Predictive Validity of Auditory Matching Tasks, Verbal Behavior, and the ABLA Test

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Abstract

The Assessment of Basic Learning Abilities (ABLA) test has proven to be a useful assessment and training tool for staff responsible for training persons with developmental disabilities. The ABLA test assesses a person's ability to learn six tasks that are hierarchically ordered in level of difficulty. Two auditory matching tasks, a prototype visual-auditory nonidentity matching (VANM) task and a prototype auditory-auditory nonidentity matching (AANM) task have been demonstrated to be more difficult than ABLA level 6, and are hierarchically ordered in difficulty in relationship to each other. As a preliminary step to adding the VANM and AANM tasks to the ABLA test, Experiment 1 assessed the predictive validity of the VANM and AANM prototype tasks, as well as a third task, auditory-auditory identity matching (AAIM). A Chi-square analysis showed that the prototype VANM, AAIM, and AANM tasks demonstrate predictive validity. Experiment 2 examined where echoics, tacts, and mands fit in level of difficulty in relation to the ABLA tasks and the auditory matching tasks. Using order analysis, echoics, tacts and mands were all found to be more difficult than ABLA levels 3, 4, and 6. Pairwise comparisons found echoics to be less difficult than tacts and mands. Limitations of the experiments and areas of future research are discussed.

Introduction

Persons with developmental disabilities frequently face difficulty in mastering important everyday tasks because of problems they experience in learning auditory, visual, and motor discriminations. Kerr, Meyerson, and Flora (1977) examined common training tasks presented to persons with developmental disabilities in the areas of self-care skills, educational tasks, and vocational tasks. They determined that most tasks required an ability to learn to imitate and/or master one or more of five two-choice discriminations. They developed a test, called the Assessment of Basic Learning Abilities (ABLA) test (formerly referred to as the AVC test), to assess an individual's ability to learn such discriminations. The ABLA test is both a training tool and an assessment device that assesses the ease or difficulty with which a client can learn to perform six tasks that are hierarchical in level of difficulty. Studies have demonstrated that two different types of auditory matching tasks are more difficult than the six levels of the ABLA test (Harapiak, Martin, & Yu, 1999; Vause, Martin, & Yu, 2000). As a preliminary step to determining whether prototype auditory matching tasks might be a worthwhile addition to the ABLA test, this research assessed the predictive validity of three different prototype auditory matching tasks.

This research also assessed the difficulty of echoics, tacts, and mands in relation to the ABLA tasks and the auditory matching tasks. In Skinner's 1957 book, "Verbal Behavior" he discussed six types of verbal operants, including echoics, tacts, and mands. Skinner defined echoics as "verbal behavior . . . under the control of verbal stimuli, the response generates a sound-pattern similar to that of the stimulus" (p. 55). A tact was defined as "a verbal operant in which a response of given form is evoked (or at least

strengthened) by a particular object or event or a property of an object or event" (pp. 81-82). He defined a mand as "a verbal operant in which the response is reinforced by a characteristic consequence and is therefore under the functional control of relevant conditions of deprivation or aversive stimulation . . . the response has no specified relation to a prior stimulus" (pp. 35-36).

Individuals with developmental disabilities often have difficulties developing language (Sundberg & Partington, 1998). Language problems can lead to increased aberrant behaviors, decreased happiness, and difficulties developing peer relationships. Two of the ABLA tasks are auditory discriminations. Although several studies have indicated that the ABLA auditory discriminations are prerequisite to learning more complex language discriminations, no one has yet examined echoics, tacts, and mands in relation to the ABLA test. This research examined these relationships.

The ABLA Test

The ABLA test includes an imitation task, a 2-choice position task, two 2-choice visual discrimination tasks, and two 2-choice auditory discrimination tasks (see Table 1). Before testing whether or not a client can perform an ABLA level, the client is given a demonstration, a guided trial, and a practice trial at the level. A client must make a correct response on a practice trial for scoring to begin. Correct responses are reinforced with praise and intermittently with food or a preferred activity. When an error occurs, the tester provides a demonstration, a guided trial, and a practice trial. To proceed to a successive level a client must meet the passing criterion of eight consecutive correct responses at the level being tested. A client continues a task until all six levels are passed or until the failing criterion of eight cumulative errors on a task is met.

Table 1

ABLA Test Levels and Some Everyday Tasks at Each Level

ABLA Level and Original Names	ABLA Test Task	Everyday Examples
Level 1: Imitation	The tester puts an object into a container and asks the client to do likewise.	- Children playing follow-the-leader - Taking turns stirring the cake batter.
Level 2: Position Discrimination	When a red box and a yellow can are randomly presented in a fixed position, the client is required to place a piece of foam in the yellow can when the tester says, "Put it in."	- Turning on the cold (vs. the hot) water tap. - Placing a fork on the left side of a plate when setting a table.
Level 3: Visual Discrimination	When a red box and a yellow can are randomly presented in left-right positions, a client is required to place a piece of foam in the yellow can when the tester says, "Put it in."	- Locating one's own printed name on the blackboard when it is in different locations. - Finding a particular shirt in a closet when the location changes each time it is replaced.
Level 4: Match-to-Sample Discrimination	The red box and a yellow can are randomly presented in left-right positions and the client is given a small yellow cylinder or a small red cube. The client is required to place the yellow cylinder in the yellow can and the red cube in the red box.	- Sorting socks into pairs. - Restocking a partially empty salad bar.
Level 5: Auditory Discrimination	When presented with a yellow can and a red box in fixed positions, the client is required to put a piece of green foam in the appropriate container when the tester randomly says, "red box" or "yellow can."	- Responding appropriately to the spoken words, "stop" and "go." - Responding to requests such as "stand up" vs. "sit down."
Level 6: Auditory-Visual Combined Discrimination	The same as level 5, except that the right-left position of the containers is randomly alternated.	- Correctly playing the game of musical chairs. - Responding to instructions about objects or people when their positions frequently change (e.g., Please stand beside Tom.").

Generalizations from Research on the ABLA

Several characteristics of the ABLA test have been well researched. First, the ABLA tasks are hierarchically ordered in level of difficulty from level 1 (imitation) to level 6 (auditory- visual discrimination) (Kerr et al., 1977; Martin, Yu, Quinn, & Patterson, 1983; Wacker, Steil, & Greenbaum, 1983). Second, the ABLA test has demonstrated high test-retest reliability (Martin et al., 1983). Third, failed ABLA tasks are difficult to teach with commonly used prompting and reinforcement procedures (Meyerson, 1977; Stubbings & Martin, 1995, 1998; Witt & Wacker, 1981; Yu & Martin, 1986). Mastery, if attained at all, requires hundreds of teaching trials. Fourth, the ABLA test results are predictive of a person's performance on other tasks including academic and vocational skills (Martin et al., 1983; Meyerson, 1977; Stubbings & Martin, 1995; 1998; Tharinger, Schallert, & Kerr, 1977; Wacker, 1981). Finally, ABLA auditory tasks have been found to be correlated with measures of communication ability (Vause et al., 2000).

The Importance of the ABLA Auditory Tasks for Learning Language Discriminations

The ability to make ABLA auditory discriminations appears to be a prerequisite to learning more complex language discriminations. Forty-two normally developing children (aged 13 to 35 months) who were able to pass the two auditory discrimination tasks of the ABLA had significantly higher scores on mean length of utterance, upper bound, and a vocabulary sample than age-matched children who failed those two auditory tasks (Casey & Kerr, 1977). The same study established that the hierarchical order of acquisition of the six basic discrimination tasks exists in normally developing children, with ABLA level 4 (visual match-to-sample) developing around 17 to 18 months of age,

and ABLA levels 5 and 6 (auditory discrimination skills) developing between 27-32 months (the age at which normal children typically experience rapid growth in speech production). In another study, of 52 children with developmental disabilities, those who failed the auditory discrimination levels of the ABLA also failed the Distar Reading Readiness test, while those who passed ABLA level 6 also passed the Distar (Meyerson, 1977). Finally, Ward (1995) found that 32 children with developmental disabilities had expressive communication abilities that were highly correlated with ABLA performance. Specifically, single words or signs occurred only in children who had achieved ABLA visual matching, and combinatorial speech occurred only in children who had acquired the auditory tasks of the ABLA.

Auditory Matching Discriminations and the ABLA Test

Four types of auditory matching tasks have been examined for their relationship to the ABLA test. Walker, Lin, and Martin (1994) developed a 2-choice task to produce a matching sound. In this test, a bell and tambourine are placed on a table in front of a participant. A second bell and tambourine are placed underneath the table and out of sight of the participant. Across trials, the tester rings either the bell or the tambourine located under the table. The participant displays the auditory matching ability by correctly matching the sound presented by the tester. This is an auditory-visual nonidentity discrimination in that the participant hears a sound and then visually discriminates an object to be manipulated to produce an identical sound.

Ward (1995) described a 2-choice auditory-visual nonidentity discrimination to produce a non-matching sound. A yellow cylinder with a squeaker inside and a red cube with rice inside were placed on a table in front of a participant. If the tester asked,

"Where's the squeak, squeak...?" then a correct response involved the participant picking up and shaking the yellow cylinder to produce a squeak inside. If the tester asked, "Where's the ch, ch, ch...?" then a correct response involved the participant picking up and shaking the red box to produce the sound of rice moving back and forth inside it.

In another type of auditory matching task (Lin, Martin, & Collo, 1995), a tester said, "pen, pen, pen" on some trials and "block, block, block," on other trials. On each trial, one assistant repeated the word that matched the word spoken by the tester and another assistant repeated the other word. A correct response occurred if the participant presented the object to the assistant who spoke the word that matched that of the tester. In previous research (Harapiak et al., 1999) this task was referred to as an auditory-auditory identity matching task because the participant was required to give the object to the assistant whose words matched that of the tester. However, because a participant could learn to correctly perform this task without the tester's prompts, by matching the visual characteristics of the object to the name of the object spoken by one of the assistants, this prototype task is now referred to as a visual-auditory nonidentity matching (VANM) task.

A fourth category of auditory matching involves auditory-auditory nonidentity matching (AANM; Dube, Green, & Serna, 1993). With this type of matching, a tester might say, "ball, ball, ball," in a high rapid tone on some trials, and "ice, ice, ice," in a slow deep tone on other trials. One assistant would say, "bat, bat, bat," in a high rapid tone and a second assistant would say, "skate, skate, skate," in a slow deep tone. AANM would be demonstrated by a participant selecting the assistant who said, "bat, bat, bat," in a high rapid tone when the tester said, "ball, ball, ball," in a high rapid tone. AANM would also be demonstrated by a participant selecting the assistant who said, "skate,

skate, skate," in a slow deep tone when the tester said, "ice, ice, ice," in a slow deep tone.

The four auditory matching tasks and the ABLA levels appear to be ordered; in increasing difficulty as follows: ABLA level 4, a 2-choice task to produce a matching sound, ABLA levels 5 and 6, a 2-choice task to produce a nonmatching sound, VANM, and AANM (Harapiak et al., 1999; Lin et al., 1995; Vause et al., 2000; Walker et al., 1994; Ward, 1995).

