Does Performance on the ABLA Test Predict Object Name Recognition?

By

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A Thesis submitted to

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In Partial Fulfillment of the Requirements for the Degree of

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Abstract

Research has shown that performance on the Assessment of Basic Learning Abilities (ABLA) test correlates with language assessments for persons with developmental disabilities (DD; Marion, Vause, Harapiak, Martin, Sakko, & Walters, 2003). However, no one has examined the relationship between performance on the ABLA test and object name recognition. This study investigated whether performance on ABLA Level 6 predicts a client's ability to identify pictures of objects when the tester states the names of the objects. Five clients with severe DD who passed ABLA Level 6, but failed a test of Auditory-Auditory Identity Matching (AAIM), and five clients who passed ABLA Level 4, but failed ABLA Levels 5 and 6 and AAIM, were assessed to determine their ability to point to pictures of common objects after hearing their names. Four of the Level 4 participants failed all name recognition tasks, and one Level 4 participant passed all name recognition tasks. All five of the Level 6 participants passed all of the name recognition tasks. The difference in performance between the two groups was significant at the .05 level. These results constitute a first step in demonstrating that mastery of ABLA Level 6 may be an important bridging task for teaching naming skills to persons with severe developmental disabilities.

Does Performance on the ABLA Test Predict Object Name Recognition?

The development of language is a complex process involving specific auditory and visual discriminations. Researchers often divide language development into two main categories: receptive and expressive language (Richard, 1997). Research on typically developing children has shown that in general, receptive language is mastered before expressive language (Fraser, Bellugi, & Brown, 1963; Rosenberg & Abbeduto, 1993). Furthermore, once a skill is mastered receptively, the child is often able to rapidly learn to use the same skill expressively (Dollaghan, 1985). This is consistent with the belief (Heatherington & Parke, 1975 as cited in Casey & Kerr, 1977) that speech comprehension precedes the production of meaningful speech. As with typically developing children, children with developmental disabilities are likely to develop receptive before expressive language (Rosenberg & Abbeduto). However, the progression from receptive to expressive language is less likely to occur (Wynn & Smith, 2003).

In one type of assessment of receptive language abilities, an individual might be required to identify one of two randomly designated objects requested vocally by a teacher. In such a task, the position (e.g., left or right), as well as the object requested, alternates randomly from trial to trial. In this task, a correct response requires an individual to discriminate between two or more auditory prompts, as well as two or more visually presented alternatives. Once an individual has mastered this auditory-visual combined (AVC) discrimination, they have mastered an example of receptive language.

This AVC discrimination is one of the types of discriminations that are assessed on a test called the Assessment of Basic Learning Abilities (ABLA) test. The ABLA test

consists of six hierarchically ordered discriminations tasks, including: Level 1, a simple imitation; Level 2, a two-choice position discrimination; Level 3, a two-choice visual discrimination; Level 4, a two-choice visual quasi-identity match-to-sample discrimination; Level 5, a two-choice auditory discrimination; and Level 6, a two choice auditory-visual combined discrimination. When assessing an individual's ability to learn ABLA Level 6, a participant is presented with a yellow can and a red box in randomly alternated left-right positions. The participant is required to consistently place a piece of foam in the appropriate container when the tester randomly says, "red box" or "yellow can". A study with 42 typically developing children revealed that those children who passed ABLA Level 6 performed significantly better on measures of verbal skills than their age-matched peers who failed ABLA Level 6 (Casey & Kerr, 1977). In another study (Ward, 1995), individuals with developmental disabilities who passed ABLA Levels 5 and 6 communicated using two or more words, while individuals who failed Levels 5 and 6 communicated using simple words or signs. Thus far however, no one has examined whether performance on ABLA Level 6 might predict the ability of a person with severe developmental disability to recognize the names of pictures of common objects. The purpose of this study was to examine that possibility.

