

University of Nevada, Reno

The Assessment of Basic Learning Abilities: The Role of Conditionality

A thesis submitted as partial requirement for the degree Master of Arts. A thesis submitted in partial fulfillment of the requirements for the degree of Master of Arts in Psychology

by

Holly Seniuk

Dr. W. Larry Williams Ph.D., BCBA-D./Thesis Advisor

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prepared under our supervision by

HOLLY SENIUK

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W. Larry Williams, Phd, Bcba-D, Advisor

Patrick Ghezzi, Phd, BCBA, Committee Member

Stephen Rock, Phd, Graduate School Representative

Marsha H. Read, Ph. D., Associate Dean, Graduate School

May, 2010

Abstract

The Assessment of Basic Learning Abilities (ABLA) is a table top test designed to measure the ability of individuals with intellectual disabilities to perform one simple and five two-choice discrimination tasks. A large body of research has shown that the 6 discriminations appear to be ordered in difficulty such that the first failed level is predictive of failure at higher levels. Conditional discriminations are tested in the ABLA at levels 4 (visual-visual) and 6 (auditory-visual). However, conditional position discrimination has not been investigated in relation to the ABLA. This study assessed the discrimination abilities of individuals who performed at ABLA levels 3-6 to determine where conditional position discrimination would fit into the ABLA hierarchy. It was found that some individuals performing at ABLA 6 demonstrated a conditional position discrimination whereas others performing at level 6 and those performing below level 6 did not learn this task after several hundred trials. Participants at level 6 who could not perform a conditional position discrimination during initial assessment were taught the task using both the standard ABLA format and a direct-response reinforcer procedure in an ABAB multiple baseline design. There was no difference in performance between procedures across all participants at level 6.

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History of the ABLA

In 1977, Kerr, Meyerson, and Flora became puzzled by the observation that some individuals with intellectual disabilities fail to acquire a new discrimination under the same conditions (system of reinforcement and teacher) that had previously resulted in rapid acquisition of other discriminations. For example, a child may be able to put his/her toys in the toy box when it is always placed in the same location and the toys are piled in the same place each time; however, when the box is moved and the toys are spread around the room, the child is unable to complete the task. Thus, Kerr et al. (1977) developed the Auditory Visual Combined Discrimination Test (AVC) in order to test both the ease and difficulty with which persons with intellectual disabilities learn to perform one simple and five two-choice discrimination tasks. The AVC assesses the basic discriminations and prerequisite skills required for an individual to perform a variety of educational, prevocational and vocational tasks (Kerr, Meyerson & Flora, 1977).

Kerr et al., (1977) demonstrated that there is a hierarchical pattern in the order of discrimination skills acquired (position, visual, match-to-sample, auditory, and auditory-visual combined). Other patterns observed as a result of this study include; poorer performance associated with lower level of functioning, and an increase in auditory discrimination skill with an increase in age. This test later became known as the Assessment of Basic Learning Abilities (ABLA) and has been demonstrated to have high test-retest and inter-tester reliability. Martin, Yu, Quinn and Patterson (1983) tested 42 individuals with intellectual disabilities on the ABLA and then retested the same

individuals three months later. It was found that there were no changes in performance for any of the participants from pre- to post-test. Inter-tester reliability was also demonstrated by using different testers in the pre- and post-tests (Martin, Yu, Quinn & Patterson, 1983).

The materials used when conducting the ABLA include a yellow can (15.5cm in diameter and 17.5cm in height), a red box with red-on-red stripes (14cm X 14cm X 14cm), a yellow cylinder (4cm in diameter and 9cm in height), a red cube with red-on-red stripes (5cm X 5cm X 5cm), and a piece of irregularly-shaped white foam. These materials were chosen on the basis that yellow and red are primary colors which are typically taught to children first. Also, a box and a can are common shapes that people are likely to come into contact with often and have value in everyday life (Vause, Yu, & Martin, 2007). In addition, these materials are inexpensive, readily available to staff at most training facilities, and easy to construct (Martin & Yu, 2000).

The ABLA consists of six levels. The first level is a simple motor task that requires the individual to place a piece of foam into either a red box or yellow can, presented alone. Level two is a two-choice position discrimination in which the correct response is to place the piece of foam in a stationary yellow can while the red box is used as a distracter. The third level tests an individual's ability to perform a two-choice visual discrimination. Level three is the same as level two with the exception that the position of the yellow can and red box are rotated randomly and the correct response is to put the piece of foam into the yellow can. The fourth level is often described as a quasi-identity-match-to-sample task (Jackson, Williams, & Biesbrouck, 2006) which requires the individual to make a visual conditional discrimination. The correct response for this level

is to place the red cube in the red box and the yellow cylinder into the yellow can when the positions of the two containers are randomly rotated. Level five requires the individual to place the piece of foam into either the red box or yellow can when in stationary positions in response to a vocal request from the tester, in what is considered a simple auditory-visual discrimination. The final level, level six, is an auditory-visual conditional discrimination and an example of an arbitrary match-to-sample. The task is the same as level five with the exception that the positions of the box and can are rotated randomly (Vause et al., 2007). After reviewing six studies, Martin and Yu (2000) discovered that of 197 clients who passed level 5 of the ABLA, all but eight also passed level 6. Thus, many researchers have chosen to omit level 5 when administering the ABLA (Martin & Yu, 2000).

