Teaching Multiply-Handicapped Switch Users to Scan: A Software Guide
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When a multiply handicapped person is unable to make choices by a direction selection technique – scanning with switches must be considered as an alternative input method. Training a multiply-handicapped switch user to scan to make choices is often a complicated task that requires specific teaching and techniques. The process of scanning involves learning fundamental skills such as motor control of the switch, attention to visual and auditory stimuli, and discrimination of visual symbols and auditory cues. These basic skills of scanning must be learned before the user can be expected to make clear choices in more complicated communicative or cognitive tasks.

Unfortunately, acquisition of these fundamental skills of scanning is overlooked by therapists and teachers in the rush to demonstrate progress on the more global goals of communication, literacy and educational achievement. It is important to consider that progress in these more global areas may be delayed because the user has not actually learned to control the scan to make clear choices. Acquiring these primary scanning skills often requires a long period of training.

The most versatile tool for teaching the user to scan is a computer with appropriate software. Trying to teach scanning with a communication device is more difficult than with a computer for several reasons. The setup required to match the user's interests and level is more intensive than with software. Also, a communication device requires that another person always be present to provide reinforcement when the user makes a choice. The trainer must be very patient for a long period of time to support the user's choice – no matter how repetitive the choices. Alternatively, with a computer and carefully chosen software, the user can practice scanning skills independently at his own pace.

There exists an extensive collection of software that can be used to teach scanning. Embedded within this software are a variety of levels and activities that are very useful for creating a training program for beginning scanners. However, it is often complicated to sort through this large collection to find specific software to match the user's level. This article introduces an original software guide to simplify the process. The guide breaks down the attributes of specific computer programs so that they could be placed into specific training levels for beginning scanners.

This guide consists of 13 graduated levels sandwiched between 2 general "bookend" categories: (1) pure cause-effect activity, (2) answering questions via scanning. The levels are more thoroughly defined below. The guide is presented in a format so the trainer can sort software to match the switch user's skill level. The guide can also be used as an evaluative tool to determine the user's level. Below is a sample page from the software guide.

Comp	Software Title	Specific Activity or Mode	Press/Release	Visual Tracking	2SwitchTrain	Cont Sequence	Errorless Story	Errorless Choices	Reaction Time	Follow Command	No Distractors	Multiple Distractors	Picture Match	Control Symbols	Function Symbols
DonJ	CircleTime Tales Deluxe	Press to Turn Pages Mode				x									
DonJ	Forgetful & Friends	Story Completion Mode				x									
Inclu	Happy Duck					x									
Inclu	Switch It Maker					x									
Inclu	Big Bang	Builds				x									
Inclu	Switch It Jigsaw Maker	Reveal				x									
Inclu	Switch It Gadgets	All other modes				x									
Inclu	Switch It Farm	Picture Builds				x									
Inclu	Switch It Farm	Stories				x									
Inclu	Switch It Diggers	All other modes				x									
Inclu	Switch It At Home	All other modes				x									
Intell	Take Me Out to the Ball Game					x									
RJCp	Children's Switch Progressions	Timed-reinforcement mode				x									
RJCp	Teenage Switch Progressions	Level 2				x									
SimT	Switch Kids	Bubble Gum activity				x									
SoTo	Switch Basics	Step Forward				x									
SoTo	Switch Basics	Celebrate				x									
SoTo	Old Macs Farm	Animal Books-Option 1 mode				x									

Example sorting done on the guide to find software activities pertaining to Level 4 – "Continue Sequence"

There are other guides available for choosing appropriate software. One of the most widely used is Stages. The first 2 stages presented in the Stages curriculum, "Cause-Effect" and "Language Readiness", relate most closely to the software shown in this new guide. Other software guides have been developed by software companies which classify their software into levels or categories to guide the teacher in choosing what software to purchase. At this point it is important to note that too often the catch-all phrase "cause-effect" is used to define software and activities pertaining to switch users at the beginning level. This nebulous definition is not helpful because it does not do justice to the subtleties are involved in learning to scan. Pure "cause-effect" will be discussed later in the article.

