Paper ref.	Speaker	Paper	Authors	Affiliates
p157	Ms Kim Adams	**Measuring user accuracy and speed with scanning access on dynamic display speech generating devices**		

Type: Poster Presentation

Theme RESEA

Final paper:

BACKGROUND

In a larger study, children used the infrared (IR) output on their speech generating device (SGD) to control a Lego(TM) robot to do math measurement activities. The participants used two-switch scanning to select both language and robot commands on a grid array on their SGD. We sought an automatic data capture protocol to measure if participants had the minimum required motor accuracy level using their scanning method in order to proceed with the study. We also required that the protocol could be used multiple times to assess presence of motor learning over time; controlling a robot via a SGD has the potential to improve scanning skills through practice since it requires a high number of switch hits. Finally, we required that the protocol be independent of language since math activity outputs were not only words, but also IR commands.

A review of the literature revealed no tests that met our requirements. Auto data captured metrics used in recent SGD research studies typically use rate of communication in words per minute (e.g., 1). One commercial protocol uses the metric "Selection Rate", measured in bits/per second, but it expects word-based data, hence it ignores any IR output (2). Some protocols use symbols as targets rather than text, but they have other limitations. For example, some commercial SGDs have built-in page layouts for assisting in motor assessments for appropriate grid size (e.g., Prentke Romich Company's Chase the Rabbit and Dynavox's Startup User), but grid size changes automatically. In another example, Compass(TM) has a fixed grid size (although not the size that we required) but it uses symbol matching that adds a cognitive demand on the user. The Green Dot Test is for direct access users on standard and alternative sized keyboards (3). This test removes the cognitive aspect of recognition and understanding of letters or symbols by simply using "dots" as targets, but data collection is obtained manually.

Since the Green Dot Test most closely matched our requirements, we modified it for our purposes. This paper discusses a protocol to automatically capture data for the measurement of dynamic display SGD accuracy and speed while using scanning.

METHODOLOGY

Participants

There were three participants in the study, two girls, one 14 years old (P1) and the other 12 (P2), and one 10 year old boy (P3), all who had Cerebral Palsy. They used Vanguard(TM) SGDs with two-switch scanning using Specs(TM) switches attached to their wheelchair headrests. P1 and P3 used a 45 cell grid array with row-column (R-C) scanning. P2 used an 84 cell grid array with quarter-row-column (Q-R-C) scanning. Unrelated to the study, P3 began using an 84 cell grid array part way through the study. He did so to have more language available on the main screen.

Materials

SGD activity was captured and time stamped using the Language Activity Monitor (LAM) logfiling feature and a video that framed the SGD screen.

Two sets of 12 target cell locations were determined by consensus between three augmentative communication specialists, one for the 45 cell grid, and one for the 84. Targets were chosen in each scanning area, with emphasis on the first scan position since it requires the fastest reaction time. Target locations remained constant.

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A SGD page was created with all cells left blank (i.e., no symbol or label). The cells were programmed to send the row-column location of all selections to the logfile and to perform audio and visual feedback for correct selections (i.e., speak and display "Got it" in the message window). The command <LAM-MARKER>(row,column)" was used to send the row-column location to the logfile, but not the message window.

Procedure

The modified Green Dot test was performed at the beginning of the study, after training with the robot, and then after using the robot for functional math activities (approximately 4 weeks apart). The participants were told that both accuracy and speed were important in the test. They were not allowed to correct errors. P3 did not have a third test since he switched to the 84 cell grid array and the Q-R-C scanning method. However, he performed tests with both Q-R-C and R-C scanning on the 84 grid to test a theory; he felt that his new Q-R-C scanning method was no faster than his old R-C method.

Selection order for targets was determined by randomly drawing the target locations from an envelope prior to each test. The total "distance" travelled to attain all 12 targets was constant from one test to the next since the cursor jumped back to an initial scan position after a cell was selected.

During the test, the investigator manually placed an adhesive dot on a target cell (making sure to press hard enough to activate the cell), waited for the participant to make their selection, and then removed the dot (again activating the cell). This technique resulted in three entries per target in the logfile, the first and third entries were those of the investigator and the middle one was the participant's selection. Selections were marked as errors if the participant's row-column location was not the same as the investigator's. Number of errors was also tracked during the test by the investigators. The video was used to provide supplemental information on what happened when a participant missed a target cell.

Total time to complete the test was measured with a stop watch during the test. Values were verified later from the logfile by taking the time when the participant selected the last target minus the time when the investigator placed the first target.

RESULTS

The following results show the accuracy (% correct selections out of 12 possible targets), the time to perform the test, and average time per selection (total time/12 targets) for each participant. Time to manually place and remove the dots was consistent across participants and tests and was assumed to be an insignificant portion of selection time.