Martin and Yu (2000) discussed three reasons for considering the addition of auditory matching tasks to the ABLA test. First, in the study by Vause et al. (2000), the ability to pass the ABLA auditory tasks was correlated with measures of communication ability. However, they found higher communication scores on the Communication Ability Screening Survey and the Vineland Adaptive Behavioral Scales lead to an ability to pass the two highest auditory matching tasks, VANM and AANM. Therefore, the predictive validity of the ABLA test for learning complex language discriminations may be improved by the addition of auditory matching tasks to the ABLA test. Second, research indicates that language comprehension, as represented by failed ABLA auditory discriminations, is extremely difficult to teach using standard prompting and reinforcement procedures (Meyerson, 1977; Witt & Wacker, 1981). The addition of one of the auditory matching tasks may serve as an intermediate training step for ABLA levels 5 and 6. Third, the auditory matching tasks that are more difficult than ABLA level 6 may allow for further differentiation of clients previously grouped as ABLA level 6. This differentiation might allow staff to teach language discriminations that are a prerequisite to complex speech.

A fifth type of auditory matching is auditory-auditory identity matching (AAIM).

AAIM is similar to VANM as described above except that no objects are used. In AAIM, the tester says, "pen, pen, pen" on some trials and "block, block, block," on other trials. An assistant repeats the word that matches the word spoken by the tester and another assistant repeats the other word. In order for a response to be considered correct, the participant must point to the assistant who says the word that matches that of the tester.

Predictive Validity of Auditory Matching Tasks

Before the auditory matching tasks are added to the ABLA test, research needs to assess whether the generalizations that have been demonstrated for the ABLA levels also apply to the auditory matching tasks. One such generalization is that the ABLA tasks are predictive of an individual's performance on similar tasks (Martin et al., 1983; Stubbings & Martin, 1995, 1998; Tharinger et al., 1977; Wacker, 1981). Two studies, to date have examined the predictive validity of two of the auditory matching tasks described previously. Walker et al. (1994) examined the predictive validity of the bell-tambourine task, a 2-choice task to produce a matching sound. In this study eight participants were assessed on 10 2-choice tasks to produce 10 common matching sounds. The materials included: two toy cars and two round bells; two squeaky toys and two sets of keys; two cups with wooden balls in each and two toy phones; two cups with four coins in each and two bell toys; and two noise-making boxes and two bells with handles. Four participants who failed the 2-choice task to produce a matching sound (bell/tambourine task) failed all five pairs of sounds. Four participants who passed the 2-choice task to produce a matching sound (bell/tambourine task) passed all five pairs of sounds.

Lin et al. (1995) assessed the predictive validity of the prototype VANM task in which a participant was required to place the correct object (e.g., pen) in the hand of an

assistant who said, "pen, pen, pen" (rather than an assistant who said, "block, block, block"), when the tester said, "pen, pen, pen," and likewise place the correct object in the hand of the assistant who said, "block, block, block," when the tester said, "block, block, block." Eight participants who failed this prototype VANM task also failed two similar tasks, one involving the words "spoon" and "hat," and the other involving the words "cup" and "glass." However, four additional participants who passed the prototype task also passed the two similar tasks. Thus, the VANM prototype task appears to be predictive of similar auditory matching tasks involving single-syllable words. Does the VANM prototype task also predict performance using two-syllable words and does the AAIM prototype task predict performance on single-syllable words, two-syllable words and common sounds? Experiment 1 examined this possibility. The AANM prototype task involves single-syllable words. Thus far, no one has examined the predictive validity of the prototype AANM task. Therefore, Experiment 1 also assessed if the AANM prototype task was predictive of performance on single-syllable and two-syllable word tasks, as well as performance on matching AANM audio-taped common sounds.

Echoics, Tacts, and Mands

As indicated previously, the ability to make ABLA auditory discriminations appears to be prerequisite to learning more complex language discriminations. One of the first language discriminations commonly taught to persons with developmental disabilities in language training programs is vocal imitation (Brigham & Sherman, 1968; Lovaas, 1977; Lovaas, Berberich, Perloff, & Schaeffer, 1966; McReynolds, 1969). No one has yet assessed the relation between the ability to imitate words and the ability to make the ABLA discriminations. Experiment 2 assessed where echoics fit in the

hierarchy of ABLA levels and the auditory matching tasks. Secondly, Experiment 2 assessed where tacts, and mands fit in the hierarchy of ABLA levels and auditory matching tasks. Thirdly, Experiment 2 examined the hierarchy between echoics, tacts, and mands.

Experiment 1

Statement of the Problem

The purpose of this experiment was to determine if the prototype tasks to assess VANM, AAIM and AANM have predictive validity for other VANM, AAIM and AANM tasks. It was hypothesized that: (a) participants who passed ABLA level 6 and failed the prototype tasks for VANM, AAIM and AANM, would fail the VANM, AAIM and AANM predictive tasks; (b) those who passed the prototype VANM task, but failed the AAIM and AANM tasks would pass the predictive VANM tasks, and fail the AAIM and AANM predictive tasks; (c) those who passed the prototype VANM and AAIM tasks, but failed the AANM task would pass the predictive VANM and AAIM tasks, and fail the AANM predictive tasks; and (d) those who passed the prototype VANM, AAIM and AANM tasks, would pass the predictive VANM, AAIM and AANM tasks.

The predictive tasks for VANM included: two single-syllable tasks with objects included, and two two-syllable tasks with objects included. The predictive tasks for AAIM included: two single-syllable tasks, two two-syllable tasks, and two tasks using audio-taped common sounds. The predictive tasks for AANM included: two single-syllable tasks, two two-syllable tasks, and two tasks using audio-taped common sounds.

The question arises: why assess some auditory matching tasks live, while others are assessed using audio-taped common sounds? The goal was to assess the predictive

validity of the VANM, AAIM, and AANM tasks for live single-syllable and two-syllable words because the ability to recognize words that are the same or go together may be a precursor to echoics, which was assessed in Experiment 2. A second goal was to assess the predictive validity of the AAIM and AANM tasks for matching common sounds. However, the only realistic way to do so for certain sounds (e.g., thunder/siren) was with audio-taped sounds. It was also desirable to ensure that differences that may have emerged between the ability to match words versus common sounds was not simply due to one assessment being live and the other involving audio-taped sounds. It was hypothesized that there would be no difference in performance on live versus audio-taped common sounds.

Method

Participants and Setting

Twenty clients (10 females and 10 males) ranging in age from 25 to 41 years, with a mean age of 32 years from the St. Amant Centre, a residential and community training facility for persons with developmental disabilities, and from group-homes affiliated with the Centre participated. All participants, with one exception, were previously tested on the ABLA test and the auditory matching tasks by Harapiak et al. (1999) or Vause et al. (2000). Consent was obtained from each client, parent(s)/advocate, and/or legal guardian (see Appendix A). After written consents were obtained, an initial assessment included testing on the highest level previously passed and the first level previously failed with the ABLA test and the auditory matching tasks to ensure that their test performance had remained stable. The one participant who was not previously tested was tested on the ABLA test, and all the auditory matching tasks.

Six participants passed ABLA level 6 and failed the prototype VANM, AAIM and AANM tasks; four passed ABLA level 6 and the prototype VANM task but failed the prototype AAIM and AANM tasks; two participants passed ABLA level 6, and the prototype VANM, AAIM, and failed the prototype AANM tasks; and eight participants passed ABLA level 6, and the prototype VANM, AAIM, and AANM tasks.

Level of functioning and sensory deficits were obtained from the clinical records, and results from the Scales of Independent Behavior-Short Form (SIB-Woodcock-Johnson Psychoeducational Battery: Part Four; Bruininks, Woodcock, Weatherman, & Hill, 1984) were used to indicate the level of adaptive functioning for most participants. Participants' characteristics are presented in Table 2. Sessions were conducted at the St. Amant Centre or at the participant's home. The tester and two research assistants were present in the test room during assessments.

Test Materials

ABLA level 6 test materials included: a yellow can (15 cm in diameter x 17 cm in height), a red box with black stripes (14 cm x 14 cm x 10 cm), and an asymmetrical piece of beige foam. The materials used in the prototype VANM task included one blue pen and a red block with black stripes. There were no materials needed for the prototype AAIM and AANM tasks. The materials chosen to test the predictive VANM tasks using single-syllable words included a glue stick ("glue") and spool of thread ("thread"), a computer disk ("disk") and roll of tape ("tape"). To test for two-syllable words, a hand held mirror ("mirror") and toothbrush ("toothbrush"), a mini stapler ("stapler") and a small flashlight ("flashlight") were used. Three cassette players were also used for testing predictive AAIM tasks involving common sounds (barking/meowing, and brushing

Table 2

Characteristics of Participants

Participant	Sex	Age	Highest ABLA and Prototype Tasks Passed	Level of functioning – SIB	Level of functioning (obtained from medical charts)	Sensory deficits
MK	M	29.2	Level 6	Severe	Severe	None
SV	F	31.8		Severe	Severe	Significant myopia/wears corrective lenses
HJ	M	26.3		Severe	Severe	Vision slightly worse in right eye/no corrective lenses
EK	F	28.3		Severe	Severe	None
DS	F	34.5		Severe	Severe	Farsighted/wears corrective lenses
MC	F	28.0		Severe	Moderate	None
NI	M	25.11	Level 6 VANM	Severe	Severe	Nearsighted
LA	F	37.5		Severe	Severe	Left ear moderate hearing loss and right ear loss with negative middle ear pressure due to head colds
VR	M	31.6		Severe	Moderate	Hearing aid in right ear/slightly far sighted/no corrective lenses
TN	M	31.9		Severe	Moderate	Cataract in right eye is worse but no intervention at this time
RC	F	35.6	Level 6 VANM AAIM	Severe	Severe	Farsighted/wears corrective lenses/mild bilateral high frequency permanent loss
BM	F	29.0		Severe	Severe	Left eye is a "lazy eye"/nearsighted/wears corrective lenses
PC	F	41.3	Level 6 VANM AAIM	Severe	Mild	Severe visual impairment due to macular degeneration/legally blind/wears corrective lenses
GK	M	35.0	AANM	Severe	Severe	Nearsighted/wears corrective lenses

Participant	Sex	Age	Highest ABLA and Prototype Tasks Passed	Level of functioning – SIB	Level of functioning (obtained from medical charts)	Sensory deficits
RT	M	35.5		Severe	Mild	None
DK	M	29.6		Severe	Mild	None
SB	M	40.8		N/A	Mild	Wears corrective lenses
JW	F	35.0		Severe	Moderate	None
MG	M	33.0		Severe	Mild	Nearsighted/wears corrective lenses
PB	F	25.2		Mild	Mild	Tunnel Vision

teeth/water draining in a sink) and AANM tasks involving common sounds (electric guitar/drums and flute/violin, thunder/siren and sneezing/baby crying). No materials were needed in testing predictive AAIM tasks using single-syllable words ("glue"/"thread, and "disk"/"tape") and two-syllable words ("mirror"/"toothbrush" and "stapler"/"flashlight"). As well, no materials were needed in testing predictive AANM tasks using single-syllable words ("cold"/"frost" and "hot"/"burn", and "dove"/"white" and "plant"/"green") and two-syllable words ("coffee"/"filter" and "cassette"/"walkman," and "haircut"/"scissors" and "hotdogs"/"ketchup").

