale Gardner-Fox

[www.Lburkhart.com](http://www.Lburkhart.com)

There is more to using  
switches than getting a  
child to "hit the switch"

**Going on a Switch Hunt?**



**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**

**You Don't Start with  
Automaticity of Movement**

## What Does Research Say About Learning a Motor Task?

- Initiation of intent must come from within the child
- Problem solving opportunities for trial and error
- Practice and repetition with a purpose
- Thousands of repetitions with variation

Developing Automaticity takes practice:  
Thousands of Repetitions with Intent, Purpose, and Variation

Motivation Provides Intent

Natural Context Provides Purpose and Variation

## Dynamic Assessment

- Integral part of intervention, not a one time event
- Observe
- Intervene/Adjust/scaffold
- Observe
- Repeat
- Repeat... repeat.... repeat



SETT Framework  
by Joy Zabala

The SETT Framework is a four part model intended to promote collaborative decision-making in all phases of assistive technology service design and delivery from consideration through implementation and evaluation of effectiveness.

joyzabala.com

## SETT refers to

- S** for the Student
- E** for the Environment
- T** for the Tasks
- T** for the Tools needed for the student to accomplish the tasks.

Student

### Questions to Ask

- ❖ What does the Student need to do?
- ❖ What are the Student's special needs?
- ❖ What are the Student's current abilities?

### Environment

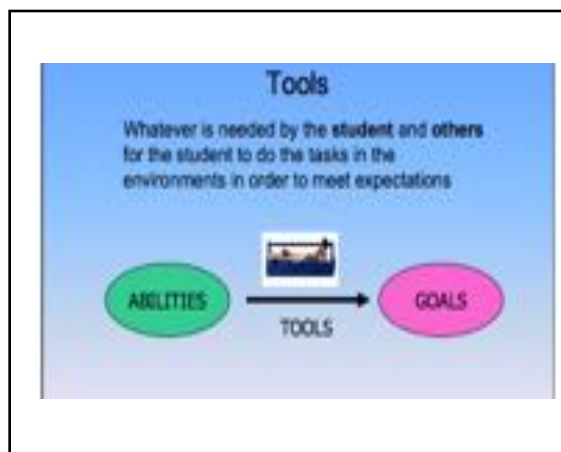
- ❖ What are the instructional and physical arrangements?
- ❖ Are there special concerns?
- ❖ What materials and equipment are currently available in the environments?

### Environment

- ❖ What supports are available to the student and the people working with the student on a daily basis?
- ❖ How are the attitudes and expectations of the people in the environment likely to affect the student's performance?

### Tasks

- ❖ What activities occur in the student's natural environments which enable progress toward mastery of identified goals?
- ❖ What is everyone else doing?
- ❖ What are the critical elements of the activities?



### Tools Generate Solutions

- ❖ The system of AT tools and strategies required for a student with these needs and abilities to do these tasks in these environments?
- ❖ What no tech, low tech, and high tech options should be considered?

## Tools

- ❖ How might the student's special needs be accommodated without changing the critical elements of the activities?
- ❖ Will modifications be necessary
- ❖ What strategies might be used?

The screenshot shows the website 'Closing The Gap' with the URL 'www.closingthegap.com'. The main navigation bar includes 'NEWSPAPER', 'RESOURCE DIRECTORY', 'CONFERENCE', 'SOLUTIONS', and 'FORUMS'. Below this, there are links for 'About The Resource Directory', 'Feature Product of the Week', 'Order a Resource Directory', and 'How to be Included'. The main content area is titled 'ABOUT THE RESOURCE DIRECTORY' and contains several links and a list of categories: Software, Hardware, Other Assistive Technology, Producers, and Organizations. A sidebar on the right shows 'FORUMS - LATEST POSTS' with sponsored forums like 'Bus Communications', 'Universal Access to Kurzweil 3000', and 'Freedom of Speech'.

## Forms available on her website

- [SETT Scaffold for Consideration of AT Needs](#)
- [SETT Scaffold for Data Gathering](#)
- [SETT Scaffold for Tool Selection](#)
- [SETT Scaffold for implementation and Evaluation of Effectiveness Planning](#)
- 

The SETT Framework  
A Collaborative Planning and Decision Making Tool

	Date			
	Student	Environment	Tasks	Perspective
What We Know				
What We Need to Know				

## Re:SETT

- Use of the SETT Framework is an on-going process
- ReSETTing is not starting over, but rather revisiting the information in the SETT Framework often in order to update changes.