Part.#	Trial	Accuracy(%)	Time(mm:ss)	Time/ selection (mm:ss)
P1	Initial	83	02:54	0:14
	After training	75	02:33	0:13
	After functional tasks	83	03:27	0:17
P2	Initial	100	02:13	0:11
	After training	100	01:48	0:09

	After functional tasks	100*	01:56*	0:11*
P3	Initial	100	01:29	0:07
	After training	100	01:32	0:08
	QRC 1	100	01:44	0:09
	RC 1	92	01:48	0:09
	QRC 2	100	01:37	0:08
	RC 2	100	01:40	0:08

* Calculated with 11 targets.

DISCUSSION AND CONCLUSION

Participants all had sufficient initial accuracy to begin the study, but they did not show improved accuracy and time over the course of the study. Both P2 and P3 were experienced users who had used their systems regularly for many years, at least 6 and 5 years respectively, therefore their two-switch step scanning skills have probably plateaued. P3's only error was making a selection one column too early. In contrast, P1 was a fairly irregular SGD user, who only had her device for 2 ½ years. Observation of the video for P1 showed that her errors in the first two tests were due to selecting a cell to quickly escape from scanning an incorrect row (causing an error). By the third test she waited for the cursor to finish incorrect scan cycles without clicking (causing increased time) and her errors were only due to selecting one column too early. P1 learned a strategy to reduce errors even though it was slower. There will be time benefits from this strategy when she is communicating with her SGD since each correction of an error requires two new selections (clearing the wrong entry and selecting the correct one).

The test results verified to P3 that Q-R-C scanning did not have a time advantage over R-C scanning. However, it started a dialog about how Q-R-C could have an advantage when he is communicating; P1 had not been using the frequency layout which is developed specifically for Q-R-C scanning where the most frequently used words are in the first quadrant. He began using that layout subsequent to the test.

The robot facilitated activities in the larger study placed high cognitive demands on the participants. Participants had to 1) ascertain the relative orientation between the robot and the item to be manipulated, 2) determine the required robot movement to go in the desired direction, 3) determine which symbol on the SGD would result in the desired movement, and 4) select that symbol from the grid array. Performing this Green Dot test allowed us to separate the participant's motor efficiency using their selection method from the cognitive demands of the activity.

It is often important to ascertain motor capability without confounding the test with cognitive or communicative requirements such as finding a specific letter or symbol or spelling a word. While this is true for many individuals it is particularly important for children and those with cognitive deficits. The modified Green Dot test provided a simple automatic data capture protocol to measure scanning accuracy and speed on dynamic display SGDs. Randomizing the order in which the target cells were presented allowed the SGD test page to be used for multiple tests over time.

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P159 Ms Sandra Pires **The impact of AAC in the family with a child with Down syndrome**

Type: Poster Presentation

Theme RESEA

Final paper:

The impact of AAC in the family with a child with Down syndrome

Studies on Down syndrome (DS) and its communicative characteristics are abundant and address the difficulties in developing verbal language, verbal expression capacity and their specific features regarding phonology, syntax and lexicon (Roberts, Price & Malkin, 2007).

Children with DS develop gestural communication in a more advanced and prolonged manner due to their language development characteristics (Iverson, Longobardi & Caselli, 2003; Roberts, Price & Malkin, 2007; Stefanini, Caselli & Volterra, 2007).

The use of resources and systems which aid communicative capacity in individuals with DS becomes necessary as a result of their language difficulties, and is needed to improve interaction in the medium, albeit with the intention of supporting or replacing speech, temporarily or permanently, depending on individual needs. (Kumin, 2003).

According Von Tetzchner & Martinsen (2000), where intervention using Augmentative and Alternative Communication (AAC) in children with DS is intended to promote verbal language development and acquisition while improving the quality of interaction. The use of AAC for individuals with DS is seen as an opportunity to promote oral communication since it exploits the value of visual processing which contributes in turn, toward dealing with the characteristic verbal memory difficulties in DS (Miller, Leddy & Leavitt, 1999).

The study by Clibbens (2001) investigated the use of gestures as an AAC resource, which was verified as a strategy facilitating language development. When graphical symbols are introduced, gestures are not discarded but rather, proposed for combined use. According to Clibbens, (2001) the use of AAC boards, in addition to gestures, may help as a strategy to boost potential communication, increasing the number of symbols used.

In earlier work, Romski & Sevcik (1993) pointed to the importance of taking into account the language condition, of both expression and reception capacity when assessing acquisition and use of the AAC system, so as to devise more suitable intervention propositions which address the needs of the individual.

However, the role of the family is essential to become able the use of AAC with this population. Family needs belong to the AAC team and, so, needs understand the AAC recommendation and AAC use´s proposal. It needs to verify family profile and understand family needs.

The literature indicates difficulties to the family to accept, understand and use effectiveness the AAC board with DS child. According Angelo (1997) the AAC proposal require many changes in the daily family structure. Family members participate on teams and are involved in assessment an intervention, family affects AAC outcomes and AAC devices and services affect the family (Angelo, 1997).