The test takes approximately thirty minutes to complete. During the procedure the tester sits at a table directly across from the individual being tested. Each level begins with a demonstration, a guided trial, and a practice trial. Test scoring at a given level begins when the testee engages in an independent correct response at that level after the practice trial. Correct independent trials result in reinforcement in the form of verbal praise and a preferred edible or tangible item. Incorrect responses are followed by a guided trial and an opportunity to perform an independent response. A level is considered passed when the individual engages in eight consecutive independent correct responses, and failed when eight cumulative incorrect responses are observed (Vause et al., 2007). The pass criterion of eight consecutive responses was chosen because statistically that pattern will only occur by chance in a two-choice situation 4 times in 1,000 trials (Kerr et al., 1977).

Research on the ABLA

A great amount of research developed as a result of the findings of Kerr et al. (1977). The ABLA research most relevant to the current study is the early finding that the levels are hierarchically ordered. Kerr et al. (1977) found that of the 117 individuals who participated in their study, 111 showed similar results, such that when an individual passed a certain level, lower levels were also passed and if they failed a certain level, higher levels were not passed (Kerr et al., 1977). Another important finding of the Kerr et al. (1977) study was that failed levels are failed rather quickly and are very difficult to teach, if they are learned at all, which provides further evidence of the hierarchical nature of the ABLA. It was found that 97% of the participants in the study passed or failed a level within 30 trials or less (Kerr et al., 1977), a result also replicated with typically developing children (Casey & Kerr, 1977). In addition, further studies have demonstrated that failed levels are difficult to teach using standard prompting and reinforcement procedures (Meyerson, 1977; Witt & Wacker, 1981; Yu & Martin, 1986). For example, Meyerson (1977) found that participants needed anywhere from 100 to 900 trials of practice on a failed ABLA level before any higher level of discrimination could be attained (Meyerson, 1977).

However, there have been attempts to teach individuals tasks that match their failed ABLA level using techniques other than standard prompting and reinforcement procedures. Conyers et al. (2000) used a multiple-component training procedure which included a direct-response reinforcer procedure to teach individuals who failed ABLA level 6 an auditory-visual combined discrimination task. In this procedure the trainer

placed an edible under the container that was the correct choice. When the participant placed a green block with Velcro on the correct choice (also with velcro) and lifted it up the edible reinforcer was revealed. The other elements of the multiple-component training procedure included varied reinforcers, and interruption of incorrect responses. The multiple-component training procedure was found to be effective in producing rapid acquisition of the task (Conyers et al., 2000).

Researchers have suggested that when the topography of the behavior is functional (ie. directly results in obtaining a reinforcer) it may be learned more rapidly than when reinforcement is delivered by another person (Koegel & Williams, 1980). Williams, Koegel and Egel (1981) found that a functional response-reinforcer relationship resulted in faster acquisition of target behaviors. The study compared an arbitrary response-reinforcer relationship, in which reinforcers were delivered contingent upon correct responding in a form that had no specific relationship to the behavior being taught, to a functional response-reinforcer relationship condition where the behavior was directly related to obtaining the reinforcer. For example, if the behavior was opening their mouth the edible item would be placed in their mouth, or if the target behavior was touching their head, the reinforcer would be placed on their head. During the arbitrary condition all participants performed at or below 50%. When the functional condition was implemented performance increased to 100% within five trial blocks or less for each participant.

The authors suggest that one explanation for these results is that the functional response-reinforcer relationship may direct attention to the specific task, thus clarifying the exact target behavior that will be reinforced (Williams, Koegel & Egel, 1981).

Discrimination

A critical aspect of learning many functional skills in areas such as communication and social interaction is learning to discriminate between relevant stimuli in the environment. Discriminations can be conceptualized as being on a continuum of complexity; at the least complex end of the continuum are non-relational discriminations which involve simple, simultaneous discriminations that do not require the presence of sample stimuli. For example, when an individual learns that when a plate is present the correct response is to put it in the dishwasher, the individual has learned to respond to the presence of a given environmental stimulus and to not respond in the absence of that stimulus. At the opposite end of the continuum are conditional discriminations, in which the function of comparison stimuli change from trial to trial dependent upon sample stimuli. In this type of discrimination a given stimulus is presented each trial as either the correct or incorrect comparison. An example of a conditional discrimination would be putting a plate in the dishwasher if it was dirty or used, but not if it was clean. If conditional discriminations involve formal physical similarity they are considered non-arbitrary, and in contrast, if they are formally dissimilar they are considered arbitrary. Conditional discriminations may occur within or across any sensory modality, such as visual, auditory, olfactory, and tactual (Williams & Jackson, 2009). The ability to perform conditional discriminations is assessed in the ABLA through levels 4 and 6. Level 4 is considered a quasi-match-to-sample task, and level 6 is a conditional auditory-visual task. However, the ability to perform a conditional *position* discrimination is not

measured by the ABLA and it is unclear as to where this task would fit in the ABLA hierarchy of discrimination abilities.

Purpose of the Current Study

Research on the ABLA has demonstrated its value as a clinical tool. It is useful in determining what tasks individuals with intellectual disabilities may have difficulty with, the best choice presentation methods, and it allows for predictions to be made regarding the individual's performance on tasks and standardized tests and other tasks (Martin, Thorsteinsson, Yu, Martin & Vause, 2008). Research has demonstrated that the discrimination tasks measured by the ABLA are hierarchically ordered (simple position, simple visual, conditional visual-visual, and conditional auditory-visual) making level 4 the first test of conditional discrimination. Conditional position discrimination has not been assessed in relation to the ABLA, therefore it is unclear where this task would fit in the ABLA hierarchy. The purpose of this study was to determine where in the ABLA hierarchy conditional position discrimination would fit. This study also evaluated the effectiveness of a direct-response reinforcer procedure in teaching a conditional position discrimination.