The ABLA Test

A description of the ABLA tasks (referred to as levels) is presented in Appendix A. When testing a client for a particular ABLA level, the client is first given a demonstration of the correct response, a guided trial and an opportunity for an independent response at that particular level. Following a correct independent response, formal testing begins. Each correct independent response is followed with an edible

reinforcer that was chosen by the client at the beginning of the session from a choice of three edibles, as well as verbal praise (e.g., "good job"). If an error occurs, an error correction procedure is implemented. The correction procedure consists of a demonstration of the correct response, a guided trial, and the opportunity for an independent response. A particular level is passed if a client makes eight consecutive correct responses independently. A level is not passed if eight cumulative independent errors occur. Correct responses or errors on assisted trials (e.g., demonstration, guided trial) do not count towards the pass or fail criteria. Errors on the independent response portion of the error correction procedure count towards the failure criterion, but correct responses do not count towards the pass criterion. The pass criterion of eight cumulative correct responses was chosen based on Kerr, Meyerson, and Flora's (1977) suggestion that only once in 256 trials will eight consecutive correct responses occur by chance in a two-choice discrimination in which successive responses are independent. This criterion minimizes the likelihood that participants will pass a level by chance.

Research on the ABLA Test, and Vocational, Academic and Self Care Tasks

Researchers have hypothesized that for people with mental retardation, the deficits in learning certain tasks may be a function of deficits in learning the prerequisite auditory, visual and motor discriminations. The ABLA test developed by Kerr et al. (1977) has proven to be a useful tool for determining appropriate tasks for persons with developmental disabilities. The ABLA test does not assess the already existing behavioral repertoire of individuals; rather it determines the client's ability to learn new discriminations rapidly. It tests an individual's learning-to-learn capabilities. Research has shown that most vocational, academic, and self-care tasks require the auditory, visual,

or motor discriminations assessed by the ABLA test (DeWiele & Martin, 1996; Kerr et al.,1977). Furthermore, these discriminations are similar to the types of discriminations individuals encounter in day-to-day life such as turning on the cold rather than the hot water tap (Level 2), or sorting socks into pairs (Level 4).

The levels of the ABLA test are hierarchically ordered in terms of difficulty (Kerr et al., 1977; Martin, Yu, Quinn, & Patterson, 1983; Wacker, Steil, & Greenebaum, 1983). Failed ABLA levels are difficult to teach using standard prompting and reinforcement and may require hundreds of trials before the discrimination is learned, if it is learned at all (Meyerson, 1977; Stubbings & Martin, 1995, 1998; Witt & Wacker, 1981; Yu & Martin, 1986). If a task is chosen above a client's ability level, the client may not be able to learn it even following a number of trials of reinforced practice. If a task is chosen below a client's ABLA level, he or she should be able to learn the task very quickly. Thus, a client's ABLA level has been found to be predictive of the type of tasks which he or she is likely to readily learn, for example simple imitation tasks or match to sample tasks. Tharinger, Schallert and Kerr (1977) found that when predictions were made about whether clients could rapidly learn certain tasks based on their ABLA levels, 83% of the predictions were confirmed. Therefore, tasks can be analyzed according to the discriminations necessary for their completion. Matching tasks with a client's current ABLA level is important for both clients and staff in that exposure to training tasks matched to a client's ABLA test level results in fewer aberrant behaviors than tasks that are mismatched to that client's ABLA level (DeWiele & Martin, 1996; Vause, Martin, & Yu, 2000).

Additionally, the ABLA test has been shown to be a better indicator of a client's ability level than experienced staff assessment. Stubbings and Martin (1998) asked staff to judge which tasks a particular client would easily master. These judgments were subsequently compared with predictions based on a client's ABLA level. Results indicated that even though each staff member had been working with their respective clients for at least eight months, the ABLA test was significantly more accurate in predicting which tasks clients would learn quickly.

Further research (Harapiak, Martin, & Yu, 1999; Vause et al., 2000) has indicated that an auditory-matching task may be a worthwhile addition to the ABLA test. On each trial of an auditory-auditory identity-matching (AAIM) prototype task, the tester says a word, an assistant says the same word, and a second assistant says a different word. The client is required to point to the assistant who makes the identical sound spoken by the tester. Research has revealed that an AAIM prototype task is more difficult than Level 6, has good retest reliability, has good predictive ability for other types of AAIM tasks and may be a prerequisite to learning language skills (Harapiak, Yu, & Martin, 2001; Harapiak et al., 1999; Vause et al., 2000).