**How do  
Children  
Learn?**

### The Brain Builds Connections



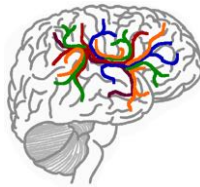
Based Upon Associations to Known Understandings

### Neurologically, Learning is:

- Strengthening Existing Connections
- Adding New Connections by Association
- Discarding Unused Connections

“What Fires Together Wires Together”

“Use it or Lose it!”



Learning is Connecting Intent with Movement



Physical, Emotional and/or Cognitive Movement

Learning is Enhanced by Attention to Relevant Components

What does Attention Look Like?



Stepping Stones to Switch Access - Strategies to Provide Children with Developmental Problem Solving Experiences





**Anat Baniel**  
**9 Essentials:**

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

- Essential 1—Movement with Attention
- Essential 2—The Learning Switch
- Essential 3—Subtlety
- Essential 4—Variation
- Essential 5—Slow
- Essential 6—Enthusiasm
- Essential 7—Flexible Goals
- Essential 8—Imagination & Dreams
- Essential 9—Awareness

### Essential 1: Movement with Attention

- Learning is determined by where the brain is focused
- The brain only attends to a small amount of stimuli at one time
- Movements done automatically do not create new connections in the brain

### High levels of activity in prefrontal cortex

- During new learning
- But Not when performing something that has become automatic
- Eventually, lower brain regions take over and the skill can operate in the background

Jueptner, Stephan, Frith, et al. | 1997

### Step 1: Single Switch: Cause and Effect

Child begins to associate an intentional movement with the ability to cause something to happen

### Working on Cognitive Part not the "Correct" movement

**Begin with Accidental Switch  
Activation**

## Essential 3—Subtlety

- Less is more
- Difficult to discriminate differences when there is too much competing input
- Use small movements instead of whole body reaction

## Proximity/Sensor Switches

(No pressure required, so less associated full body reactions and more opportunity to discriminate and grade movements)



Ablenet



Adaptive Switch Labs



Splashtop - mirror Computer screen on iPad (connect switches to computer)

## Cause and Effect Learning vs Recreation and Leisure



Momentary / Direct / Short vs Longer Entertainment

## Multiple Opportunities to Practice, Control, and Engage

RJ Cooper - Application Clicker

Application Clicker

Click the button below after reading these instructions in your application, position the cursor over the button you want Application Clicker to click on.

Press S to Start the timer (or to reset it).

After your "Time" as selected below, I will click for you to stop reinforcement. You will hear a ding (optional). Start your reinforcement again with a mouseclick. The timer starts automatically.

\* Control-Q gets you back here \*

Let's Get Started

Click on a Setting then the arrow below

Time (in seconds) to wait before I click for you: 5

Volume of this: 4

Will Click Initially For You

Auditory Prompt (ding)

Will Doubleclick

<http://www.rjcooper.com>

www.mightybook.com

When we last saw our bungling beavers, Captain Merzban was in arroyo, damper of losing a race with a...

## Step 2: Single Switch: Multiple Locations Multiple Functions



Child understands simple cause and effect but needs practice intending and executing a movement for different purposes or locations

## Single Switch - Multiple Locations (body parts or locations on surface)

Fun Exploration: Creating little problems to solve to work out what does this do? How can I use it?

Sing small parts of a song for multiple opportunities on a sequenced device



Single Switch - Multiple Functions

<http://www.rjcooper.com>



CD Player Shows a Greenball switch for Next Song. Other switch input is Play/Pause

Switch-Adapted DVD Player



<http://enablingdevices.com>

Expanding Possibilities

Give Switch Toys a Mission



Connections are Formed Through Active Experience Not Isolated Drills

Connections are Formed within Natural Contexts It has to make sense to the kid!

Contexts Help with Retrieval

Provides multiple connections in the brain with more pathways to retrieval

Connections are Formed within Multiple Modality Experiences with Active Participation



### Learn About Concepts by Using Concepts in an Activity

That looks great    That looks crazy    That looks terrible    That looks silly

Draw a face.  
 Draw a nose. Make it big.  
 I'll tell you what I think!



#### Conclusion/Significance

Voluntary exercise is the most effective intervention in upregulating the hippocampal BDNF level, and facilitating motor recovery. Rats that exercised voluntarily also showed less corticosterone stress response than other groups. The results also suggested that the forced exercise group was the least preferred intervention with high stress, low brain BDNF levels and less motor recovery.