Method

Setting and Participants

Ten individuals with various types of intellectual disabilities participated in this study. Six of the participants tested at ABLA level 6, two at ABLA level 4, and two at ABLA level 3. Four of the participants were recruited through fliers posted in the community, while the other six participants were recruited through a school for children with intellectual disabilities. Information about the study was sent home for the parents to

read. Parents interested in having their child participate in the study contacted the experimenter. The study followed a protocol approved by a University Institutional Review Board, and all participation was voluntary.

All sessions were conducted in a room with video recording capabilities. Sessions for four of the participants were conducted in a room at their home, whereas sessions for the other six participants were conducted in a private room at the school. All rooms contained a table and chairs for conducting table-top assessments. All sessions were recorded using a video camera positioned so that both the experimenter and participant were in view. Sessions lasted approximately 30-60 minutes.

Equipment and Reinforcers

During sessions the experimenter sat directly across from the participant with the table separating the two. All materials were kept beside the experimenter and out of sight of the participant. During table-top tasks materials were placed on the table between the experimenter and the participant. Reinforcement for correct responses consisted of small edible and/or tangible items determined to be highly preferred by the participant through a preference assessment (Fisher, Piazza, Bowman, & Hagopian, 1992). For one participant (Chris) a formal preference assessment was not conducted because the participant's teacher only identified one preferred activity (going for a walk). The reinforcing effectiveness of this activity was verified via subsequent reinforcer assessment.

Procedure

ABLA Testing. Each participant was assessed on the ABLA according to the procedures outlined by Martin & Yu (2000). Materials included a yellow can,

approximately 15 cm in diameter and 17 cm in height; a red box with black stripes, approximately 14 cm X 14 cm X 10 cm; a yellow cylinder, approximately 4 cm in diameter 7 cm in height; a red cube with black stripes and approximate dimensions of 5 cm X 5 cm X 5 cm; and a piece of irregularly shaped grey foam, approximately 5 cm in diameter. Once the participant performed eight consecutive correct responses for a level testing began for the following level. Testing was terminated when the participant performed eight cumulative incorrect responses on a given level. It was then determined that the highest level passed was their ABLA score.

Interobserver agreement was collected across participants on 33% of ABLA testing sessions (range = 88-100%, mean = 97%). Interobserver agreement was scored by having another experimenter independently watch video recorded sessions and scoring all responses as correct or incorrect, and calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100%.

Procedural integrity was addressed by having another experimenter independently watch video recorded sessions and follow a checklist of experimenter behaviors that were determined to be critical. A checkmark was placed beside those steps which the experimenter completed. Procedural integrity was then calculated by dividing the number of steps performed by the total number of steps and multiplying by 100%. For the ABLA assessment procedural integrity data was collected on 35% of sessions across participants, all receiving a score of 100%.

Conditional Position Discrimination Assessment. The ability to perform a conditional position discrimination was assessed for all participants. The materials used in this procedure consisted of a yellow paper dot 8 cm in diameter, two large yellow cans

15 cm in diameter and 17 cm in height; and a yellow cylinder 4 cm in diameter and 9 cm in height.

The yellow cans were presented on the table in front of the participant and remained in fixed positions between trials. The presence of the yellow dot in front of the yellow cans was rotated randomly between trials. The participant was presented with the yellow cylinder and asked “where does it go?” In the presence of the yellow dot the correct response was to place the cylinder in the yellow can on the right. When the yellow dot was not present the correct response was to place the yellow cylinder in the yellow can on the left.

Testing began with a demonstration, a guided trial, and the opportunity to perform an independent correct response for both the presence of the yellow dot and absence of the yellow dot. Once the participant was able to perform a correct independent response for each condition scoring began. All correct responses were reinforced with preferred edible or tangible items or preferred activities determined by the preference assessment. Incorrect responses were followed by the same correction procedure used by Martin & Yu (2000). A correct response was defined as dropping the stimulus into the container, touching the bottom of the container with the stimulus, or putting the hand holding the stimulus into the container up to the wrist. Testing was terminated when the participant performed eight consecutive correct responses or eight cumulative incorrect responses.

Interobserver agreement and procedural integrity data were collected in the same manner as for the ABLA testing sessions. Interobserver agreement data were collected for 40% of the sessions, with a mean of 98% and a range of 93-100%. Procedural

integrity data were also collected for 40% of the sessions. The mean integrity score was 95% (range = 80-100%).

Conditional Position Discrimination Teaching. Those participants who were unable to perform a conditional position discrimination during initial testing participated in the teaching part of this study. This part of the study consisted of two phases: the standard ABLA teaching procedure (A), and a direct-response reinforcer procedure (B). The two participants who tested at ABLA level 3 only participated in phase A, one participant who tested at ABLA 4 participated in both phases while another only participated in phase A, and all three participants who tested at ABLA 6 and who did not pass the conditional position discrimination testing participated in both phases A and B. The design for the ABLA level 6 participants was an ABAB multiple baseline across participants. Only one participant at ABLA level 4 participated in the B phase as a probe to determine if the direct-response reinforcer procedure had differential effects on individuals at lower ABLA levels. The maximum number of trials for each phase was set at 500 because past ABLA research demonstrates that if an individual does not learn a given discrimination within 100 trials it is unlikely that they will learn that particular discrimination. For each participant, a minimum of 5 trial blocks and maximum of 50 trial blocks were conducted within each phase. The number of trial blocks varied across participants. Phases were changed when no increasing or decreasing trend was evident based on visual inspection.

Phase A (Standard). The materials and procedure for this phase were the same as during the conditional position discrimination testing with the exception of the pass/fail criterion. Trials were conducted in blocks of ten. During half of the trials the yellow dot

was present and during the other half the yellow dot was not present. The presence of the yellow dot was randomly rotated between trials. After each block of 10 trials participants were provided with a one-minute break. Each session consisted of 3-8 trial blocks. The consequence for correct and incorrect responding was the same as during the conditional position discrimination testing. Mastery criterion was set at 80% or above across three consecutive trial blocks.