Research on the ABLA Test and Language

Research has shown that performance on the ABLA test correlates with language assessments. In a study conducted by Casey and Kerr (1977), 42 typically developing children who were able to pass the two auditory discriminations of the ABLA had significantly higher scores on mean length of utterance, upper bound and vocabulary sample than age-matched children who failed those two auditory tasks. Ward (1995) found that for children with autistic-spectrum disorders their expressive language abilities

were correlated with their ABLA performance and that the children who had achieved ABLA visual matching used only single words or signs and the children who had acquired the auditory tasks of the ABLA produced two or three word utterances. Meyerson (1977) found that no children with developmental disabilities, who failed ABLA Levels 5 and 6, passed the Distar Reading Readiness Test, suggesting that simple speech discrimination skills as measured by auditory-visual combined discriminations (Levels 5 and 6) are prerequisites for more complex language discriminations. Finally, Barker-Collo, Jamieson, and Boo (1995) assessed individuals with developmental disabilities on the ABLA test, the Vineland Adaptive Behavioral Scales (VABS) (Sparrow, Balla & Cicetti, 1984) and the Communication Status Survey (CSS; Barker-Collo, 1995). ABLA Levels 5 and 6 were found to be significantly correlated with VABS scores of receptive and expressive language and communications measures of the CSS.

Statement of Problem

The purpose of the present study was to investigate whether performance on ABLA Level 6 predicts a client's ability to identify pictures of common objects when the tester names the objects. Five clients who passed ABLA Level 6 but failed AAIM, and five clients who passed ABLA Level 4 but failed ABLA Levels 5 and 6 and AAIM were assessed to determine their ability to point to pictures of common objects after hearing their names. It was hypothesized that individuals classified at ABLA Level 6 would pass the receptive name recognition tasks, whereas individuals classified at ABLA Level 4 would not pass the receptive name recognition tasks.

Method

Participants and Setting

Ten adults with severe mental retardation were recruited for the study. A participant's diagnosis was obtained from each client's personal health record. The participants reside at the St. Amant Centre, a residential center and community training facility for persons with developmental disabilities. Five of the participants had passed the ABLA (Kerr et al., 1977) visual discriminations (Levels 3 and 4) and failed the ABLA auditory discriminations (Levels 5 and 6) and the AAIM task. The other five participants had passed the auditory discriminations but failed the AAIM task. Consent for participants to take part in this study was obtained from the participant's legal guardian.

Sessions were conducted in a quiet room in the Research Department at the St. Amant Centre. The room had a rectangular table in the centre with a chair on each side. A participant sat directly across from the experimenter. When inter-observer reliability and procedural reliability assessments were conducted (as described later), an observer sat next to the experimenter.

Materials

The materials for the ABLA test consisted of a red box and a yellow can, a beige irregularly shaped piece of foam, and a small red cube and a small yellow cylinder. For the receptive naming recognition assessment, twenty common objects were photographed on a neutral background. The objects were chosen after observing clients in their living and work environments to determine those objects that they were in contact with on a regular basis. Common objects that were considered include: a fork, a sock, a bed, a cup,

a plate, paper, pants, a face cloth, a chair, a switch, a knife, a shoe, keys, a toothbrush, a wheelchair, a pencil, a shirt, a television, a table, a comb, a radio, a coffee pot, a tray, a van, a backpack, a book, an elevator, a bike, and a computer. Additionally, staff members were encouraged to list and rate other objects (not on the list) that each participant frequently encountered and that could easily be represented in a photograph. Furthermore, once the list had been compiled, staff members who were familiar with the individual were asked to rate the frequency with which each client encountered and heard the names of those objects (Appendix B). The rating scale ranged from "never encounters or hears the name of the object" (0 rating) to "encounters and hears the name of the object 7 or more times a day" (rating of 4). Objects that were encountered at least 3-4 times a day (rating of 2 or higher) were defined as "encountered frequently". The objects that were specific to each client and that were representative of the objects that each client frequently encountered were then individually photographed on a neutral background. The photographs were then made into 8" X 11" laminated sheets.