Progressive Levels of Training Software for Beginning Scanners

Level	Label	Description
	Pure Cause Effect	Simplest level – random sounds/sights/toys
1	Press/Release	Momentary/Timed/Latched
2	Visual Tracking	Progressive movement on screen
3	2 Switch Training	Differentiating between left versus right switch
4	Continue Sequence	Press to proceed in a story – visual or auditory
5	Errorless Choices	Random choice by pressing (visual or auditory)
6	Errorless Story	Random choice to control story
7	Reaction Time	Press/release by attending to prompts on screen
8	Follow Command	"Stop-Start" "Press-Wait"
9	Zero Distractors	Move cursor to correct row or column
10	Multiple Distractors	Move cursor to correct row or column with distractors present

11	Match Pictures	Move cursor to match pictures/symbols/outlines
12	Control Symbols	Scan through symbols representing direction
13	Function Symbols	Scan through symbols representing functions
	Answer Questions	Press to choose right answer – language activities

Description of the 13 Progressive Levels of Software

Pure Cause-Effect
Preceding the first numbered level in this software guide is a "bookend" category called "Pure Cause-Effect". This category includes activities where the user is presented the opportunity to press a switch to cause visual or auditory stimulation to occur. It includes battery-operated toys, environmental control as well as simple software that provides random sounds and visual stimuli.

This "pure" cause-effect level activity is useful for establishing setup skills for operating a switch including: optimal body positioning, consistent movement, switch type and mounting position. It also determines whether the user does best with auditory or visual stimulation and if he is aware of the contingencies associated with his action. Once the proper setup is established, training can move to the next levels. The prognosis is not good for a user who perseverates in banging the switch, pulling at the wires or tearing the switch from the mount.

Level 1 (Press-Release)
This first level of this software guide focuses on activities which emphasize the physical act of controlling the press-release pattern. It includes experimenting with latched, timed and momentary modes of control. At this level the trainer is determining how long the user attends to the display, if he makes an effort to continue the action, and if he repeats the press. A critical factor at this level is determining whether the user waits between presses to observe the result of his actions.

Level 2 (Visual Tracking)
At this level the trainer investigates whether the user is attending to subtle visual changes on the screen. The trainer may discover that the user can focus for short periods but is unable to visually track movement because subtle contrasts or small movement may not be enough to catch the user's attention. This level also helps to determine if the user is able to pick out key visual information from the background indicating whether he will be able to follow a moving indicator (cursor) for scanning. The ultimate result of training at this level may indicate that the user does best with auditory cues rather than visual.

Level 3 (2 Switch Training)
The emphasis at this level is to find out if the user has the physical and/or cognitive ability to control 2 switches for input. The user must realize that the left switch does one thing and the right does another. Limited range of motion may be prevent him from using this system. It may also bring out the fact that the user is neglecting a side or needs frequent cuing to press either switch. The end result may be that 2 switches may not be the best option and one switch scanning procedures may be best.

Level 4 (Continue Sequence)

Level 4 involves using software that contains short sequences of action to maintain attention and develop anticipation. This significance of this level is that it clarifies whether the user is anticipating continued action because of his pressing. This is the first level where the action is linear and meaningful, not random – so the user can anticipate where to look next. Hopefully he will show that a positive, affective response to demonstrate he is interested in what will happen next, indicating higher level cause-effect learning.

Level 5 (Errorless Choices)
This is the first level where distinct choices are displayed on the screen. It is also very significant that this is the first time there is a moving indicator (cursor) on the display that relates to making a choice. The user is starting to learn to stop and start pressing for a reason. The term "errorless" means that whichever choice is made – something will happen. Hopefully the user will realize that multiple choices are available and that the movement of the moving indicator (cursor) is significant. The size and style of the cursor are very important factors to consider in determining visual attention to the movement.

Level 6 (Errorless Story)
Level 6 software includes moving the cursor through an array of choices that simulate manipulating a book. The activity is the virtual implementation of turning pages in physical book. The user is typically most interested in experimenting with the buttons (choices) on the screen (similar to a toddler reading a book with his parent and physically turning the pages) rather than for the literacy. However, with repetition – he starts to realize that the buttons also give him control of a story.