The same procedures for collecting interobserver agreement and procedural integrity data were used to ensure accurate data recording and consistency across sessions during the assessment sessions was used during all teaching sessions. Table 1 provides the percentage of data collected, the mean, and the range for each phase.

Phase B (Direct Response-Reinforcer). The materials used for the direct response-reinforcer (DRR) procedure were the same as in phase A, with the exception being that the yellow cylinder was not used in this phase. During this procedure a second experimenter placed the reinforcer (determined by preference assessment) under the yellow can that was the correct choice while the view of the participant was blocked by a board 30cm in height and 50cm in length. Both yellow cans were then placed upside down in front of the participant and the board was removed. During half of the trials the yellow dot was present in front of the yellow cans and during half the trials the yellow dot was not present. The correct response when the yellow dot was present was to lift the yellow can on the right, and the correct response when the yellow dot was not present was to lift the yellow can on the left. When the participant engaged in a correct response the reinforcer would be found underneath the can that they lifted. If the participant did not take the reinforcer immediately they were prompted to consume it. If this occurred

more than once a preference assessment was conducted to determine if that item was indeed preferred. If the participant did not engage in the correct response a demonstration of the correct response was provided. Trials were conducted in blocks of ten. After each trial block the participant was provided with a one-minute break. Each session consisted of 3-8 trial blocks. Mastery criterion was set at 80% or above across three consecutive trial blocks.

Results

Initial Assessment

Table 2 shows all participants, their ABLA test level and their performance on the initial conditional position discrimination assessment. Six of the participants tested at ABLA level 6, two at ABLA level 4, and two at ABLA level 3. None of the participants who tested at levels 3 and 4 passed the initial conditional position discrimination test. Of the participants who tested at ABLA level 6, three passed the conditional position discrimination during initial testing and three did not.

Conditional Position Discrimination Teaching

Seven of the participants took part in this component of the study. Only those participants who did not pass the conditional position discrimination assessment were included in this part of the study. Of the participants who tested at ABLA levels 3 and 4, none were able to learn the conditional position discrimination using the standard teaching procedure. One participant at ABLA level 4 participated in both the standard teaching procedure and the direct-response reinforcer procedure. This participant did not learn the task during either phase. Of the ABLA level 6 participants none were able to pass the conditional position discrimination task during either phase. Table 3 provides the

range of scores as well as the mean score for each participant that participated in both phases. Figure 6 provides a graphic display of the mean score for each phase for those participants who tested at ABLA level 6. The individual outcomes for each participant are described below.

Chris. Chris is a 16 year-old male diagnosed with failure to thrive who performs at ABLA level 3. Figure 1 shows the data for the teaching part of the conditional position discrimination for Chris. The data are variable for the first ten trial blocks, and then begin to stabilize around chance levels. Chris' scores ranged from 20-80% and had an overall mean of 51% accuracy. After 50 trial blocks (500 trials) Chris did not meet mastery criteria for the conditional position discrimination task therefore his participation in the study was terminated.

Bryan. Bryan is a 17 year-old male diagnosed with autism spectrum disorder who performs at ABLA level 3. Figure 2 shows Bryan's performance during the teaching part of the conditional position discrimination task. The data for this individual also show variability until trial block 10 where they begin to stabilize around 30-50% accuracy. After trial block 40 performance increased and then decreased again. Although there was a slight upward trend in the last three trial blocks all previous increases in performance for this participant were followed by a decrease and did not reach mastery criteria. Bryan's performance ranged from 20-90% accuracy with an average of 51%. Since this participant reached the maximum number of trials without reaching mastery criteria, and had an average of 51% across trial blocks his participation in the study was terminated.

Kelly. Kelly is a 9 year-old female diagnosed with moderate mental retardation who performs at ABLA level 4. Figure 3 shows the data for Kelly's performance on the

conditional position discrimination task. After 370 trials Kelly was unable to reach mastery criteria for the conditional position discrimination, with her scores ranging from 20-70% accuracy and a mean of 46%. Kelly's participation in the study was terminated after only 37 trial blocks because she was on vacation for one week prior to a one month break from school. This resulted in a five week gap in data collection. Given that her performance was stable it was determined that it was highly unlikely that she would learn this task after only 13 more trial blocks.

Marie. Marie is a 16 year-old female with a diagnosis of autism spectrum disorder who performs at ABLA level 4. Figure 4 shows the data for Marie's performance on the conditional position discrimination task during both the standard teaching phase (A) and the direct-response reinforcer phase (B). Marie participated in both phases as a probe to determine if the direct- response reinforcer procedure had a differential effect on individuals at ABLA level 4. The data for Marie's performance during phase A indicate that she was unable to perform a conditional position discrimination after 500 trials. Her scores on this task ranged from 30-90%, with a mean of 55%. Marie's performance decreased during phase B, with a range of 10-70% and a mean of 47%. Marie's performance was terminated after 20 trial blocks during phase B as the data indicated that learning did not occur.

Jacob. Jacob is a 7 year-old male with a diagnosis of traumatic brain injury who performs at ABLA level 6. Figure 5 displays Jacob's performance on the conditional position discrimination during all phases of the study. During the first standard teaching phase performance increased but remained at chance levels, with a range of 0-90% and a mean of 46%. During the next phase (direct-response reinforcer) performance remained

similar to that of the previous phase (range 20-70%, mean 45%). During the following two phases, performance increased only slightly and continued to remain around chance levels. During the second phase of the standard teaching procedure scores ranged from 40-70% with a mean of 54%. During the final phase (second direct response-reinforcer phase) scores ranged from 30-80%, with a mean of 55%. Jacob's participation in the study was terminated due to a 1 and a half month break from school.