DeWiele and Martin (1998) designed the data sheet for ABLA level 6 (see Appendix B). Lin et al. (1995) designed the VANM and AAIM data sheets (see Appendix C). The AANM data sheet (see Appendix D) was designed by Vause et al. (2000). Twelve different data sheets, designed by the author were used in scoring a participant's pass or fail performance on each predictive validity task (see Appendices E through P).

Procedure

An initial assessment was conducted on the participant's highest level previously passed and first level previously failed on the ABLA test and the auditory matching tasks. As mentioned above, with the exception of one, all participants had previously been tested by Vause et al. (2000).

Assessment of VANM. The procedure used was that described by Lin et al. (1995). The tester was positioned next to the participant. Two research assistants were seated within reach of the participant. They were required to keep their palms extended and facing up during testing. In general, the procedure was as follows: on some trials, one

of a pair of objects was presented to the participant (e.g., a glue stick) and the tester said the corresponding auditory cue (e.g., "glue, glue, glue"). On other trials, a different stimulus (e.g., a spool of thread) was given to the participant, and a different auditory cue (e.g., "thread, thread, thread") was given by the tester. The two research assistants extended and opened up their palms and alternatively produced auditory cues such that one assistant produced the matching cue of the tester and the other assistant produced the other cue.

Across trials, the tester randomly alternated the sample stimulus (e.g., "glue, glue, glue" or "thread, thread, thread"). Also, across trials, the two assistants randomly alternated as to who presented the matching word, and as to who spoke first.

Prior to scoring, a demonstration trial, a guided trial, and a practice trial was conducted. On the demonstration trial, the tester said the correct auditory cue (e.g., "glue, glue, glue"), the assistants then said the appropriate cues as indicated on the data sheet, and the tester gave the glue stick to the assistant who said the matching word. On the guided trial, the tester said the correct auditory cue (e.g., "glue, glue, glue"), the assistants said the cues, and then guided the participant's hand to place the stimulus (e.g., a glue stick) in the hand of the assistant who said the matching cue ("glue, glue, glue"). On the practice trial, the tester said the correct auditory cue (e.g., "glue, glue, glue"), the assistants said the cues, and the tester requested the participant to place the stimulus (e.g., a glue stick) in the hand of the correct assistant. The participant was required to make a correct independent response. This same procedure involving a demonstration, a guided trial, and a practice trial was also used with the other stimulus (e.g., a spool of thread). Participants were reinforced with praise and other reinforcers (e.g., potato chips, smarties,

popcorn, etc.) following correct responses. Test trials and scoring began after the participant performed a correct response on the practice trial with both stimuli.

A response was scored as correct if the participant placed the correct stimulus (e.g., a glue stick) in the hand of the assistant who said the same auditory cue ("glue, glue, glue") as the tester. A response was scored as incorrect if the participant placed the stimulus in the hand of the assistant who did not say the matching word (e.g., "thread, thread, thread") that the tester spoke (e.g., "glue, glue, glue"). On correction trials, errors were counted towards the failing criterion, but correct responses were not counted towards the passing criterion. In order to pass a task, eight consecutive correct responses had to be met. If eight cumulative incorrect responses occurred, then the task was defined as a failure.

If the participant did not respond or behaved in undesirable ways, the tester removed the stimulus, turned away for 10 seconds, and then began a new trial. If this continued over many trials, the session was stopped and the participant was assessed at a later date. The same procedure was used for testing the additional single-syllable words (disk/tape), and two-syllable words (mirror/toothbrush and stapler/flash-light).

Assessment of AAIM. The same procedure as described above for testing VANM was used for testing AAIM single-syllable words and two-syllable words, although the objects were not included. The participant was required to point to the assistant who said the correct auditory cue as spoken by the tester.

Assessment of AAIM involving common sounds. The procedure used was that described by Lin et al. (1995). The tester and assistants were seated across from the participant. The assistants were required to keep one palm extended and facing up during

testing. The assistants' other hand held the tape recorder. The procedure was as follows: on some trials, the tester played an auditory cue (e.g., barking). On other trials, a different auditory cue (e.g., meowing) was played by the tester. The two assistants alternatively played auditory cues such that one assistant played the matching cue of the tester and the other assistant played the other cue.

Across trials, the tester randomly alternated the taped sound (e.g., barking or meowing). Also, across trials, the two assistants randomly alternated as to who played the matching sound, and as to who played the sound first.

A demonstration trial was provided by the tester who played the correct auditory cue (e.g., barking), the assistants then played the appropriate cues as indicated on the data sheet, and the tester pointed to the assistant who played the matching sound. A guided trial was provided by the tester who played the correct auditory cue (e.g., barking), the assistants played the cues, and then guided the participant's hand to point to the assistant who played the matching cue (e.g., barking) that the tester played. A practice trial was conducted in which the tester played the correct auditory cue (e.g., barking), the assistants played the matching and nonmatching cues, and the tester requested the participant to point to the assistant who played the matching sound. This same procedure was repeated with the other sound (e.g., meowing).

Reinforcement for correct responses, the error correction procedure following errors, the passing and failing criteria, and the extinction procedure following undesirable behavior was the same as described for VANM. The order that participants were tested was as follows: VANM single-syllable tasks, VANM two-syllable tasks, AAIM single-syllable tasks, AAIM two-syllable tasks, followed by matching common sounds.

Assessment of AANM. The participant was seated next to the tester. The two research assistants sat across from the tester and participant. A demonstration trial was provided in which the tester said an auditory cue (e.g., "cold, cold, cold"), Assistants A and B said auditory cues (e.g., "frost, frost, frost" or "burn, burn, burn"). The tester pointed to the assistant who said the correct cue (e.g., "frost, frost, frost"). A guided trial was provided by the tester, in which the tester said an auditory cue (e.g., "cold, cold, cold"), and Assistants A and B said cues, the tester guided the participant's hand to point to the assistant who said the correct cue (e.g., "frost, frost, frost"). A practice trial was provided in which the tester said an auditory cue (e.g., "cold, cold, cold"), Assistants A and B said auditory cues, and the participant was required to make an independent response by pointing to the correct assistant. The demonstration, guided trial, and practice trial were then conducted using different auditory cues (e.g., "hot" and "burn"). Across trials, the tester randomly alternated the sample stimulus. Also, across trials, the two assistants randomly alternated as to who spoke first, and who said which auditory cue. Reinforcement for correct responses, the error correction procedure following errors, the extinction procedure following undesirable behavior and the passing and failing criteria were as described above for the VANM assessments. The same procedure was used for testing additional single-syllable words (dove/white, plant/green) and two-syllable words (coffee/filter, cassette/walkman and haircut/scissors, hotdogs/ketchup).

Assessment of AANM involving common sounds. To test for the ability to match AANM common sounds, tape recorders were used. As described for testing the ability to match AAIM common sounds, the assistants were seated across from the participant. The participant was seated next to the tester. A demonstration trial was provided in which the

tester played an audio-tape of a cue (e.g., electric guitar), and Assistants A and B played audio-tapes of cues (e.g., drums or violin). The tester pointed to the assistant who played the correct cue (e.g., drums). A guided trial was provided by the tester, in which the tester played an audio-taped cue (e.g., electric guitar), and Assistants A and B played audio-tapes of cues, the tester guided the participant's hand to point to the assistant who played the correct cue (e.g., drums). A practice trial was provided in which the tester played an audio-taped cue (e.g., electric guitar), Assistants A and B played audio-taped cues, and the participant was required to make an independent response by pointing to the correct assistant. The demonstration, guided trial, and practice trial were then conducted using different audio-taped cues (e.g., violin and flute). Across trials, the sample sound played by the tester was randomly alternated. Also, across trials, the two assistants randomly alternated as to who played an audio-tape first, and who played which auditory cue. Reinforcement for correct responses, the error correction procedure following errors, the extinction procedure following undesirable behavior and the passing and failing criteria were as described above for the AANM assessments. The order that participants were tested was as follows: single-syllable tasks, two-syllable tasks, and then matching common AANM sounds.

Interobserver Reliability Assessments.

Interobserver reliability (IOR) data was collected for 60% of the VANM, AAIM, and AANM prototype sessions and for 83% of VANM, AAIM, AANM predictive sessions. A participant's response was recorded simultaneously by the research assistants. Percent agreement was determined by dividing the number of the agreements scored by the assistants during a session by the total number of agreements plus disagreements, and

multiplying this number by 100% (Martin & Pear, 1999). IOR data for the prototype sessions ranged from 95% to 100%, with a mean of 98%. IOR data for the predictive sessions ranged from 92% to 100%, with a mean of 96%.

Procedural Reliability Assessments.

The assistants on the first 10 trials for each task recorded on a checklist (see Appendix Q) the steps that were followed by the tester. Procedural reliability agreements were calculated in the same manner as described for IOR assessments (Martin & Pear, 1999). Procedural reliability checks were obtained for 25% of the VANM, AAIM, and AANM prototype sessions, and 30% of the VANM, AAIM and AANM predictive sessions. Procedural reliability checks were 100% for both prototype and predictive sessions.

Results

Table 3 shows the pass or fail performance on the predictive tasks. Six participants passed level 6 and failed the three prototype tasks. As predicted, five of these six participants failed all the predictive tasks. Participant MC passed AAIM and AANM with audio-taped common sounds predictive tasks. Four participants passed level 6 and VANM. As predicted, all four passed the VANM predictive tasks and failed the AAIM predictive tasks. Across all four participants and the AAIM taped sounds tasks, the AANM predictive tasks, and the AANM taped sounds tasks, there were 27 failures as predicted, and five passes which was not predicted. Two participants passed level 6, VANM, and AAIM, and as predicted, they passed all VANM and AAIM predictive tasks. Across both participants and all the AANM tasks, there were seven failures as predicted, and five passes which was not predicted. Eight participants passed level 6, VANM,

Table 3

Test Results on Predictive Tasks Passed and Predictive Tasks Tested

		VANM	AAIM		AANM		
Participant	Highest ABLA and Prototype Tasks	VANM Predictive tasks	AAIM Predictive Tasks	AAIM taped sounds predictive tasks	AANM Predictive tasks	AANM taped sounds predictive tasks	Percent Predictions Confirmed by participants
MK	Level 6	0/ 4	0/ 4	0/ 2	0/ 4	0/ 2	P F
SV		0/ 4	0/ 4	0/ 2	0/ 4	0/ 2	N/A 93%
HJ		0/ 4	0/ 4	0/ 2	0/ 4	0/ 2	
EK		0/ 4	0/ 4	0/ 2	0/ 4	0/ 2	
DS		0/ 4	0/ 4	0/ 2	0/ 4	0/ 2	
MC		0/ 4	0/ 4	2/ 2	0/ 4	2/ 2	
NI	Level 6 VANM	4/ 4	0/ 4	0/ 2	0/ 4	0/ 2	P F
LA		4/ 4	0/ 4	0/ 2	1/ 4	0/ 2	100% 75%
VR		4/ 4	0/ 4	1/ 2	0/ 4	0/ 2	
TN		4/ 4	0/ 4	2/ 2	0/ 4	1/ 2	
RC	Level 6 VANM	4/ 4	4/ 4	2/ 2	0/ 4	0/ 2	P F
BM	AAIM	4/ 4	4/ 4	2/ 2	3/ 4	2/ 2	100% 50%
PC	Level 6	4/ 4	4/ 4	2/ 2	4/ 4	2/ 2	P F
GK	VANM	4/ 4	4/ 4	2/ 2	4/ 4	2/ 2	100% N/A
RT	AAIM	4/ 4	4/ 4	2/ 2	4/ 4	2/ 2	
DK	AANM	4/ 4	4/ 4	2/ 2	4/ 4	2/ 2	
SB		4/ 4	4/ 4	2/ 2	4/ 4	2/ 2	
JW		4/ 4	4/ 4	2/ 2	4/ 4	2/ 2	
MG		4/ 4	4/ 4	2/ 2	4/ 4	2/ 2	
PB		4/ 4	4/ 4	2/ 2	4/ 4	2/ 2	

Note. N/A = not applicable, P = pass, and F = fail.