Procedure

Only objects described by staff as frequently encountered were considered when selecting the pairs of photographs for each participant. All participants had at least 10 objects that had been defined as frequently encountered which allowed the experimenter to create 5 pairs per participant. The pairs of photographs were chosen randomly. If a pair was created, through random selection, in which each of the objects started with the same letter (e.g., "sock", "shoe"), then all pairs for that particular participant were re-chosen until pairs were selected in which each object began with a different letter. The purpose of this qualifier was to ensure that the names of a pair of objects were very distinct from

each other. A complete list of the pairs selected for each participant appears in Appendix C.

At the start of each session, participants were given a choice of six edibles that staff indicated were preferred. Participants who were either unable to or uninterested in consuming the edibles were given a choice of six tangible items. Examples of the tangible reinforcers include a disco ball, a massager, and a toy with flashing lights. A participant was asked to choose one of the edibles/tangibles, which was then used as a consequence for correct independent responses throughout that session.

During the assessment of the name recognition of a pair of pictures, the experimenter placed two 8" X 11" photographs on the table in front of the participant. The testing procedures for a pair of photographs followed the ABLA procedures for testing Level 6, in that before the first trial with a pair of pictures, each participant was given a demonstration, a guided trial, and the opportunity for an independent response with each of the pictures. A demonstration consisted of the experimenter stating the name of one of the pictures (e.g., "fork"). The experimenter then pointed to the correct photograph. Following the demonstration a guided trial was given. The experimenter again stated the name of one of the photographs and then guided the participant's hand to point to the correct picture. Finally, the participant was given an opportunity for an independent response. The participant was required to point to the correct photograph named by the experimenter. If the participant responded correctly, the chosen edible or tangible reinforcer was given. If the response was incorrect, another demonstration, guided trial and independent response occurred until there had been a successful independent response. The demonstration, guided trial and opportunity for an

independent response were given for each picture with the pictures on alternating sides. Test trials then began.

On a test trial, the experimenter stated the name of one of the pictures. For example, if the pair of pictures consisted of a sock and a shoe, the experimenter either said "cup" or "plate". The participant was then required to point to the appropriate picture of the pair when the tester spoke its name. Following a correct response a participant was given the chosen reinforcer and praise. After an incorrect response the experimenter said "no" and then proceeded with a demonstration, a guided trial and an opportunity for an independent response. The location (e.g., left or right side) of the two pictures and the words (e.g., "cup" or "plate") spoken were randomly alternated across trials (see Appendix D). For each predictive task pair, testing continued until the pass criterion of eight consecutive correct responses or the failure criterion of eight cumulative errors was met. Testing for a particular task pair continued until the pass or fail criterion was met for that task pair. Then testing was done on the next task pair, and so on, until all the pairs were tested. The predictive task pairs were presented in random order.

Reliability Assessments

Inter-observer reliability (IOR) checks were conducted for approximately 42% of the sessions. In order to calculate an IOR, an observer and the tester independently recorded the picture pointed to by a participant for each trial. A trial was defined as an agreement if both observers recorded the same response; otherwise, it was defined as a disagreement. IOR scores were calculated by dividing the number of agreements in a session by the number of agreements plus the number of disagreements, and then

multiplying by 100% (Martin & Pear, 1999). IOR scores ranged from 90 – 100% across all participants with a mean of 99%.

Procedural reliability checks (PR) were calculated for 42% of the sessions using a checklist of steps to be followed (see Appendix E). An observer and the experimenter independently monitored all parts of the procedure to ensure that they were carried out correctly. PR scores were calculated in the same fashion as IOR scores. PR scores across participants ranged from 93-100% with a mean PR score of 99%.

Experimenter accuracy checks were calculated for 42% of the sessions. During an accuracy check, an observer recorded the extent to which the experimenter correctly followed the testing procedure. The mean accuracy check score across sessions was 99% with a range of 95-100%.