Mike. Mike is a 16 year-old male with a diagnosis of autism spectrum disorder. The data for Mike (Figure 5) remained relatively stable during the first phase ranging from 20-60%, with a mean of 40%. During the following phase the data demonstrate an increase in variability and an increase in performance (range 30-70%, mean 48%). However performance only increased to around chance levels. Performance decreased during the second standard teaching procedure phase (range 30-50%, mean 40%), and did not surpass chance level. Performance again increased during the second direct-response reinforcer, as did variability. The range in scores during this phase was 10-60% and the mean was 45%. After 810 trials between all four conditions, performance on this task failed to surpass 70%. Therefore Mike's participation in the study was terminated.

Jane. Jane is a 9 year-old female with a diagnosis of autism spectrum disorder (Figure 5). During the initial four trial blocks of the first phase there was an increase in performance for this participant. However, performance then began to decline and show variability throughout the phase (range 30-90%, mean 52%). During the following phase the data demonstrate both a decrease in variability as well as a decrease in performance (range 20-60%, mean 44%). The data for the second standard teaching phase follow a similar pattern as those of the initial standard teaching phase with an initial increase in

performance followed by a decrease. The data then remained stable at 50%. There was an overall increase in performance during this phase with a range of 50-90% and a mean of 60%. During the final phase the data remained stable at 50% for all trial blocks. Given the failure to reach mastery criteria after 840 trials Jane's participation in the study was terminated.

Discussion

The results of this study indicate that those individuals who are unable to perform a conditional position discrimination during initial testing may not be able to learn the task after as many as 840 trials. This is consistent with the ABLA literature that suggests failed levels are often difficult to teach, even after several hundred teaching trials (Meyerson, 1977; Witt & Wacker, 1981; Yu & Martin, 1986). Those individuals who were able to perform this task were able to do so within 12 or fewer trials. This result is also consistent with the ABLA research which indicates that levels are passed or failed quickly. Kerr (1977) found that 97% of participants passed or failed a level in 30 trials or less. The findings of this study follow the same patterns as current ABLA levels. This suggests that a level to assess the ability to perform a conditional position discrimination would fit within the current ABLA structure.

It is apparent from the findings of this study that individuals testing below ABLA level 6 are unable to perform a conditional position discrimination. Thus, the ability to perform a conditional position discrimination would fall above ABLA level 6. The fact that some individuals at ABLA level 6 were able to perform this task and some were not indicates that there may be a level above 6 that distinguishes this ability. However, it is unclear why some individuals are able to perform this task whereas others are not. It was

anecdotally observed that those individuals who were able to perform this task had a much more advanced vocal repertoire. For example, these individuals were able to speak in full sentences and engage in conversations with the experimenter. Those individuals who were unable to perform this task had a vocal repertoire that was limited to two to three word utterances.

Previous studies have indicated that the ABLA is related to communication skills. Performance on the ABLA has been found to be correlated with performance on the communication portion of the Vineland Adaptive Behavior Scale (VABS) (Sparrow, Balla, & Cicchetti, 1984), and the Communication Status Survey (CSS) (Barker-Collo, Jamieson & Boo, 1995). Additionally, Vause, Martin & Yu (2000) identified two tasks that were found to be more difficult than ABLA level 6 (auditory-auditory identity matching and auditory-auditory non-identity matching). This suggests that additional levels beyond level 6 of the ABLA may be useful in assessing communication ability more precisely.

The results of this study also indicate that the direct-response reinforcer teaching procedure may not be effective in teaching a conditional position discrimination. Although others have found it to be useful in teaching other skills that require lower forms of discrimination such as imitation and following vocal instructions (Williams, Koegel & Egel, 1981), the procedure was not effective for teaching this type of discrimination. The procedure was also found to be useful in teaching skills at ABLA level 6 to individuals who had failed that level (Conyers et al., 2000). However, the procedure was part of a multiple-component training package. Thus, it is unclear if the direct-response reinforcer procedure alone would have produced the same results.

The results for Jane are of particular interest as there appears to be an initial increase in performance at onset of both standard conditions followed by a decrease in performance. In the second standard condition the decrease is more rapid and the data quickly stabilize at chance levels. During this particular phase, it was observed that the participant was consistently placing the cylinder in the same container every time. This differs from the first standard condition during which the participant demonstrated more variability in responding. That is, the participant would often show a pattern of placing the cylinder in the container which had been the correct response during the trial that immediately proceeded. However, toward the end of the study (during the last three conditions) it was clear this participant was responding with a side bias. This pattern was also demonstrated by Chris whose data showed some variability at the beginning and then began to stabilize around 50% for the remainder of his participation in the study.

When an individual consistently responds on one side, the schedule of reinforcement does not necessarily make it in their best interest to respond in this pattern when not learning the discrimination. This pattern of responding provides them with reinforcement on 50% of the trials, which may be less profitable, especially when variable responding resulted in greater than 50% of the trials producing reinforcement, as in the case of Chris and Jane.

However, not all participants demonstrated this pattern of responding; other patterns appeared to develop. For example, one participant (Marie) would almost consistently respond by alternating the side in which she would place the cylinder, or the container that she would lift (ie. right, left, right, left etc.). Other participants (Mike and Jacob) often responded by choosing the container that was the correct choice on the

previous trial. Interestingly, it appeared that the complexity of the pattern of responding may be correlated with performance on the ABLA.