AAIM, and AANM, and they passed all the predictive tasks. Also, 17 of the 20 participants demonstrated the same performance on live versus audio-taped common sounds.

The pass and fail criteria used were those developed by Kerr et al. (1977). In a sequence of eight independent trials in a two-choice task, eight consecutive correct responses may occur by chance approximately once if the sequence is repeated 256 times. Therefore, it is very unlikely that the passes obtained in this study occurred by chance alone.

The average number of tasks passed for the six participants who passed ABLA level 6 only and failed all three prototype tasks was 0% for VANM, 6% for AAIM, and 6% for AANM. The average number of tasks passed for the four participants who passed ABLA level 6 and the VANM prototype task only was 100% for VANM, 13% for AAIM, and 8% for AANM. The average number of tasks passed for the two participants who passed ABLA level 6 and the VANM and AAIM prototype tasks, and failed the AANM prototype tasks was 100% for VANM, 100% for AAIM, and 42% for AANM. The average number of tasks passed for the eight participants who passed all three prototype tasks was 100% for VANM, 100% for AAIM, and 100% for AANM.

The number of predictions confirmed at each test level are presented in Table 3. Across all predictive tasks and participants, 94% of the predictions were confirmed.

Chi-square analyses were performed to assess the statistical significance between each prototype task and the predictive tasks. In order to be considered a pass, a participant needed to obtain at least 50% on the predictive tasks. For example, participant TN passed one out of six AANM predictive tasks, this was not considered a pass.

Participant BM passed five out of six AANM predictive tasks, this was considered a pass. The criterion of 50% was used, because the likelihood of passing two tasks by chance using eight consecutive correct is 1/65,536. A significant relationship was found between the prototype VANM task and the VANM predictive tasks (X^2 (1) = 20, $p < .001$). Of the 20 individuals, 6 (30%) failed both the prototype VANM and VANM predictive tasks, whereas 14 (70%) passed both the prototype VANM and VANM predictive tasks. A significant relationship was found between the prototype AAIM task and the AAIM predictive tasks (X^2 (1) = 20, $p < .001$). Of the 20 individuals, 10 (50%) failed both the prototype AAIM and AAIM predictive tasks, whereas 10 (50%) passed both the prototype AAIM and AAIM predictive tasks. A significant relationship was found between the prototype AANM task and the AANM predictive tasks (X^2 (1) = 16.3, $p < .001$). Of the 20 individuals, 11 (55%) failed both the prototype AANM and AANM predictive tasks, whereas 8 (40%) passed both the prototype AANM and AANM predictive tasks. One individual (5%) who failed the prototype AANM task passed the AANM predictive tasks. In conclusion, results indicate that all three prototype tasks demonstrate predictive validity.

Experiment 2

Statement of the Problem

The purpose of this experiment was to examine echoic, tact, and mand responses and their relationship to ABLA level 3, ABLA level 4, ABLA level 6, and the five types of auditory matching (two-choice task to produce a matching sound, two-choice task to produce a nonmatching sound, VANM, AAIM and AANM). ABLA level 5 was not tested because previous studies have found few individuals at ABLA level 5 (Lin et al.,

1995; Vause et al., 2000; Walker et al., 1994). In the study by Vause et al. (2000) that included 40 participants, no participants were found to be at ABLA level 5. One possibility is that individuals who pass ABLA level 5 subsequently pass ABLA level 6 in a relatively short period of time. It was hypothesized that echoics would be more difficult than ABLA level 3, ABLA level 4, the 2-choice task to produce a matching sound, ABLA level 6, the 2-choice task to produce a nonmatching sound, and VANM. These tasks all require visual cues, and there are no relevant visual cues present during an echoic task. It was hypothesized that echoics would be less difficult than AAIM and AANM, because these tasks require the participant to respond to the auditory cues of the tester and two assistants. The ability to imitate vocally requires the participant to respond to only one auditory cue, which is given by the tester. Vocal tact and vocal mand responses were also assessed for their relationship to the ABLA hierarchy and auditory matching tasks.

Method

Participants and Setting

Consent was obtained from each client, parent(s)/advocate, and/or legal guardian (see Appendix A) as described in Experiment 1. Twenty-six clients (11 females and 15 males) from the St. Amant Centre, and from group-homes affiliated with the Centre participated.

Ages, level of functioning and sensory deficits were obtained (see Table 4). Clients ranged in age from 22 to 41 years, with a mean age of 31.4 years. Sessions took place at the St. Amant Centre or at the participant's home.

Test Materials

Table 4

Characteristics of Participants

Participant	Sex	Age	Highest ABLA and Prototype Tasks Passed	Level of functioning – SIB	Level of functioning (obtained from medical charts)	Sensory Deficits
SL	F	25.3	Level 3	N/A	Severe	None
BB	M	22.4		N/A	Profound	Myopic astigmatism, amblyopia and optic atrophy
MS	F	41.4		N/A	Severe	Left eye ptosis and double elevator palsy
KG	M	32.0		Severe	Severe	None
WM	M	25.0	Level 4	Severe	Moderate	None
HT	M	24.1		Severe	Moderate	None
KV	F	22.4		Severe	Severe	None
MR	M	40.6		N/A	Moderate	None
DS	F	34.5	Level 6	Severe	Severe	Farsighted/wears corrective lenses
MC	F	28.0		Severe	Moderate	None
FL	F	28.3		Severe	Moderate	Left eye ptosis/wears corrective lenses
HJ	M	26.3		Severe	Severe	Vision slightly worse in right eye/no corrective lenses
MK	M	29.2		Severe	Severe	None
EK	F	28.3		Severe	Severe	None
SV	F	31.8		Severe	Severe	Significant myopia/wears corrective lenses
NI	M	25.11	Level 6 VANM	Severe	Severe	Nearsighted
VR	M	31.6		Severe	Moderate	Hearing aid in right ear/slightly far sighted/no corrective lenses
TN	M	31.9		Severe	Moderate	Cataract in right eye is worse but no intervention at

Participant	Sex	Age	Highest ABLA and Prototype Tasks Passed	Level of functioning – SIB	Level of functioning (obtained from medical charts)	Sensory Deficits
						this time
LA	F	37.5		Severe	Severe	Left ear moderate hearing loss and right ear loss with negative middle ear pressure due to head colds
PC	F	41.3	Level 6	Severe	Mild	Severe visual impairment due to macular degeneration/legally blind/wears corrective lenses
JW	F	35.0	VANM	Severe	Moderate	None
MG	M	33.0	AAIM	Severe	Mild	Nearsighted/wears corrective lenses
DK	M	29.6	AANM	Severe	Mild	None
GK	M	35.0		Severe	Severe	Nearsighted/wears corrective lenses
RT	M	35.5		Severe	Mild	None
SB	M	40.8		N/A	Mild	Wears corrective lenses

Note. All participants passed the Assessment of Basic Learning Abilities Test (ABLA) level 1 to 2 (not shown in the table).

ABLA level 3 test materials included a yellow can (15 cm in diameter x 17 cm in height), a red box with black stripes (14 cm x 14 cm x 10 cm), and an asymmetrical piece of beige foam. ABLA level 4 materials included the yellow can and red box with black stripes in addition to a yellow cylinder (2.5 cm x 6 cm) and a red wooden cube with black stripes (4 cm x 4 cm). ABLA level 6 test materials were described in Experiment 1. The materials used in the 2-choice task to produce a matching sound included two identical tambourines and two identical table bells. The materials used in the 2-choice task to produce a nonmatching sound included a rattle and a can of rice. The materials used in the VANM, AAIM, and AANM tasks were described in Experiment 1. A tape recorder was used to record echoic, tact, and mand responses. The words and objects used to test for echoic and tact responses, except three ("box," "can", and "foam") were chosen from a table entitled the "First 240 Word List" by Sundberg and Partington (1998). Sundberg and Partington (1998) suggest that these are words that should first be taught to children. The materials used in the tact assessment included a red box, a yellow can, a blue pen, a plastic container with apple juice or fruit punch, a white foam cup, a container of chocolate or vanilla instant pudding, a plastic spoon, a brown plastic bowl, a three piece wooden puzzle of a bear, a beige piece of foam, and a piece of white paper (21.5 x 28 cm). The materials used in the mand assessment included a container of chocolate or vanilla instant pudding, a plastic spoon, a plastic container with apple juice or fruit punch and a white foam cup. A blue rubber ball was used throughout echoic, tact, and mand assessments.

The data sheets for ABLA levels 3 (see Appendix R), 4 (see Appendix S) and 6 (see Appendix B) were designed by DeWiele and Martin (1998). The 2-choice task to

produce a matching sound data sheet (see Appendix T) was designed by Walker et al. (1994). The 2-choice task to produce a nonmatching sound data sheet (see Appendix U) was designed by Ward (1995). As described in Experiment 1, Lin et al. (1995) designed the VANM and AAIM data sheets (see Appendix C), and the AANM data sheet (see Appendix D) was designed by Vause et al. (2000). The data sheet to assess for echoics and tacts (see Appendix V) was designed by the author. A data sheet was also designed to test for mands (see Appendix W).

Procedure

The participant sat across the table from the tester during the echoic, tact, and mand assessments. An initial assessment was conducted on the participant's highest level previously passed and first level previously failed on the ABLA test and auditory matching tasks as described by Vause et al. (2000). The order in which participants were tested was as follows: echoic, tact, and mand assessments.

For the echoic assessment, each trial began with the tester asking the participant to "Say..." (e.g., "Say spoon"). The participant's response was either recorded as a correct response (pronouncing all vowels and consonants), an approximation of the word (saying specified parts of the word as indicated on the data sheet), an incorrect response, or an omission (no response).

For the tact assessment, the tester presented an object in front of the participant at the beginning of every trial, and said the prompt, "What's this?" Responses as defined for the echoic assessment were recorded as a correct response, an approximation of the word, an incorrect response, or an omission.

After every three trials for both echoic and tact assessments, the tester placed a

ball in front of the participant and asked him/her to "Pick up the ball." This task was used to minimize frustration and maintain attending behavior, if a participant was unable to echo or to respond to the prompt, "What's this?" It was chosen because it was a task that was within everyone's repertoire. The participant was reinforced with praise after picking up the ball (e.g., "Good job", "Way to go"). Also, for both echoic and tact assessments the participant received praise two to three seconds after each correct word or approximation as scored by the tester. Praise was delayed for interobserver reliability reasons. In order to score responses, the assistant listened to each response and scored each response before hearing if praise was given by the tester. Following a correct, incorrect, or an approximation response the tester waited five seconds, and then presented the next trial. If the participant did not respond on a trial after five seconds, this was counted as an omission. The same words were used in both the echoic and tact assessments. The assessment involved presenting 11 words for echoics and each word was repeated three times, for a total of 33 trials. For the tact assessment, 11 objects and the prompt, "What's this?" was presented three times for a total of 33 trials.