Results

Four of the five Level 4 participants failed all of the name recognition tasks. However, one of the Level 4 participants passed all of the name recognition tasks without any errors. The performance of the Level 6 participants was consistent across all tasks with all five of the participants passing all of the name recognition tasks. For data analysis purposes, participants earned one point for each object name recognition task passed and zero points for each task failed. A one-tailed independent samples t-test was used to evaluate the significance of the difference between the points assigned for passing of the name recognition tasks by the ABLA Level 4 participants versus the points assigned for the passing of the name recognition tasks by the Level 6 participants. Results from the one-tailed t test demonstrated a significant difference ($t[8] = 4.43$, $p < .05$).

Discussion

In this study, ABLA Level 6 performance predicted object name recognition performance. That is, a person who passed Level 6 was likely to pass an object name recognition task, while a person who failed Level 6 was not likely to succeed at object name recognition. As indicated previously, passing or failing of ABLA Level 6 is also predictive of communication scores on the VABS. This study assessed the more specific relationship between passing or failing Level 6 and the ability to demonstrate name recognition of pictures of objects. The ability to master object name recognition, an aspect of receptive language, may be an important pre-requisite skill to further language acquisition, especially expressive language.

How can we account for the one Level 4 participant who passed all of the name recognition tasks? Further assessment with this participant, indicated that although that client failed ABLA Level 6 he was able to perform a number of tasks comparable to ABLA Level 6. Upon completion of the study the client was tested on ABLA Level 6 using 3-dimensional objects other than the box and can typically used in the ABLA test, and passed easily. The 3-dimensional objects used in the follow-up assessments differed from those of the object contact questionnaire but were still considered to be objects that the participant was likely to encounter such as a ball, sunglasses, and so forth. Furthermore, in many of his daily activities this participant has been given vocational tasks that would be classified as examples of ABLA Level 6 tasks, including "take this to (name of staff)"; and "bring me the plates or spoons" (when the names are randomly alternated). It may be that the Level 6 tasks that this participant passed involved stimuli more familiar than the standard box and can, thereby making the discriminations between

the stimuli easier. Furthermore, this participant was less likely to come in contact with, or hear the names "box" and "can" in his daily living and working environments.

A limitation of the present study is that the object contact questionnaires given to staff relied on subjective estimates of the frequency with which a client encountered and heard the name of a common object, and the same staff did not rate all the objects for all the clients. However, given that 9 of 10 participants consistently performed as predicted, potential inconsistencies between estimated and actual frequency of exposure to the test objects does not appear to have seriously affected the results.

The small number of participants (five in each of the Level 4 and Level 6 groups) who were tested on the name recognition tasks may also have limited the generality of the study. On the other hand, it is again important to note the high consistency of the data across 9 of the 10 participants.

The results of this study suggest that ABLA Level 6 may be a prerequisite skill in the acquisition of receptive language, specifically object name recognition. ABLA Level 4 consists of a match-to-sample visual discrimination in which the client is asked to look at the object presented by the instructor and determine the matching stimulus in a choice of two stimuli. On the other hand, ABLA Level 6 consists of an auditory-visual discrimination. ABLA Level 6 requires an individual to make a discrimination between two words that are spoken by the instructor as well as a visual discrimination between two objects in front of the participant. Therefore, Level 6 requires an increasingly complex auditory and visual discrimination. While clients at Level 4 have mastered the necessary visual discrimination skills, they have yet to acquire the necessary auditory discriminations required for Level 6. The results of this study suggest the necessity of

mastering these auditory discrimination skills in order to be successful at object name recognition. Further research should focus on teaching one or more types of simple auditory-visual discriminations to Level 4 clients, and then testing them on object name recognition tasks.

These results constitute a first step in demonstrating that mastery of ABLA Level 6 is an important bridging task for teaching naming skills to persons with severe mental retardation. An individual without the ability to perform the pre-requisite auditory-visual discrimination is unlikely to be successful at tasks involving receptive language. As identified previously, receptive language is a building block to more complicated expressive language; therefore these results have important implications for front-line staff regarding teaching communication skills to individuals with developmental disabilities. Knowing a client's ABLA level will allow staff to identify which clients are likely to pass an object name recognition task, thereby decreasing frustration for clients who have not yet mastered the required auditory-visual discriminations necessary for the tasks. Future research should examine not only the link between receptive and expressive language, but also methods of teaching auditory-visual discriminations to participants at ABLA Level 4.