The results of this study are limited in that they only apply to a small sample of the population. Therefore, it can only be suggested that there may differences in the communication abilities of those who can perform a conditional position discrimination and those who cannot and that those individuals below ABLA level 6 may not be able to perform this task. A large number, random trial study that produced the same results would allow for making such claims more definitively.

Another limitation of the study is that the direct-response reinforcer condition was only conducted with participants at ABLA level 6 and one participant at ABLA level 4 (Marie). The procedure was conducted with Marie as a probe to assess whether the procedure would have differential effects based on ABLA level. The procedure was not able to be conducted using an ABLA level 3 participant because Bryan withdrew from the study prior to the inclusion of the procedure. In addition, a powerful reinforcer could not be identified for Chris that would be amenable to this procedure. As previously noted, the reinforcer used for Chris was walking in the hall. Therefore, it was not possible to construct a device that could result in direct-response reinforcement of this type.

Despite the limitations of this study the results have led to the development of additional questions to be addressed in future research. For example, the anecdotal observation of a correlation between expressive language and the ability to perform a conditional position discrimination is of interest. Future research should examine the possible correlation between the ability to perform a conditional position discrimination

and communication ability in conjunction with other auditory discrimination tasks above ABLA level 6.

In addition, although the direct-response reinforcer procedure was not effective in improving performance in this study it is possible that it is effective in teaching forms of discrimination at or below ABLA level 6, and ineffective for teaching skills above ABLA level 6. Future research may benefit by determining the effectiveness of this procedure on those forms of discrimination that have been found to be above ABLA level 6. These forms of discrimination include those identified by Vause, Martin & Yu (2000) (i.e., auditory-auditory identity matching, and auditory-auditory non-identity matching). This could be accomplished by removing the other parts of the multiple-component treatment procedure developed by Conyers et al. (2000) and assessing only the direct-response reinforcer component.

Also of interest are the anecdotal observations regarding patterns in responding displayed by the participants. Future research may want to collect empirical evidence to support or refute such claims. In addition, it may be beneficial to assess the same form of discrimination using a three-choice paradigm rather than a two-choice paradigm to avoid the development of such patterns of responding.

Finally, future research may benefit by including a larger sample of participants. It should be noted, however, that the authors of the current study found great difficulty in recruiting participants who performed at ABLA level 3. Of the 18 participants assessed on the ABLA, only 2 performed at level 3. The majority of participants performed at level 4 and above. This suggests that a study that includes a greater number of participants at each level may be difficult to conduct.

Overall, the results of this study provide a basis for further avenues for research on the ABLA. Given the limitations and the small number of participants involved in this study, the extent to which the findings can be generalized is limited. However, the results demonstrate a need for further research in this area and provide the basis for such research to be conducted. The questions raised as a result of the findings of this study should be addressed in future studies.

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| | Standard (1) | Direct-Response Reinforcer (1) | Standard (2) | Direct-Response Reinforcer (2) |
|--------------------------|---------------------|---------------------------------------|---------------------|---------------------------------------|
| Percent IOA Taken | 33% | 33% | 52% | 37% |
| IOA Range | 90-100% | 100% | 100% | 100% |
| IOA Mean | 99% | 100% | 100% | 100% |
| | | | | |
| Percent PI Taken | 33% | 33% | 85% | 42% |
| PI Range | 80-100% | 83-100% | 100% | 100% |
| PI Mean | 98% | 98% | 100% | 100% |

Table 1. Percent of sessions with interobserver agreement data and procedural integrity data, range, and mean for each phase of the conditional position discrimination teaching.

| Participant | ABLA Level | Conditional Position Discrimination Assessment |
|--------------------|-------------------|---|
| Michelle | 6 | Pass |
| Evan | 6 | Pass |
| Andrew | 6 | Pass |
| Mike | 6 | Fail |
| Jane | 6 | Fail |
| Jacob | 6 | Fail |
| Marie | 4 | Fail |
| Kelly | 4 | Fail |
| Bryan | 3 | Fail |
| Chris | 3 | Fail |

Table 2. Participants and their corresponding ABLA level and performance on the conditional position discrimination assessment.

| Participant | Standard (1) | Direct-Response Reinforcer (1) | Standard (2) | Direct-Response Reinforcer (2) |
|--------------------|---------------------|---------------------------------------|---------------------|---------------------------------------|
| Marie | 30-90% | 10-70% | | |
| | 55% | 47% | | |
| Jacob | 0-90% | 20-70% | 40-70% | 30-80% |
| | 46% | 45% | 54% | 55% |
| Mike | 20-60% | 30-70% | 30-50% | 10-60% |
| | 40% | 48% | 40% | 45% |
| Jane | 30-90% | 20-60% | 50-90% | 50% |
| | 52% | 44% | 60% | 50% |

Table 3. Range of scores and mean score for performance during each phase of the conditional discrimination teaching for each participant.