The mand assessment involved creating a conditioned establishing operation in order to observe whether a participant was manding for an item. The mand assessment consisted of 4 steps with each of two items, juice and pudding. Starting with the first item, the juice, a participant was presented with two trials in order for him/her to sample the item. For example, the tester placed some juice in a cup for the participant to sample and asked the participant to "Have some" for trials one and two. For Step 1 (the third trial), the tester hid the juice under the table, presented the empty cup to the participant and said, "Have some." The tester waited 15 seconds, if the participant manded for the

juice, it was given to him/her in order to complete the trial. If the participant did not vocally mand after 15 seconds, Step 2 was presented. For Step 2, if the participant did not vocally mand the item the tester would say, "Have some. What do you want?" with the juice hidden under the table. The tester waited a duration of 15 seconds to see if the participant vocally manded for the juice. If the participant did not mand for the juice within 15 seconds, the tester proceeded to Step 3. For Step 3, the tester brought the juice in view (although out of reach of the participant) and said, "Have some. What do you want?" The tester waited 15 seconds to see if the participant vocally manded for the juice. If the participant did not vocally mand for the juice within the 15 seconds, the tester proceeded to Step 4. For Step 4, the tester brought the juice in view (although out of reach of the participant) and said, "Have some. What do you want? Say juice." A response for each step was scored as correct, an approximation, incorrect, an omission, or nonverbal which consisted of searching for the item (i.e., looking under the table), or reaching for the item or gesturing for the item.

The second task of the mand assessment was manding for pudding which was assessed as described above for juice. The mand assessment was completed three times for the juice and three times for the pudding.

As described above for echoic and tact assessments, the participant received praise for each correct word or approximation. The next trial was presented after five seconds, and an omission was scored if the participant did not respond within five seconds. The participant was also asked to "Pick up the ball," after each completed mand assessment for each item, and praise was provided for picking up the ball.

In a study in which Kozloff (1973) taught parents of autistic children to train

speech, he taught parents that a sound was defined as imitated if it occurred correctly and unprompted 80% of the time. Therefore, mastery of echoics and tacts was considered met if a participant obtained a score of 80% or higher (11 words x 3 trials each). A participant had to have 27 trials marked as correct in order to reach 80%. Also, for mands the mastery criteria was set at 80% or higher. Correct responses or approximations were counted on Step 1 when the tester asked, "Have some," or on Step 2 when the tester asked "Have some. What do you want?"

Interobserver Reliability Assessments.

The tester and an assistant independently scored responses for echoic, tact, and mand assessments as described by Lovaas et al. (1966). Each session was tape recorded by the tester. The tester scored each response made by a participant throughout the testing. An assistant listened to the tape at a later date. The assistant listened to the response, stopped the tape, rewound the tape, heard the response a second time, and then recorded the type of response (before hearing the praise from the tester if a correct pronunciation or an approximation had been made). After scoring a response, the assistant was able to hear the praise if the tester had marked that response as correct or an approximation. However, the assistant did not change her score. As well, if the assistant did hear the praise given by the tester, the assistant was not aware if the tester had scored the response as correct or as an approximation.

IOR data was collected for 44% of echoic sessions, 33% of tact sessions, and 30% of mand sessions as described in Experiment 1. IOR data for echoics ranged from 70% to 100% with a mean of 89%; for tacts ranged from 70% to 100% with a mean of 91%; and for mands ranged from 63% to 100% with a mean of 88%.

Procedural Reliability Assessments.

A procedural checklist (see Appendix X), that lists the steps to be followed by the tester for echoics and tacts was used by two assistants to record tester behavior on fifteen trials. A procedural checklist (see Appendix Y) that indicates steps to be completed by the tester was used for the mand assessments. Procedural reliability checks were obtained for 22%, 33%, and 22% of sessions to test for echoics, tacts, and mands in the respective order as described in Experiment 1. Procedural reliability checks were 100% for echoics, 100% for tacts, and 100% for mands.

Results

As can be seen in Table 5, the four participants who passed level 3 failed the criteria for echoics, tacts, and mands. Three of the four participants who passed up to level 4 failed the criteria for echoics, tacts, or mands. Although one participant (WM) who passed level 4 did meet the criteria for echoics, he did not meet the criteria for tacts or mands. Four of the seven participants who passed up to level 6 failed the criteria for echoics, tacts, and mands. One participant (MC) at level 6 met the criteria for echoics, tacts, and mands, one (DS) met the criteria for echoics and tacts, and one (EK) met the criteria for echoics. Two of the four participants who passed up to level 6 and VANM, failed the criteria for echoics, tacts, and mands. One participant (NI) who passed VANM met the criteria for mands, and a second participant (LA) who passed VANM met the criteria for all three. Of the seven participants who passed level 6 and all the prototype tasks, six met the criteria for echoics, tacts, and mands, and one participant (GK) met the criteria for echoics and mands but not for tacts. See Appendix Z for the specific percent correct on echoics, tacts, and mands for each participant.

Table 5

Test Results on the ABLA Tasks, Auditory Matching Tasks, Echoics, Tacts, and Mands

Participants	L3	L4	L6	VANM	AANM	ECHOICS	TACTS	MANDS
SL	P	F	F	F	F	F	F	F
BB	P	F	F	F	F	F	F	F
MS	P	F	F	F	F	F	F	F
KG	P	F	F	F	F	F	F	F
WM	P	P	F	F	F	P	F	F
HT	P	P	F	F	F	F	F	F
KV	P	P	F	F	F	F	F	F
MR	P	P	F	F	F	F	F	F
DS	P	P	P	F	F	P	P	F
MC	P	P	P	F	F	P	P	P
FL	P	P	P	F	F	F	F	F
HJ	P	P	P	F	F	F	F	F
MK	P	P	P	F	F	F	F	F
EK	P	P	P	F	F	P	F	F
SV	P	P	P	F	F	F	F	F
NI	P	P	P	P	F	F	F	P
VR	P	P	P	P	F	F	F	F
TN	P	P	P	P	F	F	F	F
LA	P	P	P	P	F	P	P	P
PC	P	P	P	P	P	P	P	P
JW	P	P	P	P	P	P	P	P
MG	P	P	P	P	P	P	P	P
DK	P	P	P	P	P	P	P	P
GK	P	P	P	P	P	P	F	P
RT	P	P	P	P	P	P	P	P
SB	P	P	P	P	P	P	P	P

Note. All participants passed the Assessment of Basic Learning Abilities Test (ABLA) level 1 to 2 (not shown in the table).

Order analysis was used to evaluate the hierarchical relations among the tasks (Kerr et al., 1977). When comparing two tasks/levels, a confirmation (C) refers to a "pass" at the hypothesized lower level and a "fail" at the higher level; whereas a disconfirmation (D) refers to a "fail" at the lower level and a "pass" at the higher level. Participants who passed or failed both levels were not considered because they do not provide any information about the relative difficulty of the tasks. A standard score was derived by the formula: $z = (C\text{-}D)/\sqrt{(C + D)}$ (Kerr et al., 1977). A z-score specifies the probability that the tasks/levels were ordered in difficulty or that the set of confirmations (C) or disconfirmations (D) were drawn by chance. The top portion of Table 6 shows the frequencies of confirmations and disconfirmations between each task/level and the bottom portion of the table shows the z-scores.

First, the expected hierarchy emerged among levels 3, 4, and 6. That is, level 6 was significantly more difficult than level 3 ($p < .01$) and level 4 ($p < .05$), and level 4 was more difficult than level 3 ($p < .05$). The results obtained are consistent with past research (Kerr et al., 1977; Martin et al., 1983).

Second, for the two prototype auditory tasks (VANM and AANM) both were significantly more difficult than levels 3 ($p < .001$), 4 ($p < .001$) and 6 ($p < .01$ and $p < .001$, respectively). Moreover, AANM was significantly more difficult than VANM ($p < .05$).

Third, the three verbal tasks were all significantly more difficult than levels 3 ($p < .001$), 4 ($p < .001$) and 6 ($p < .05$, $p < .001$, and $p < .01$, respectively). However, none of the verbal tasks were significantly more difficult than the two prototype auditory tasks (VANM and AANM). In fact, the opposite direction was found between echoics, mands,

Table 6

Order Analysis – Confirmations and Disconfirmations

	Level 4		Level 6		VANM		AANM		Echoics		Tacts		Mands	
	C	D	C	D	C	D	C	D	C	D	C	D	C	D
Level 3	4	0	8	0	15	0	19	0	14	0	17	0	16	0
Level 4			4	0	11	0	15	0	10	0	13	0	12	0
Level 6					7	0	11	0	7	1	9	0	8	0
VANM							4	0	3	4	4	2	2	1
AANM									0	5	1	3	0	3
Echoics											3	0	3	1
Tacts													1	2

Results of Z-scores

	Level 4	Level 6	VANM	AANM	Echoics	Tacts	Mands
Level 3	2.000*	2.828**	3.873***	4.359***	3.742***	4.123***	4.000***
Level 4		2.000*	3.317***	3.873***	3.162***	3.606***	3.464***
Level 6			2.646**	3.317***	2.121*	3.000***	2.828**
VANM				2.000*	-0.378	0.816	0.577
AANM					-2.236	-1.000	-1.732
Echoics						1.732*	1.000
Tacts							-0.577

Note. * $p < .05$; ** $p < .01$; *** $p < .001$.

and AANM. That is, AANM was significantly more difficult than echoics and mands.

Lastly, among the three verbal tasks, tacts were found to be significantly more difficult than echoics ($p < .05$) but mands were not significantly more difficult than either tacts or echoics.

Although there appeared to be no consistent hierarchical relation among the three verbal tasks based on pass/fail patterns, a difference in means scores across the three tasks was noted. A general linear model repeated measures ANOVA indicated that there was a significant difference ($p = .006$) between echoic, tact, and mand scores. Post hoc pairwise comparisons show the mean echoic score ($M = 60.96$) was significantly higher than the mean tact score ($M = 50.77$; $p = .003$). The mean echoic score was significantly higher from the mean manding score ($M = 50.92$; $p = .026$). The mean tacting score was not significantly different from the mean manding score ($p = .953$). Based on the results of the pairwise comparisons, echoics was less difficult than tacting and manding, but tacting cannot be said to be more or less difficult than manding.

Discussion

Visual inspection of the data presented in Table 3 and the Chi-square analysis supports the hypothesis that those whose pass the prototype VANM task and fail the prototype AAIM and AANM will pass the VANM predictive tasks and fail the AAIM and AANM predictive tasks; those who pass the prototype AAIM task and fail the prototype AANM task, will pass the AAIM predictive tasks and fail the AANM predictive tasks; and those who pass the prototype VANM, AAIM, and AANM tasks, will pass the predictive VANM, AAIM, and AANM predictive tasks. These results extend previous research that has demonstrated predictive validity of the ABLA and

auditory matching (Martin et al., 1983; Meyerson, 1977; Stubbings & Martin, 1995; 1998; Tharinger et al., 1977; Wacker, 1981).