References

Barker-Collo, S. (1995). Live-to-live auditory matching: An extension of the Assessment of Basic Learning Abilities Test? *Developmental Disabilities Bulletin, 23,* 72-81.

Barker-Collo, S., Jamieson, J., & Boo, S. (1995). Assessment of Basic Learning Abilities Test: Prediction of communication ability in persons with developmental disabilities. *International Journal of Practical Approaches to Disability, 19,* 23-28.

Casey, L., & Kerr, N. (1977). Auditory-visual discrimination and language prediction [Monograph]. *Rehabilitation Psychology, 24,* 137-155.

DeWiele, L., & Martin, G. L. (1996). Can the ABLA test help staff match training tasks to the abilities of developmentally disabled trainees? *International Journal of Practical Approaches to Disability, 20,* 7-11.

Dollaghan, C. (1985). Child meets word: 'Fast mapping' in preschool children. *Journal of Speech and Hearing Research, 28*, 449-454.

Fraser, C., Bellugi, U., & Brown, R. (1963). Control of grammar in imitations, comprehension, and production. *Journal of Verbal Learning and Verbal Behavior*, 2, 121-135.

Harapiak, S. M., Martin, G. L., & Yu, D. (1999). Hierarchical ordering of auditory discriminations and the Assessment of Basic Learning Abilities Test. *Journal on Developmental Disabilities, 6,* 32-50.

Kerr, N., Meyerson, L., & Flora, J.A. (1977). The measurement of motor, visual, and auditory discrimination skills [Monograph]. *Rehabilitation Psychology, 24,* 95-112.

Marion, C., Vause, T., Harapiak, S., Martin, G. L., Sakko, G., & Walters, K. (2003). The hierarchical relationship between several visual and auditory discriminations and three verbal operants among individuals with developmental disabilities. *The Analysis of Verbal Behavior, 19*, 91-105.

Martin, G. L., & Yu, D. C. T. (2000). Overview of research on the Assessment of Basic Learning Abilities Test [Special Issue]. *Journal on Developmental Disabilities, 7(2),* 10-36.

Martin, G. L., & Yu, D. C. T. (2000). Overview of research on the Assessment of Basic Learning Abilities test [Special Issue]. *Journal on Developmental Disabilities, 7(2),* 10-36.

Martin, G. L., & Pear, J. S. (1999). *Behavior Modification: What it is and how to do it. (6th ed.)* Englewood Cliffs, NJ: Prentice-Hall Inc.

Martin, G., Yu, D., Quinn, G., & Patterson, S. (1983). Measurement and training of AVC discrimination skills: Independent confirmation and extension. *Rehabilitation Psychology, 28,* 231-237.

Meyerson, L. (1977). AVC behavior and attempts to modify it [Monograph]. *Rehabilitation Psychology, 24,* 119-122.

Richard, G. J. (1997). *The Source for Autism*. East Moline, IL: LinguisSystems.

Rosenberg, S., & Abbeduto, L. (1993). *Language and communication in mental retardation: Development, processes, and intervention*. Hillsdale, NJ: Erlbaum.

Sparrow, S., Balla, D., & Cicchetti, D. (1984). *Vineland, Adaptive Behavioral Scales.* Circle Pines, MN: American Guidance Service.

Stubbings, V., & Martin, G. L. (1995). The ABLA test for predicting performance of developmentally disabled persons on prevocational training tasks. *International Journal of Practical Approaches to Disability, 19,* 12-17.

Stubbings, V., & Martin, G. L. (1998). Matching training tasks to abilities of people with mental retardation: A learning test versus experienced staff. *American Journal on Mental Retardation, 102,* 473-484.

Tharinger, D., Schallert, D., & Kerr, N. (1977). Use of AVC tasks to predict classroom learning in mentally retarded children. *Rehabilitation Psychology, 24,* 113-118.