**Citation:** Ke Z, Yip SP, Li L, Zheng X-X, Tong K-Y (2011) The Effects of Voluntary, Involuntary, and Forced Exercises on Brain-Derived Neurotrophic Factor and Motor Function Recovery: A Rat Brain Ischemia Model. PLoS ONE 6(2): e16643. doi:10.1371/journal.pone.0016643

**Editor:** Colin Combs, University of North Dakota, United States of America

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### Motivation is More than Enjoyment - It Comes from an Inborn Drive to Explore the World

#### Curiosity and Intrigue

#### "The Need to Know"



### Essential 2—The Learning Switch

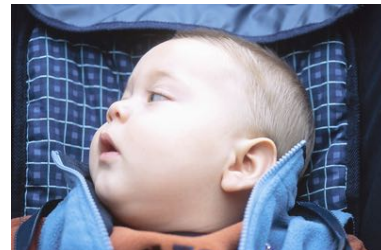
- At any given time, the brain is open for learning or not
- Anxiety and fear turn off the ability to learn
- Motivation organizes the brain

### Essential 4—Variation

- Variation is required for a brain to recognize patterns


### Babies are Motivated to Learn Through Problem Solving

Hanus Papousek (1969)



6 - 10 week old babies


**Habituation**



**Repetition**  
is a  
**Crucial**  
Component for  
**Learning!**

How do you **Balance**  
the Problem of  
**Habituation** with the  
Need for **Repetition**?


**Balance**  
**Novel and Known**



Start with what the  
child understands

**Then...**

Use **Repetition** with  
**Moderate**  
**Differences**



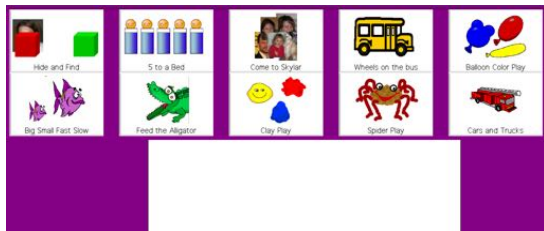
**Mastery Motivation:**

"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, & Hrnecir, (1995)

**Active Engagement:  
Internal Desire and External  
Supports to "Figure it Out"**

**Skylar's Play Box**



**CAUTION:**

**Some People Have  
Redefined**

**"Errorless Learning"**

**"Failure Free with Feedback"  
(Karen Erickson)**

**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**

**Helping Too Much Can Lead to  
Learned Helplessness**

Provide strategic feedback vs. prompting

Role of teacher, therapist, and para-professional is to facilitate independence, active engagement, and support for problem solving

Not just "get it right"

### What is the Cue?

- Because I actually want to do something for a genuine purpose within a natural context
- Someone said "hit the switch"
- Because the switch suddenly appeared in front of me

### Essential 5—Slow

- We can only do something fast that we already know how to do automatically
- Learning occurs when we slow down and add intention

### Encouraging, Quiet Wait Time

- Allow for processing time
- Repeating instructions can cause the child to have to re-start the processing
- Don't reboot their thinking
- When child can be successful, because she has the time to carry out her intent on her own, then that is when learning takes place

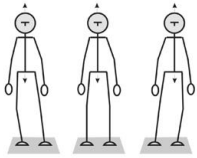

Eliminate hand-over-hand assistance  
- try to support the success of movement initiated by the child, instead of prompting the initiation of that movement

### Guided Movement


Using touch to support movement

## Good Body Mechanics

- Staggered Stance

**Weight Shift**

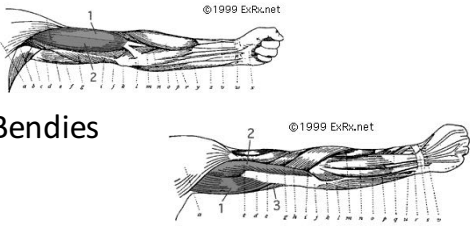


- Good body alignment

## Key Points of Control



## Muscle Belly vs Bony Prominences

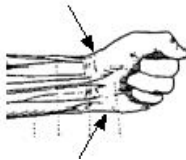


©1999 ExRx.net

**Bendies**


**Stretchies**

## Thumbs Up




- ✓ Thumbs up tends to decrease abnormal muscle tone.
- ✓ Support at the heel of the hand facilitates reach.
- ✓ Support in the palm of the hand tends to increase grasp.