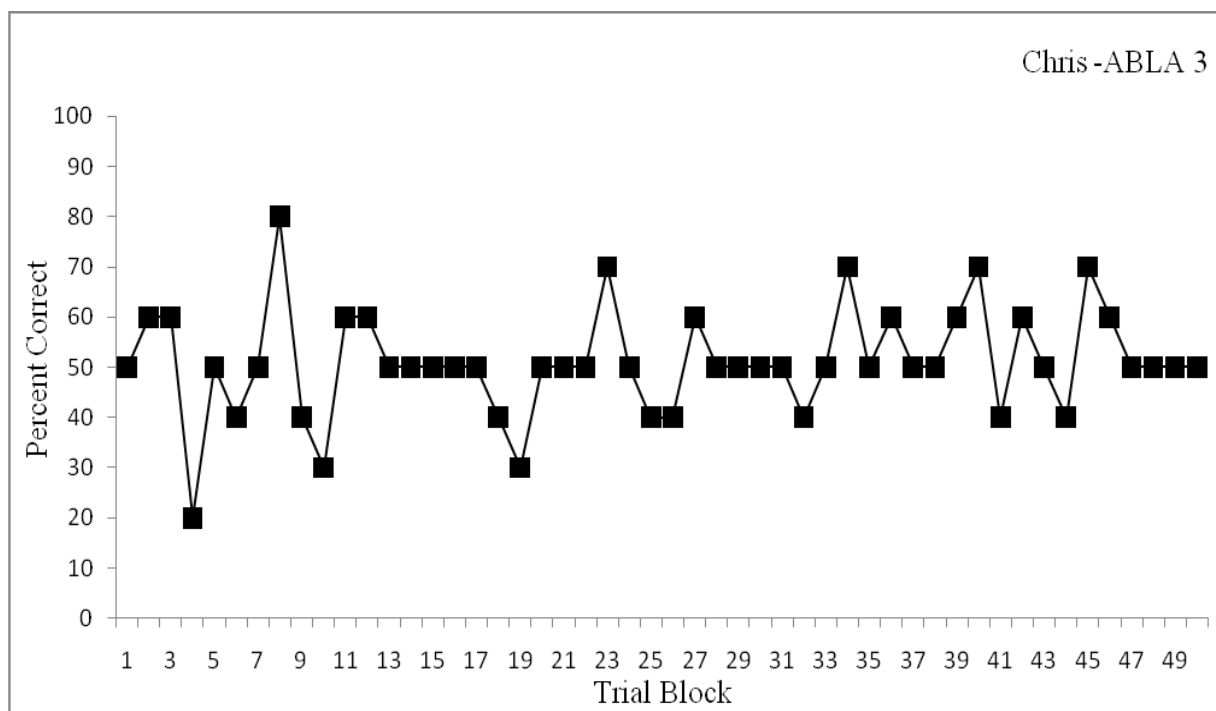


Figure 1. Chris' performance during the conditional position discrimination teaching condition.

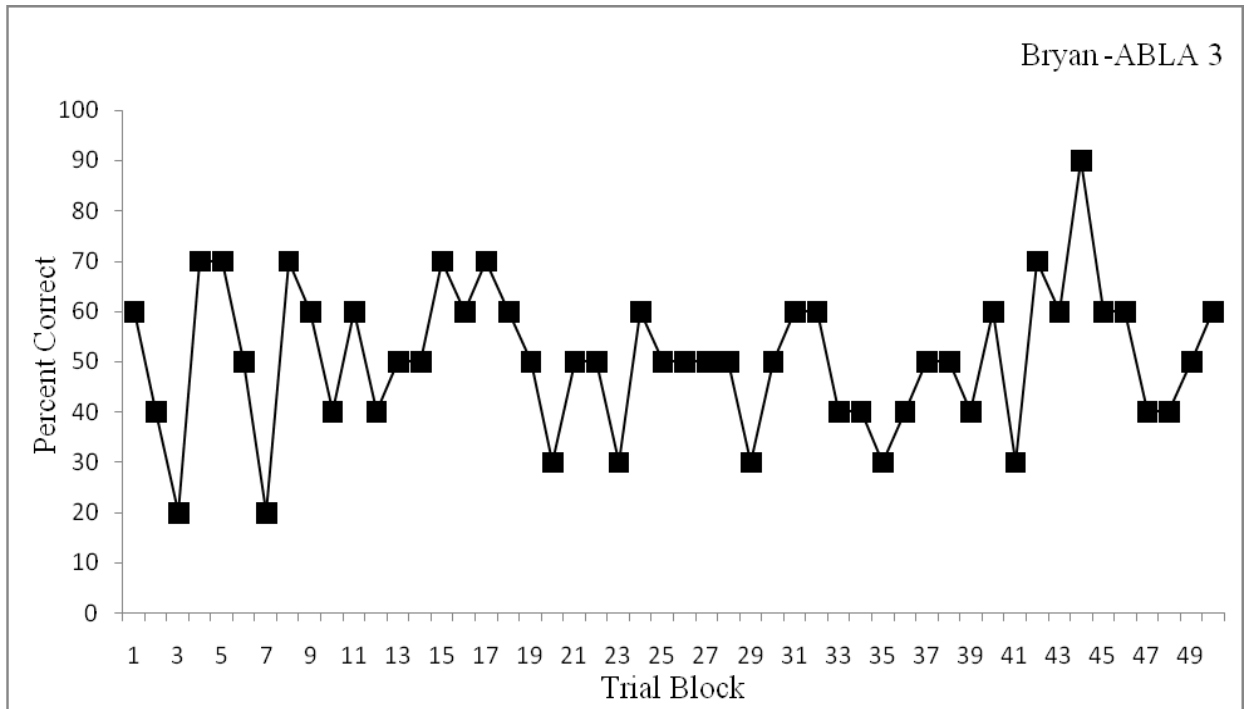


Figure 2. Bryan's performance during the conditional position discrimination teaching condition.