Level 7 (Reaction Time)
At this level the user is expected to show that he can restrain himself to react in response to a specific stimulus within a certain time limit. The stimulus can either be visual or auditory. Achievement of this level scanning shows that the user can screen out unrelated events to attend to what is really important. This level has strong influence in determining whether the user can use automatic or step scanning. If the user is too slow – he may need to use 2 switches to eliminate timing requirements.

Level 8 (Follow Command)
Preceding levels have primarily involved having the user attend to visual stimuli. This level is the first that requires the user respond to specific verbal commands. This normally starts with cuing the user to "press", "wait", "press again" and/or "stop pressing". Anyone that has tried to teach a beginner to scan has used these simple commands repeatedly – often to the point of exhaustion! (This is a clear instance where the computer demonstrates its ability to be a more patient trainer than a human!)

Level 9 (Zero Distractors)

This level is the first that requires the user to move the indicator (cursor) to a specific target, then select it. By showing that he recognizes that this single target has significance – the beginning scanner is clearly demonstrating intention and control to make something happen. This level cannot yet be called choicemaking since there is only one target available, but the user definitely is making decision about what is relevant in the scanning process. Choices can be presented both visually and auditorily.

Level 10 (Multiple Distractors)
This is the first time the user has the opportunity to make a <u>correct</u> choice. The correct choice is not based on language cues or matching pictures; rather it depends on the user recognizing that something is visually different about one choice versus the others. There are multiple distractors on the screen, so the user must select the correct choice while disregarding the others to get a result. This level is closely related to the language concept of "same versus different".

Level 11 (Match Pictures)
When the user gets to this level, he has control over the scanning indicator and can select specific targets. He can now be expected to choose a correct <u>answer</u>. At this level choosing a correct answer involves using precise visual discrimination to make a visual match. The number of distractors can be increased as the user progresses.

Level 12 (Control Symbols)
This is the first level where the user is expected to make a specific choice that is represented by an abstract symbol. When he chooses a particular symbol such as a directional arrow – movement occurs on the screen that is related to the concept represented by the symbol. This is very important in learning to play games. The emphasis is still not on answering a question, but rather making a choice based on an abstract representation of an idea.

Level 13 (Function Symbols)
At this point the user has learned that the abstract symbol he chooses represents some action that is going to occur when he makes his choice. This level is the beginning step in operating environmental control devices. It is also the last level in the 13 levels of this software guide before the user proceeds to making language based choices or answering questions.

Answer Questions
The final "bookend" category in this software guide, "Answer Questions", is the start of where typical language and academic based software can be used. At this point the user has achieved the tasks presented in the previous 13 levels of learning to scan and now demonstrates proficiency in fundamental scanning skills. He can now be expected to make clear choices via scanning that will clarify his communicative, literacy and academic functioning abilities. A huge collection of software for teaching is available beyond this point.

Summary
The purpose of this software guide is to make teachers and therapists more aware of the underlying skills that are needed to achieve scanning success. By attending to the levels proposed in this software guide, the trainer should be able to select more appropriate software for the user. Once the trainer becomes familiar with the specific software, he will be able to tweak the modes and settings to customize the program for the user's benefit. Some nice features of newer computer software are that the user's name, digitized voices and photos can be included to increase attention and enable better results.

This guide should also help trainers make specific decisions about whether the user can operate 2 switches, or if he is better at automatic scanning versus step scanning with one switch. It will also aid to isolate visual factors such as how large choices need to be, what visual contrasts are needed or what cursor styles and sizes may be more effective. It can also help determine if the user will be an auditory versus visual scanner.

Hopefully by using this guide to choose appropriate software, teachers and therapists will be more effective training switch users to scan. The ultimate goal is providing multiply-handicapped switch users an effective input method to allow them to be successful in communication, literacy and academics.

The software guide described in this article is available at:
www.geocities.com/learntoscan

More information about the Stages Curriculum (Assistive Technology, Inc.) is available at:
www.assistivetech.com/p-stages.htm