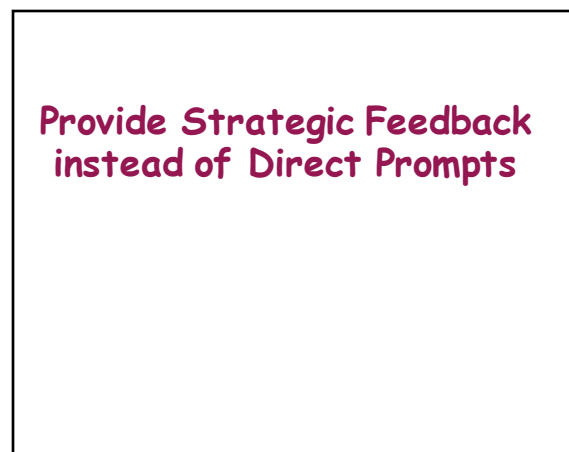
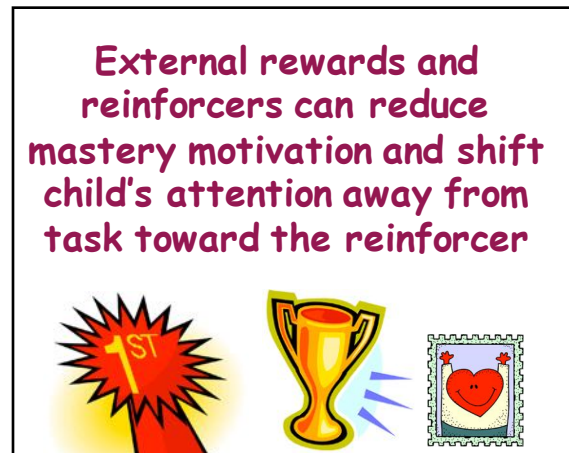
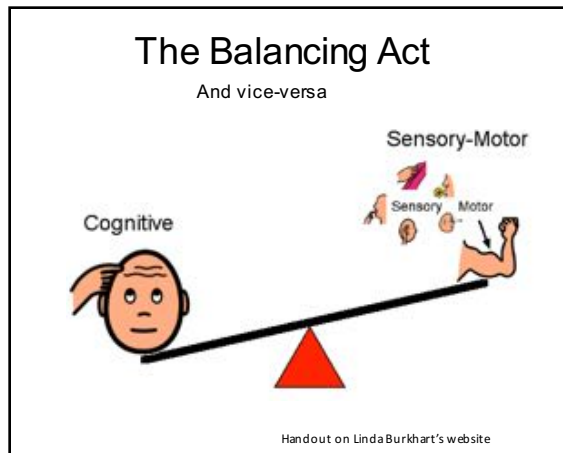
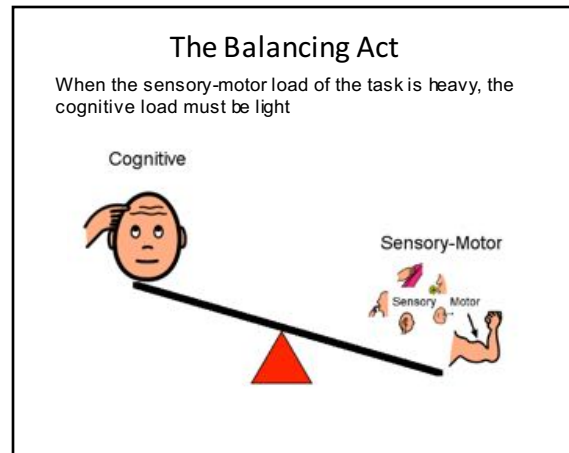
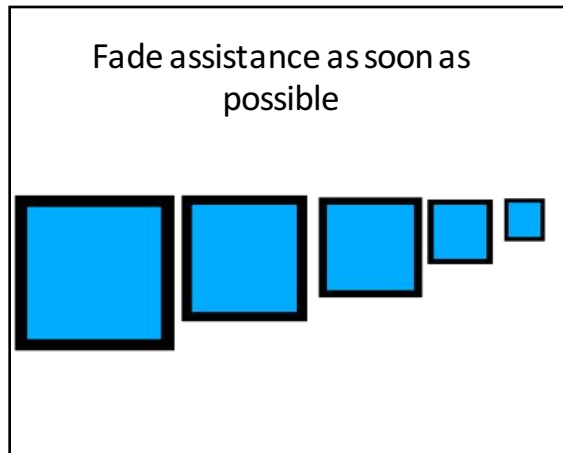
## Slow, sustained, gentle pressure



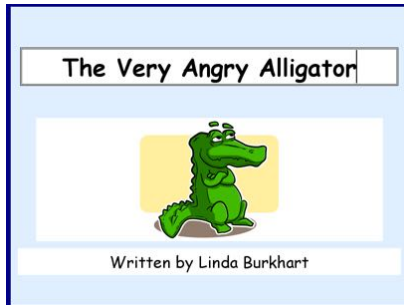
## Hand-under-hand



- ✓ Use light touch guidance to support the movement, but not to do the movement .
- ✓ Let the student finish the movement.