The findings from Experiment 2 indicate that echoics are more difficult than ABLA levels 3, 4, 6. Unfortunately, it could not be determined if echoics were more or less difficult than VANM and AANM. Tacts and mands were also found to be more difficult than levels 3, 4, and 6. As with echoics, tacts and mands were not found to be more or less difficult than VANM and AANM. The pairwise comparisons did demonstrate that echoics were less difficult than tacts and mands, and there was no significant difference between tacts and mands. However, using the pairwise comparisons, the actual mean differences were small (60.96% for echoics versus 50.92% for mands and 50.77% for tacts).

A question arises: Can the results be accounted for in terms of level of general functioning of the clients? Level of functioning as assessed by performance on the SIB was not correlated with performance on tests for auditory matching, echoics, tacts, and mands. All participants who were tested on the SIB were found to be functioning at the severe level in terms of adaptive behaviors. However a comparison of Tables 4 and 5 indicate that of the participants who passed ABLA level 6, the auditory matching tasks, and most of the tests for echoics, tacts, and mands, five were mildly retarded, one was moderately retarded, and one was severely retarded according to agency records. On the other hand, none of the participants who failed the tests for auditory matching and echoics, tacts, and mands were mildly retarded. Thus, future research should more carefully assess level of functioning (as determined by IQ) as it relates to tests for auditory matching and echoics, tacts, and mands.

Experiments 1 and 2 have several limitations. First, it cannot be determined whether or not participants' prior knowledge of the words used in the tasks may have contributed to their performance. It may have been preferable, from a research perspective, to use nonsense syllables when assessing the various tasks. However, accepted standards for assessment, research, and training with persons with developmental disabilities indicates that tasks and prompts should have functional value for the participants (Favell & McGimsey, 1993; Van Houten et al., 1988). A second shortcoming to the experiments is the possibility of experimenter bias in that the tester was not blind to the ABLA levels and auditory matching levels of the clients. However, the high interobserver reliability scores and high procedural reliability scores that were obtained, combined with the fact that different assistants scored data for IOR purposes on separate occasions, minimize the likelihood of this type of bias. A final shortcoming to Experiment 2 was the small sample size for each of the groups.

Future research might focus on examining the ABLA auditory matching levels, echoics, tacts, and mands with a larger sample size. Future research might also determine the extent to which the auditory matching levels, echoics, tacts, and mands are related to measures of communication abilities and IQ assessments.

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Appendix A

Client Consent Form

PROJECT DESCRIPTION AND CONSENT FORM FOR CLIENTS

Project Title: Predictive validity of auditory discrimination tasks on the ability to match common sounds.

This project will be conducted by Shayla Harapiak (University of Manitoba) and supervised by Dr. Garry Martin (University of Manitoba). This project has been approved by the University of Manitoba Faculty of Arts Ethics Review Committee.

What is the study about?

The ability to tell different sounds apart is vital to everyday functioning and communication. It would be advantageous to clinicians and care-providers to be able to predict a client's ability by using practical and simple assessments. We want to find out if performance on a simple discrimination test will predict one's ability to match common sounds.

What will the project include, and how long will it last?

If you consent to take part in this project, we will:

- Assess your ability to tell sounds apart with a simple discrimination test using a variety of common sounds.
- Schedule assessments at your convenience. Altogether, it will take about 3 hours of your time. Assessments can be completed over several meetings.

Is participation voluntary?

Yes. Participation is voluntary. Whether you do this or not will in no way affect my services you may be receiving now or in the future from St. Amant Centre.

Can I stop at any time?

Yes. Even after you participate, you can stop any time and for any reason. It will not affect any services you may be receiving now or in the future.

Will my personal information be kept confidential?

Yes. The identities of all participants will be kept strictly confidential. All data collected during the study will be kept in a locked office and will be accessible only to the researcher. Any presentations, reports, or publications as a result of this project will not contain any identifying information.

Are there any risks to taking part in the study?

No. The assessment procedures will include modeling, verbal prompting, and positive reinforcers (e.g., praise and/or preferred activities). These are common procedures, and present no risk to you.

Are there any benefits in taking part in the study?

Yes. The information obtained will help staff to support you in your living environment by educating you on how to match sounds and how to follow instructions at different degrees of difficulty.

Will participating cost anything?

No.

Is there any compensation for participating?

No. There is no financial compensation for participating.

Who should I call if I have questions or concerns about the project?

If you have any questions or concerns about the project please call Shayla Harapiak (256-4301, ext. 434) or Dr. Garry Martin (474-8589).

What should I do if I am interested?

If you are interested in taking part in the project, please complete the next section. If you are a family member or an advocate, but are not the legal guardian, we would like your support for the participant to take part in this project. Please sign the next section, *Support of Family/Advocate*, to indicate your support.

Support of Family/Advocate (if family is not the legal guardian)

I support the participation of (print name of participant) _____ in this project.

_____	_____	_____
Print Name of Parent/Advocate	Signature of Parent/Advocate	Date

Signature

By signing this form, I (print your name) _____ agree to participate in the above named research project. I am aware that I may stop at any time with no impact on any services that I am receiving or may receive in the future. I agree to allow the project staff to:

- **Gather demographics and diagnostic information about me from my clinical/agency records.**
- **Do assessments with me.**
- **Include my results in publications, reports, and talks, so that others may learn from this project. My identity, however, will not be disclosed.**

_____	_____	_____
Signature of Client	Signature of Witness	Date

Legal Guardian Consent Form

PROJECT DESCRIPTION AND CONSENT FORM FOR LEGAL GUARDIANS

Project Title: Predictive validity of auditory discrimination tasks on the ability to match common sounds.

This project will be conducted by Shayla Harapiak (University of Manitoba) and supervised by Dr. Garry Martin (University of Manitoba). This project has been approved by the University of Manitoba Faculty of Arts Ethics Review Committee.

What is the study about?

The ability to tell different sounds apart is vital to everyday functioning and communication. It would be advantageous to clinicians and care-providers to be able to predict a client's ability by using practical and simple assessments. We want to find out if performance on a simple auditory discrimination test will predict one's ability to match common sounds.

What will the project include, and how long will it last?

If you consent for the client to take part in this project, we will:

- Assess the client's ability to tell sounds apart with a simple discrimination test using a variety of common sounds.
- Schedule assessments at his/her convenience. Altogether, it will take about 3 hours of his/her time. Assessments can be completed over several meetings.

Is participation voluntary?

Yes. Participation is voluntary. Whether the client does this or not will in no way affect any services he/she may be receiving now or in the future from St. Amant Centre.

Can the client stop at any time?

Yes. Even after the client participates, he/she can stop any time and for any reason. It will not affect any services the client may be receiving now or in the future.

Will the client's personal information be kept confidential?

Yes. The identities of all participants will be kept strictly confidential. All data collected during the study will be kept in a locked office and will be accessible only to the researchers. Any presentations, reports, or publications as a result of this project will not contain any identifying information.

Are there any risks to taking part in the study?

No. The assessment procedures will include modeling, verbal prompting, and positive reinforcers (e.g., praise and/or preferred activities). These are common procedures, and present no risk to the client.

Are there any benefits in taking part in the study?

Yes. The information obtained will help staff to support the client in his/her living environment by educating the client on how to match sounds and how to follow instructions at different degrees of difficulty.

Will participating cost anything?

No.

Is there any compensation for participating?

No. There is no financial compensation for participating.

Who should I call if I have questions or concerns about the project?

If you have any questions or concerns about the project please call Shayla Harapiak (256-4301, ext. 434) or Dr. Garry Martin (474-8589).

What should I do if I am interested?

The person(s) with legal authority to give consent should sign in the section, *Signature of Person Legally Authorized to Given Consent*, at the bottom of this page.

Signature of Person Authorized to Give Consent

By signing this form, I give consent for (print name of participant) _____ to participate in the above named research project. I am aware that he/she may stop at any time with no impact on any services that the participant is receiving or may receive in the future. I agree to allow the project staff to:

- **Gather demographics and diagnostic information about the participant from the clinical/agency records.**
- **Do assessments with the participant.**
- **Include the participant's results in publications, reports, and talks, so that others may learn from this project. Identity, however, will not be disclosed.**

_____	_____	_____
Print Name of Person Legally Authorized to Give Consent	Signature of Person Legally Authorized to Give Consent	Date

Appendix B

ABLA Level 6 Data Sheet

Participant: _____ Residence: _____
Tester:_____ IOR: _____
Date: _____
LEVEL 6 (AUDITORY-VISUAL) – "L" and "R" indicate correct placement of can – Say, "Red Box" (RB) or "Yellow Can" (YC)

R RB 1	R YC 2	L YC 3	L RB 4	R YC 5	R RB 6	L YC 7	L RB 8	L YC 9	L YC 10	R RB 11	R YC 12
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—

L RB 13	L RB 14	R RB 15	R YC 16	L YC 17	L YC 18	R RB 19	L YC 20	R YC 21	R RB 22	L RB 23	L YC 24
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—

R RB 25	L RB 26	R YC 27	R YC 28	L RB 29	L YC 30	R YC 31	R RB 32	L RB 33	L YC 34	R YC 35	L RB 36
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—

L RB 37	R YC 38	R RB 39	L YC 40
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

Appendix C

VANM and AAIM Data Sheet

Participant: _____ Residence: _____
Date: _____
"Pen" – P "Block" – B. The number in parentheses indicates which assistant speaks first. Circle VANM or AAIM

T:	P	B	B	P	P	B
A:	(1)P	(1)B	(1)P	(2)B	(2)P	(2)B
B:	(2)B	(2)P	(2)B	(1)P	(1)B	(1)P
	1	2	3	4	5	6
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	P	B	B	B	P	B
A:	(1)B	(2)P	(2)B	(1)P	(2)B	(1)B
B:	(2)P	(1)B	(1)P	(2)B	(1)P	(2)P
	7	8	9	10	11	12
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	P	P	B	P	B	B
A:	(1)B	(2)P	(2)P	(1)P	(1)B	(1)P
B:	(2)P	(1)B	(1)B	(2)B	(2)P	(2)B
	13	14	15	16	17	18
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	P	B	P	P	B	P
A:	(2)B	(2)B	(2)P	(1)P	(2)P	(1)B
B:	(1)P	(1)P	(1)B	(2)B	(1)B	(2)P
	19	20	21	22	23	24
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—

Appendix D

AANM Data Sheet

Participant: _____ Residence: _____

Date: _____

"Ball" - B and "Field" - F "Ice" – I and "Rink" – R. The number in parentheses indicates which assistant speaks first. Trials: correct response is to point to the assistant.