Vause, T. Martin, G. L., Cornick, A., Harapiak, S., Chong, I., Yu, D. C. T., et al. (2000). Training task assignments and aberrant behavior of persons with developmental disabilities. *Journal of Developmental Disabilities, 7,* 37-53.

Vause, T., Martin, G. L., & Yu, D. (2000). ABLA test performance, auditory matching and communication ability. *Journal on Developmental Disabilities, 7,* 123-141.

Wacker, D. P., Steil, D. A., & Greenbaum, F. T. (1983). Assessment of discrimination skills of multiply-handicapped preschoolers and prediction of classroom task performance. Journal of the Association for the Severely Handicapped, 8, 65-78.

Wacker, D. P. (1981). Applicability of a discrimination assessment procedure with Hearing-impaired mentally handicapped clients. *Journal of the Association for the Severely Handicapped, 6,* 51-58.

Ward, R. (1995). *Bridging the gap between visual and auditory discrimination learning in children with severe developmental disabilities*. Unpublished Ph.D. thesis, University of Toronto, Canada.

Witt, J. C., & Wacker, D. P. (1981). Teaching children to respond to auditory directives. An evaluation of two procedures. *Behavior Research of Severe Developmental Disabilities, 2,* 175-189.

Wynn, J. W. & Smith, T. (2003). Generalization between receptive and expressive language in young children with autism. *Behavioral Interventions, 18,* 245-266.

Yu, D., & Martin, G. L. (1986). Comparison of two procedures to teach visual discriminations to severely mentally handicapped persons. *Journal of Practical Approaches to Developmental Handicap, 10,* 7-12.

Appendix A

A Description of the ABLA Levels and the Types of Discriminations Required

ABLA Level	**Type of Discrimination**
1) Imitation: A tester puts an object into a container and asks the client to do likewise	A simple imitation
2) Position Discrimination: When a red box and a yellow can are presented in a fixed position, a client is required to consistently place a piece of beige foam in the container on the left when the tester says. "Put it in."	A simultaneous visual discrimination with position, color, shape and size as relevant cues
3) Visual Discrimination: When a red box and a yellow can are randomly presented in left-right positions, a client is required to consistently place a piece of beige foam in the yellow can when the tester says, "Put it in."	A simultaneous visual discrimination with color, shape and size as relevant cues
4) Match-to-Sample Discrimination: A client demonstrates level 4, if when allowed to view a yellow can and a red box in randomly alternating left-right positions, and is presented randomly with a yellow cylinder and a red cube, he/she consistently places a yellow cylinder in the yellow	A conditional visual-visual identity discrimination with color, shape and size as relevant cues.

can and a red cube in the red box.	
5) Auditory Discrimination: When presented with a yellow can and a red box (in fixed positions), a client is required to consistently place a piece of foam in the appropriate container when the tester randomly says, "red box: (in a high-pitched rapid fashion) or "yellow can."	A conditional auditory- auditory non-identity discrimination with pitch, pronunciation, and duration as relevant auditory cues and with position, color, shape and size as relevant visual cues
6) Auditory-Visual Discrimination: The same as Level 5, except that the right-left positions of the containers is randomly alternated.	A conditional auditory-visual non-identity discrimination, with the same auditory cues as level 5, and with only color, shape and size as relevant visual cues.

Note: From "Overview of Research on the Assessment of Basic Learning Abilities Test," by Martin, G. L., & Yu, D. C. T., (2000). *Journal on Developmental Disabilities, 7,* 14-15. Reprinted with permission.

Appendix B

Object Contact Questionnaire

We would like to assess the extent to which (client) is able to identify objects in his/her daily living environment. Below is a list of objects, which (client) may or may not encounter, in his/her daily living and/or working environment. Please estimate the frequency with which he/she encounters and hears the names of these objects, on a daily basis. The rating scale is as follows:

0 – Never encounters or hears the name of the object

1 – Encounters and hears the name of the object 1 – 2 times a day

2 – Encounters and hears the name of the object 3 – 4 times a day

3 – Encounters and hears the name of the object 5-6 times a day

4 – Encounters and hears the name of the object 7 or more times a day

Please assign a number from 0-5 for each object.