## Technology needs to provide good strategic feedback



## The Power of Modeling! Take a Turn



## Peer Models

Neurologically - Who matters to the child?

## Teaching Movements for Communication

- Teaching head nod and head shake for yes and no
- Partner Assisted Scanning as pointing

## Stability and Active Position

- Weight bearing on pelvis
- Moving forward slightly
- Able to rotate and shift weight - even if only slightly
- Grasp bar
- Control often begins at the head when body is active engaged with gravity

## Disassociation Head and Body Verbal Referencing

- Provide verbal feedback as the child moves his head as he scans:
  - "Your head is up and now down. I see you saying yes"
  - "head to the side, to the other side, no"

### Partner-Assisted Scanning

- Items are presented one at a time, ending with:
  - "None of those" or
  - "Something else"
- Child indicates "no" to move to the next choice and "yes" to select one item



"But he doesn't have a reliable "Yes and No" so how can we use this strategy?"

Model "Yes" and "No"  
...as you go...

Look for Subtle Non-Verbal Communicative Intents, Confirmations, and Negations

### Work Towards Clearer and More Reliable Signals

- Increase Clarity of Feedback for the child and for the Communication Partner
- Teach for the long term - natural gesture
- Verbal referencing

Why is Yes / No So Hard and Often Seen as Inconsistent?



### Never Teach Yes / No with Random Questions

- Understanding the language of the question has to come first
- Developmentally, expressing yes and no appropriately comes after the child has developed some expressive vocabulary
- Yes/No for confirm and reject is an earlier skill than answering questions



### Partner-Assisted Scanning

Learning **Yes/No** as an Alternative to Pointing -

**NOT** for Responding to Random Questions

### Time for Dessert



Would you like an apple?



Would you like an apple?

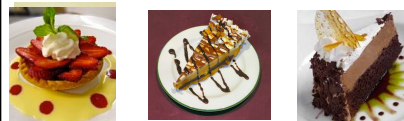


Yes or No?

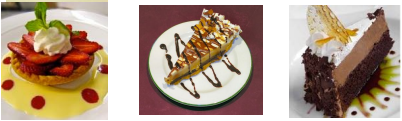
Would you like this?



Another Approach

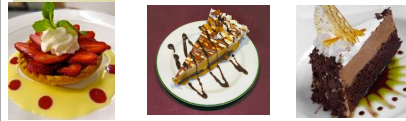


### Another Approach



Something else

### Another Approach



None of those

### Ideas to List for choices:

- Verses of a song
- Flavors of ice cream
- Books at the library
- Items to click on an iPad
- Dress-up clothes to wear
- Anything and everything all day long



### Song Verses for Choices

Flavors of ice cream  
Books at the library

### Choices Help Provide a Means of Active Participation


But

Just Indicating a Choice that Someone Else Selects - Isn't Enough to Develop Language


### Testing and Direct Questions

last item:  
"I don't know"  
or "not sure"


red




yellow



blue



I don't know



## A Smile does not work long term for yes

- What if the message is "something's wrong" (smile) "something hurts" (smile) "stomach" (smile) - a smile is inappropriate.
- What if the child thinks of, or hears something funny during a scan - he has just said "yes"

## Teach Movements for "yes" and "no"

### Practice Yes/No in Fun Ways Use Verbal Referencing

Work to get good positioning and then tell the child what they could do for yes and no

Don't Forget Speech as an Option for "Yes" and "No"

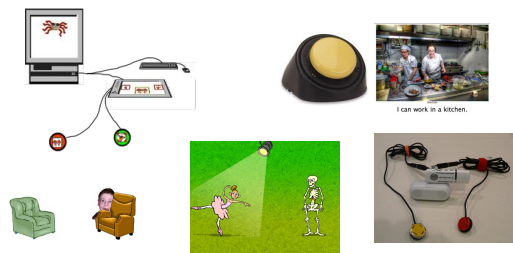
When a child is using an alternative method of indicating Yes and No, verbally let them know what you are responding to

"I see you are looking up for yes!"