T:	I	B	B	I	I	B
A:	(1)R	(1)F	(1)R	(2)F	(2)R	(2)F
B:	(2)F	(2)R	(2)F	(1)R	(1)F	(1)R
	B	2	3	4	5	6
	1					
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	I	B	B	B	I	B
A:	(1)F	(2)R	(2)F	(1)R	(2)F	(1)F
B:	(2)R	(1)F	(1)R	(2)F	(1)R	(2)R
	7	8	9	10	11	12
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	I	I	B	B	B	B
A:	(1)F	(2)R	(2)R	(1)F	(1)F	(1)R
B:	(2)R	(1)F	(1)F	(2)R	(2)R	(2)F
	13	14	15	16	17	18
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	I	B	I	I	I	I
A:	(2)F	(2)F	(2)R	(1)R	(2)R	(1)F
B:	(1)R	(1)R	(1)F	(2)F	(1)F	(2)R
	19	20	21	22	23	24
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
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Appendix E

VANM and AAIM with a Single-Syllable - #1 and #2

Participant: _____ Residence: _____

Date: _____

"Glue" – G "Thread" – T. The number in parentheses indicates which assistant speaks first.

Circle: VANM or AAIM.

T:	G	T	T	G	G	T
A:	(1)G	(1)T	(1)G	(2)T	(2)G	(2)T
B:	(2)T	(2)G	(2)T	(1)G	(1)T	(1)G
	1	2	3	4	5	6
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	G	T	T	T	G	T
A:	(1)T	(2)G	(2)T	(1)G	(2)T	(1)T
B:	(2)G	(1)T	(1)G	(2)T	(1)G	(2)G
	7	8	9	10	11	12
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	G	G	T	G	T	T
A:	(1)T	(2)G	(2)G	(1)G	(1)T	(1)G
B:	(2)G	(1)T	(1)T	(2)T	(2)G	(2)T
	13	14	15	16	17	18
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	G	T	G	G	T	G
A:	(2)T	(2)T	(2)G	(1)G	(2)G	(1)T
B:	(1)G	(1)G	(1)T	(2)T	(1)T	(2)G
	19	20	21	22	23	24
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
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Appendix F

VANM and AAIM with a Single-Syllable - #3 and #4

Participant: _____ Residence: _____

Date: _____

"Disk" – D "Tape" – T. The number in parentheses indicates which assistant speaks first.

Circle: VANM or AAIM.

T:	D	T	T	D	D	T
A:	(1)D	(1)T	(1)D	(2)T	(2)D	(2)T
B:	(2)T	(2)D	(2)T	(1)D	(1)T	(1)D
	1	2	3	4	5	6
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	D	T	T	T	D	T
A:	(1)T	(2)D	(2)T	(1)D	(2)T	(1)T
B:	(2)D	(1)T	(1)D	(2)T	(1)D	(2)D
	7	8	9	10	11	12
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	D	D	T	D	T	T
A:	(1)T	(2)D	(2)D	(1)D	(1)T	(1)D
B:	(2)D	(1)T	(1)T	(2)T	(2)D	(2)T
	13	14	15	16	17	18
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	D	T	D	D	T	D
A:	(2)T	(2)T	(2)D	(1)D	(2)D	(1)T
B:	(1)D	(1)D	(1)T	(2)T	(1)T	(2)D
	19	20	21	22	23	24
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—

Appendix G

VANM and AAIM with Two-Syllables - #5 and #6

Participant: _____ Residence: _____
Date: _____
Circle VANM or AAIM
Mirror – M Toothbrush – T
The number in parentheses indicates which assistant speaks first.

T:	M	T	T	M	M	T
A:	(1)M	(1)T	(1)M	(2)T	(2)M	(2)T
B:	(2)T	(2)M	(2)T	(1)M	(1)T	(1)M
	1	2	3	4	5	6
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	M	T	T	T	M	T
A:	(1)T	(2)M	(2)T	(1)M	(2)T	(1)T
B:	(2)M	(1)T	(1)M	(2)T	(1)M	(2)M
	7	8	9	10	11	12
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	M	M	T	M	T	T
A:	(1)T	(2)M	(2)M	(1)M	(1)T	(1)M
B:	(2)M	(1)T	(1)T	(2)T	(2)M	(2)T
	13	14	15	16	17	18
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	M	T	M	M	T	
A:	(2)T	(2)T	(2)M	(1)M	(2)M	
B:	(1)M	(1)M	(1)T	(2)T	(1)T	
	19	20	21	22	23	
	—	—	—	—	—	
	—	—	—	—	—	
	—	—	—	—	—	
	—	—	—	—	—	
	—	—	—	—	—	
	—	—	—	—	—	
	—	—	—	—	—	

Appendix H

VANM and AAIM with Two-Syllables - #7 and #8

Participant: _____ Residence: _____

Date: _____

Circle VANM or AAIM

Stapler - S Flashlight - F

The number in parentheses indicates which assistant speaks first.

T:	S	F	F	S	S	F
A:	(1)S	(1)F	(1)S	(2)F	(2)S	(2)F
B:	(2)F	(2)S	(2)F	(1)S	(1)F	(1)S
	1	2	3	4	5	6
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	S	F	F	F	S	F
A:	(1)F	(2)S	(2)F	(1)S	(2)F	(1)F
B:	(2)S	(1)F	(1)S	(2)F	(1)S	(2)S
	7	8	9	10	11	12
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	S	S	F	S	F	F
A:	(1)F	(2)S	(2)S	(1)S	(1)F	(1)S
B:	(2)S	(1)F	(1)F	(2)F	(2)S	(2)F
	13	14	15	16	17	18
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	S	F	S	S	F	S
A:	(2)F	(2)F	(2)S	(1)S	(2)S	(1)F
B:	(1)S	(1)S	(1)F	(2)F	(1)F	(2)S
	19	20	21	22	23	24
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—

Appendix I

AAIM with Audio-Taped Common Sounds - #9

Participant: _____ Residence: _____

Date: _____

Barking – B Meowing – M The number in parentheses indicates which assistant plays the tape first.

Trials: correct response is to point to the assistant who plays the same sound as the tester.

T:	B	M	M	B	B	M
A:	(1)B	(1)M	(1)B	(2)M	(2)B	(2)M
B:	(2)M	(2)B	(2)M	(1)B	(1)M	(1)B
	1	2	3	4	5	6
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	B	M	M	M	B	M
A:	(1)M	(2)B	(2)M	(1)B	(2)M	(1)M
B:	(2)B	(1)M	(1)B	(2)M	(1)B1	(2)B
	7	8	9	10	1	12
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	B	B	M	B	M	M
A:	(1)M	(2)B	(2)B	(1)B	(1)M	(1)B
B:	(2)B	(1)M	(1)M	(2)M	(2)B1	(2)M
	13	14	15	16	7	18
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	B	M	B	B	M	B
A:	(2)M	(2)M	(2)B	(1)B	(2)B(	(1)M
B:	(1)B	(1)B	(1)M	(2)M	1)M2	(2)B
	19	20	21	22	3	24
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—

Appendix J

AAIM with Audio-Taped Common Sounds - #10

Participant: _____ Residence: _____

Date: _____

Brushing teeth – T Water draining – H The number in parentheses indicates which assistant plays the tape first. Trials: correct response is to point to the assistant who plays the same sound as the tester.

T:	T	W	W	T	T	W
A:	(1)T	(1)W	(1)T	(2)W	(2)T	(2)W
B:	(2)W	(2)T	(2)W	(1)T	(1)W	(1)T
	1	2	3	4	5	6
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	T	W	W	W	T	W
A:	(1)W	(2)T	(2)W	(1)T	(2)W	(1)W
B:	(2)T	(1)W	(1)T	(2)W	(1)T	(2)T
	7	8	9	10	11	12
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	T	T	W	T	W	W
A:	(1)W	(2)T	(2)T	(1)T	(1)W	(1)T
B:	(2)T	(1)W	(1)W	(2)W	(2)T	(2)W
	13	14	15	16	17	18
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	T	W	T	T	W	T
A:	(2)W	(2)W	(2)T	(1)T	(2)T	(1)W
B:	(1)T	(1)T	(1)W	(2)W	(1)W	(2)T
	19	20	21	22	23	24
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—

Appendix K

AANM with a Single-Syllable - #11 and #12

Participant: _____ Residence: _____

Date: _____

Cold – C and Frost – F Hot – H and Burn – B

The number in parentheses indicates which assistant speaks first.

T:	C	H	H	C	C	H
A:	(1)B	(1)F	(1)B	(2)F	(2)B	(2)F
B:	(2)F	(2)B	(2)F	(1)B	(1)F	(1)B
	1	2	3	4	5	6
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	C	H	H	H	C	H
A:	(1)F	(2)B	(2)F	(1)B	(2)F	(1)F
B:	(2)B	(1)F	(1)B	(2)F	(1)B	(2)B
	7	8	9	10	11	12
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	C	C	H	H	H	H
A:	(1)F	(2)B	(2)B	(1)F	(1)F	(1)B
B:	(2)B	(1)F	(1)F	(2)B	(2)B	(2)F
	13	14	15	16	17	18
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	C	H	C	C	H	C
A:	(2)F	(2)F	(2)B	(1)B	(2)B	(1)F
B:	(1)B	(1)B	(1)F	(2)F	(1)F	(2)B
	19	20	21	22	23	24
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—

Appendix L

AANM with a Single-Syllable - #13 and #14

Participant: _____ Residence: _____

Date: _____

Dove – D and White – W Plant – P and Green – G

The number in parentheses indicates which assistant speaks first.

T:	D	P	P	D	D	P
A:	(1)W	(1)G	(1)W	(2)G	(2)W	(2)G
B:	(2)G	(2)W	(2)G	(1)W	(1)G	(1)W
	1	2	3	4	5	6
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	D	P	P	P	D	P
A:	(1)G	(2)W	(2)G	(1)W	(2)G	(1)G
B:	(2)W	(1)G	(1)W	(2)G	(1)W	(2)W
	7	8	9	10	11	12
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	D	D	P	P	P	P
A:	(1)G	(2)W	(2)W	(1)G	(1)G	(1)W
B:	(2)W	(1)G	(1)G	(2)W	(2)W	(2)G
	13	14	15	16	17	18
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	D	P	D	D	P	D
A:	(2)G	(2)G	(2)W	(1)W	(2)W	(1)G
B:	(1)W	(1)W	(1)W	(2)W	(1)W	(2)W
	19	20	21	22	23	24
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—

Appendix M

AANM with a Two-Syllables - #15 and #16

Participant: _____ Residence: _____
Date: _____
Coffee – C and Filter – F Cassette – T and Walkman - W
The number in parentheses indicates which assistant speaks first.

T:	C	T	T	C	C	T
A:	(1)F	(1)W	(1)F	(2)W	(2)F	(2)W
B:	(2)W	(2)F	(2)W	(1)F	(1)W	(1)F
	1	2	3	4	5	6
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	C	T	T	T	C	T
A:	(1)W	(2)F	(2)W	(1)F	(2)W	(1)W
B:	(2)F	(1)W	(1)F	(2)W	(1)F	(2)F
	7	8	9	10	11	12
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	C	C	T	T	T	T
A:	(1)W	(2)F	(2)F	(1)W	(1)W	(1)F
B:	(2)F	(1)W	(1)W	(2)F	(2)F	(2)W
	13	14	15	16	17	18
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	C	T	C	C	T	C
A:	(2)W	(2)W	(2)F	(1)F	(2)F	(1)W
B:	(1)F	(1)F	(1)W	(2)W	(1)W	(2)F
	19	20	21	22	23	24
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—

Appendix N

AANM with a Two-Syllables - #17 and #18

Participant: _____ Residence: _____
Date: _____
Haircut – H and Scissors – S Hotdogs – D and Ketchup - K
The number in parentheses indicates which assistant speaks first or plays the tape first.