Object	Rating	Object	Rating	Object	Rating
Fork		Knife		Radio	
Sock		Shoe		Coffee	
Bed		Keys		Tray	
Cup		Toothbrush		Van	
Plate		Wheelchair		Backpack	
Paper		Pencil		Book	
Pants		Shirt		Elevator	
Cloth		Television		Hat	

Chair		Table		Bike	
Switch		Comb		Computer	

If an object is frequently encountered and its name is spoken, but it is not listed here please list the object below as well as a rating for how frequently it is typically encountered. We are looking for objects that are easily represented by a photograph. These may include; furniture, toys, favorite foods, pets, cartoon characters, etc.

Object	Rating

Appendix C

Participants and their Object Pairs

Participant #	ABLA Level	Object Pairs
1	4	Bed-Cloth, Fork-Chair, Toothbrush-Shirt, Table-Cup, Plate-Sock
2	4	Book-Shirt, Wheelchair-Computer, Television-Radio, Backpack-Facecloth, Comb-Table
3	4	Tape Measure-Wheelchair, Bed-Plate, Table-Cup, Elevator-Television, Toothbrush-Backpack
4	4	Cup-Wheelchair, Plate-Toothbrush, Coffee-Table, Toilet-Shirt, Elevator-Book
5	4	Cup-Wheelchair, Chair-Backpack, Plate-Toothbrush, Television-Cloth, Radio-Book
6	6	Cup-Backpack, Coffee-Sock, Computer-Book, Plate-Television, Wheelchair-Table
7	6	Cup-Elevator, Plate-Chair, Wheelchair-Tray, Shirt-Television, Radio-Cloth
8	6	Fork-Radio, Table-Elevator, Switch-Toothbrush, Cloth-Paper, Television-Knife
9	6	Cup-Elevator, Toothbrush-Plate, Wheelchair-Table, Coffee-Tray, Toilet-Shirt
10	6	Toothbrush-Wheelchair, Sock-Coffee, Television-Elevator, Plate-Chair, Fork-Shirt

Appendix D

Interobserver Reliability

Date: Tester:
Participant: IOR:
K = "Knife" Task:
F = "Fork"

T:	F	K	K	F	K	F	K	K	F	K
L:	**F**	F	**K**	**F**	F	**K**	**K**	**F**	K	K
R:	K	**K**	F	K	**K**	F	F	K	**F**	**F**
	1	2	3	4	5	6	7	8	9	10
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-

T:	K	F	F	F	K	F	K	F	F	F
L:	**K**	**F**	K	**F**	**K**	K	**K**	**F**	**K**	K
R:	F	K	**F**	K	F	**F**	F	K	F	**F**
	11	12	13	14	15	16	17	18	19	20
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-	-

Appendix E

Procedural Reliability

Procedural Reliability

Date: Participant: Experimenter: PR: Reinforcer:

	Demo 1	Demo2	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
New Session:								
Demonstration								
Guided Trial								
Independent Response								
Steps of task:								
words said in correct order								
correct verbal cue from experimenter								
prompt if no response in 5s								
everyone praises correct response								
experimenter gives reinforcer								
For Errors:								
Experimenter says "no"								
Demonstration								
Guided Trial								
Independent Response								

	Trial 7	Trial 8	Trial 9	Trial 10	Trial 11	Trial 12	Trial 13	Trial 14
Steps of task:								
words said in correct order								
correct verbal cue from experimenter								
prompt if no response in 5s								
everyone praises correct response								
experimenter gives reinforcer								
Error Correction:								
Experimenter says "no"								
Demonstration								
Guided Trial								
Independent Response								

	Trial 15	Trial 16	Trial 17	Trial 18	Trial 19	Trial 20
Steps of task:						
words said in correct order						
correct verbal cue from experimenter						
prompt if no response in 5s						
everyone praises correct response						
experimenter gives reinforcer						
Error Correction:						
Experimenter says "no"						
Demonstration						
Guided Trial						
Independent Response						