No response may be the response when your only options are YES or NO!

- None of those
- Something else
- I don't know
- I'm not sure
- I don't understand the options

## Step 3: Two Switches Two Functions



Discrimination and Problem Solving

**Move to two switches two functions as quickly as possible**

**Increase Cognitive Engagement**

**Throw it to me!**





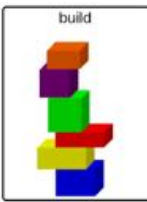

**Build it up!**



**Switch Applicator / Music**



**Manipulatives on the Computer**

**Early Songs and Play**

**Tarheelreader.com**

Which book would you like to read?




<http://tarheelreader.org/accessing-tar-heel-reader/switch-access/>

**Right Arrow Key & Left Arrow Key**  
 Right Arrow Switch Functions  
 On choice pages, is a "mover" switch and moves through choices  
 On book reading pages, goes to next page


**Left Arrow Switch Functions**  
 On choice pages, is a "picker" switch and picks a choice  
 On book reading pages, goes back a page

"These same key equivalents can be used to page forward and page backward in a book that has been downloaded into Power Point."


**Space Key & Enter Key (Functions same as Option 1)**  
 Space Switch Functions  
 On choice pages, is a "mover" switch and moves through choices  
 On book reading pages, goes to next page

**Enter Switch Functions**  
 On choice pages, is a "picker" switch and picks a choice  
 On book reading pages, goes back a page

**Inclusive Technology**  
**Two Switches - Alternate**



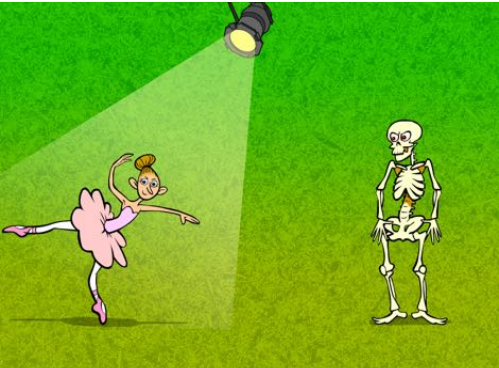
**Two Switches - Random**



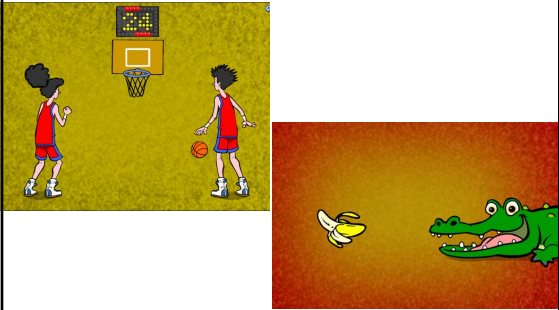
**Inclusive Technology**  
**Switch Skills for 2 - Set 1**



**Two Switches - Two Functions**



**Two Switches - Two Functions**

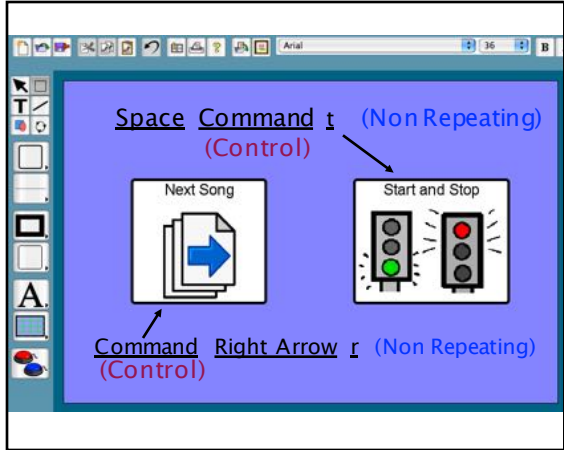


**SwitchinTime.com**  
**Switch Jam**



**Super Switch Hitter**





**Step 5: Two Switch Step  
Scan Errorless Learning**

**No "Right" or "Wrong" Answers**  
- Just a "Playground" to Explore with  
Good Strategic Feedback for the  
Child's Selections

**CAUTION:**  
Some People Have  
Redefined  
**"Errorless Learning"**  
  
**"Failure Free with Feedback"**  
(Karen Erickson)

**Loc-Line**

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