T:	H	D	D	H	H	D
A:	(1)S	(1)K	(1)S	(2)K	(2)S	(2)K
B:	(2)K	(2)S	(2)K	(1)S	(1)K	(1)S
	1	2	3	4	5	6
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	H	D	D	D	H	D
A:	(1)K	(2)S	(2)K	(1)S	(2)K	(1)K
B:	(2)S	(1)K	(1)S	(2)K	(1)S	(2)S
	7	8	9	10	11	12
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	H	H	D	D	D	D
A:	(1)K	(2)S	(2)S	(1)K	(1)K	(1)S
B:	(2)S	(1)K	(1)K	(2)S	(2)S	(2)K
	13	14	15	16	17	18
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	H	D	H	H	D	H
A:	(2)K	(2)K	(2)S	(1)S	(2)S	(1)K
B:	(1)S	(1)S	(1)K	(2)K	(1)K	(2)S
	19	20	21	22	23	24
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—

Appendix O

AANM with Audio-Taped Common Sounds - #19

Participant: _____ Residence: _____

Date: _____

Electric Guitar – G and Drums – D Flute – F and Violin – V

T:	G	F	F	G	G	F
A:	(1)D	(1)V	(1)D	(2)V	(2)D	(2)V
B:	(2)V	(2)D	(2)V	(1)D	(1)V	(1)D
	1	2	3	4	5	6
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	G	F	F	F	G	F
A:	(1)V	(2)D	(2)V	(1)D	(2)V	(1)V
B:	(2)D	(1)V	(1)D	(2)V	(1)D	(2)D
	7	8	9	10	11	12
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	G	G	F	F	F	F
A:	(1)V	(2)D	(2)D	(1)V	(1)V	(1)D
B:	(2)D	(1)V	(1)V	(2)D	(2)D	(2)V
	13	14	15	16	17	18
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	G	F	G	G	F	G
A:	(2)V	(2)V	(2)D	(1)D	(2)D	(1)V
B:	(1)D	(1)D	(1)V	(2)V	(1)V	(2)D
	19	20	21	22	23	24
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—

Appendix P

AANM with Audio-Taped Common Sounds - #20

Participant: _____ Residence: _____

Date: _____

Thunder – T and Siren – S Sneezing – Z and Baby crying - C

T:	T	Z	Z	T	T	Z
A:	(1)S	(1)C	(1)S	(2)C	(2)S	(2)C
B:	(2)C	(2)S	(2)C	(1)S	(1)C	(1)S
	1	2	3	4	5	6
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	T	Z	Z	Z	T	Z
A:	(1)C	(2)S	(2)C	(1)S	(2)C	(1)C
B:	(2)S	(1)C	(1)S	(2)C	(1)S	(2)S
	7	8	9	10	11	12
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	T	T	Z	Z	Z	Z
A:	(1)C	(2)S	(2)S	(1)C	(1)C	(1)S
B:	(2)S	(1)C	(1)C	(2)S	(2)S	(2)C
	13	14	15	16	17	18
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
T:	T	Z	T	T	Z	T
A:	(2)C	(2)C	(2)S	(1)S	(2)S	(1)C
B:	(1)S	(1)S	(1)C	(2)C	(1)C	(2)S
	19	20	21	22	23	24
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—

Appendix Q

Procedural Reliability Checklist

Participant: _____
Residence: _____
Tester: _____
POR: _____
Date: _____

	1	2	3	4	5	6	7	8	9	10
Set Up										
Demonstration										
Guided Trial										
Independent Response										
Correct auditory cue										
If correct...Praise										
If incorrect... "No..." Then go back to demonstration.										

Use check mark if correct, X if incorrect, leave blank if does not apply.

Appendix R

ABLA Level 3 Data Sheet

Participant: _____ Residence: _____
Tester:_____ IOR: _____
Date: _____
LEVEL 3 (VISUAL)
'L' and 'R' indicate correct placement of can
Ask, "Where does it go?"

L	R	L	L	R	L	R	R	R	L	L	R
1	2	3	4	5	6	7	8	9	10	11	12
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
L	R	L	L	R	L	R	R	L	R	R	R
13	14	15	16	17	18	19	20	21	22	23	24
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
L	R	L	L	L	R	R	L	R	L	L	R
25	26	27	28	29	30	31	32	33	34	35	36
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
L	R	R	L	—	—	—	—	—	—	—	—
37	38	39	40								
—	—	—	—								
—	—	—	—								
—	—	—	—								
—	—	—	—								
—	—	—	—								
—	—	—	—								
—	—	—	—								

Appendix S

ABLA Level 4 Data Sheet

Participant: _____ Residence: _____
Tester: _____ IOR: _____
Date: _____
LEVEL 4 (MATCH-TO-SAMPLE)
'L' and 'R' indicate correct placement of can – 'B' indicates to present little red box – 'C' indicates to present small yellow cylinder – Ask. "Where does it go?"

R	R	L	R	L	L	R	L	L	L	R	R
C	B	B	C	C	B	B	C	B	C	B	C
1	2	3	4	5	6	7	8	9	10	11	12
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
R	L	L	R	L	L	R	L	R	R	L	R
B	B	X	B	B	C	C	C	B	C	B	B
13	14	15	16	17	18	19	20	21	22	23	24
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
L	R	L	L	R	R	L	L	L	R	L	L
B	B	C	C	C	B	B	C	B	B	C	C
25	26	27	28	29	30	31	32	33	34	35	36
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—
R	R	L	L								
C	B	B	C								
37	38	39	40								
—	—	—	—								
—	—	—	—								
—	—	—	—								
—	—	—	—								
—	—	—	—								
—	—	—	—								
—	—	—	—								

Appendix T

2-Choice Task to Produce a Matching Sound Data Sheet

Participant: _____ Residence: _____
Tester: _____ IOR: _____
Date: _____

Trials: Bell and Tambourine

B 1	B 2	T 3	B 4	T 5	T 6
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—

B 7	T 8	T 9	B 10	B 11	B 12
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—

T 13	B 14	T 15	B 16	T 17	B 18
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—

T 19	T 20	T 21	B 22	T 23	B 24
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—

Appendix U

2-Choice Task to Produce a Non-Matching Sound Data Sheet

Participant: _____ Residence: _____
Tester:_____ IOR: _____
Date: _____

"Ch, ch, ch," or "rattle, rattle, rattle."
Trials: Rice and rattle

C 1	C 2	R 3	C 4	R 5	R 6
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
C 7	**R 8**	**R 9**	**C 10**	**C 11**	**C 12**
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
R 13	**C 14**	**R 15**	**C 16**	**R 17**	**C 18**
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
R 19	**R 20**	**R 21**	**C 22**	**R 23**	**C 24**
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—
—	—	—	—	—	—

Appendix V

Echoics and Tacts Data Sheet

Participant:_____Residence:_____
Tester: _____IOR: _____
Date:_____
Circle: Echoics or Tacts

WORD	CORRECT	APPROXIMATION (indicate in the same box)	INCORRECT	OMISSION
1. box		boh, ox		
2. can/tin		cah, ann/tii, inn		
3. pen		en, peh		
4. juice		juu, uice		
5. cup		cuh, up		
6. pudding		pudd, puh, ding		
7. spoon		spoo, oonh		
8. bowl		boh, oohl		
9. foam/sponge		foo, ooam/sponn, onge		
10. puzzle/bear		puzz, zzle/beaa, air		
11. paper		paah, perr, pape		
12. box		boh, ox		
13. can/tin		cah, ann/tii, inn		
14. pen		en, peh		
15. juice		juu, uice		
16. cup		cuh, up		
17. pudding		pudd, puh, ding		
18. spoon		spoo, oonh		
19. bowl		boh, oohl		
20. foam/sponge		foo, ooam/sponn, onge		
21. puzzle/bear		puzz, zzle/beaa, air		
22. paper		paah, perr, pape		
23. box		boh, ox		
24. can/tin		cah, ann/tii, inn		
25. pen		en, peh		
26. juice		juu, uice		
27. cup		cuh, up		
28. pudding		pudd, puh, ding		
29. spoon		spoo, oonh		
30. bowl		boh, oohl		
31. foam/sponge		foo, ooam/sponn, onge		
32. puzzle/bear		puzz, zzle/beaa, air		
33. paper		paah, perr, pape		

Place a check mark in the appropriate column.

Appendix W

Manding Data Sheet

Participant:_____Residence:_____
Tester: _____IOR: _____
Date:_____

TASK:

Verbal	Correct	Approximation	Incorrect	Omission		Nonverbal	
					Ges	Search	Reach
Step 1 (CEO)							
Step 2 (IV; Prompted Mand)							
Step 3 (IV; Prompted Mand, Tact)							
Step 4 (IV; Prompted Mand; Tact; Echoic)							

TASK:

Verbal	Correct	Approximation	Incorrect	Omission		Nonverbal	
					Ges	Search	Reach
Step 1 (CEO)							
Step 2 (IV; Prompted Mand)							
Step 3 (IV; Prompted Mand, Tact)							
Step 4 (IV; Prompted Mand; Tact; Echoic)							

Appendix X

Procedural Reliability Checklist – Echoics and Tacts

Participant:_____
Residence:_____
Tester:_____
POR:_____
Date:_____

Circle: Echoics or Tacts

Set Up	Demonstration for echoics/ "What's this?" for tacts	"Pick it up." (Every 3rd trial)	If correct or an approximation...praise
1.		n/a	
2.		n/a	
3.			
4.		n/a	
5.		n/a	
6.			
7.		N/a	
8.		N/a	
9.			
10.		N/a	
11.		N/a	
12.			
13.		N/a	
14.		N/a	
15.			

Use check mark if correct, X if incorrect, leave blank if does not apply.

Appendix Y

Procedural Reliability Checklist – Mands

Participant:_____
Residence:_____
Tester:_____
POR:_____
Date:_____

	Demonstration	Set Up	Correct Prompt	"Pick it up," after every task	If correct or approximation . . . praise
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

Appendix Z

Total Percent Correct on the Echoic, Tact, and Mand Assessments

Participant	ABLA and Prototype Tasks Passed	% Correct on Echoics	% Correct on Tacts	% Correct on Mands
SL	Level 3	0%	0%	0%
BB		0%	0%	0%
MS		45%	12%	0%
KG		0%	0%	0%
WM	Level 4	82%	21%	7%
HT		45%	45%	50%
KV		33%	3%	0%
MR		3%	3%	0%
DS	Level 6	88%	82%	67%
MC		91%	100%	100%
FL		67%	64%	50%
HJ		30%	3%	0%
MK		9%	6%	33%
EK		91%	54%	67%
SV		61%	45%	17%
NI	Level 6 VANM	70%	58%	83%
VR		39%	36%	17%
TN		58%	64%	50%
LA		100%	84%	100%
PC	Level 6 VANM AAIM AANM	94%	91%	100%
JW		100%	97%	100%
MG		100%	100%	100%
DK		97%	91%	100%
GK		82%	67%	83%
RT		100%	100%	100%
SB		100%	94%	100%