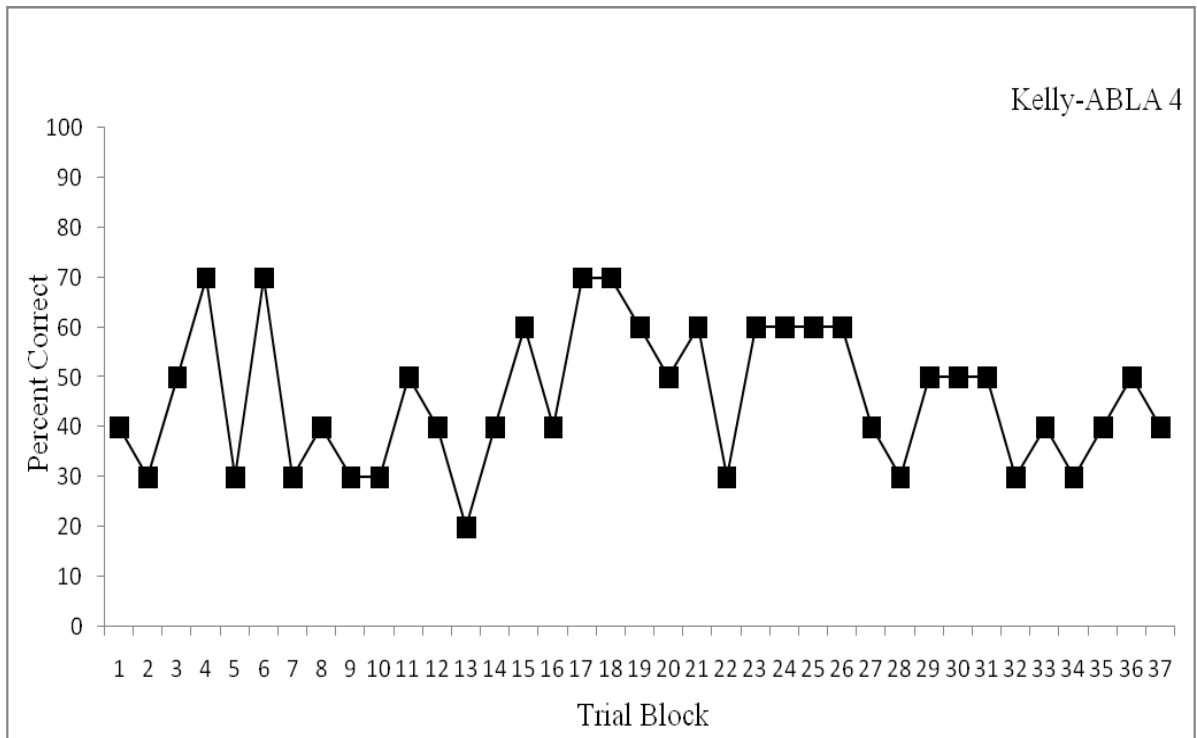


Figure 3. Kelly's performance during the conditional position discrimination teaching condition.

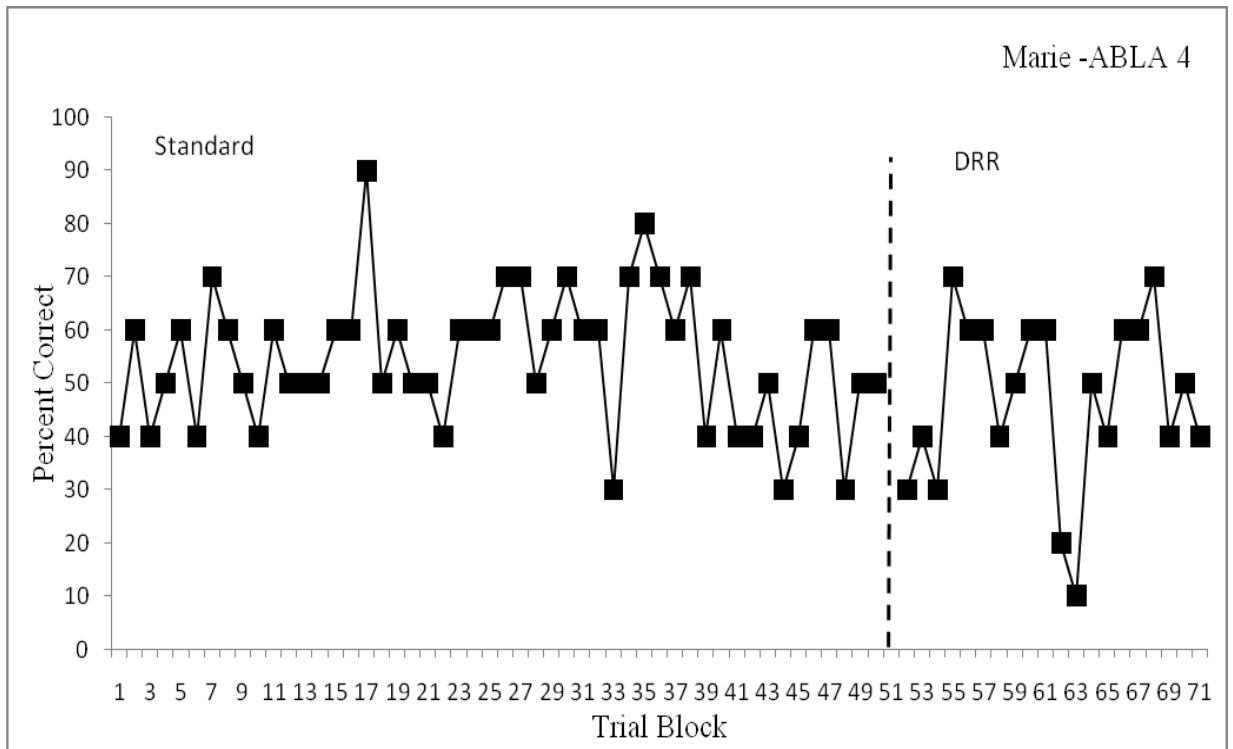


Figure 4. Marie's performance during the conditional position discrimination teaching condition.

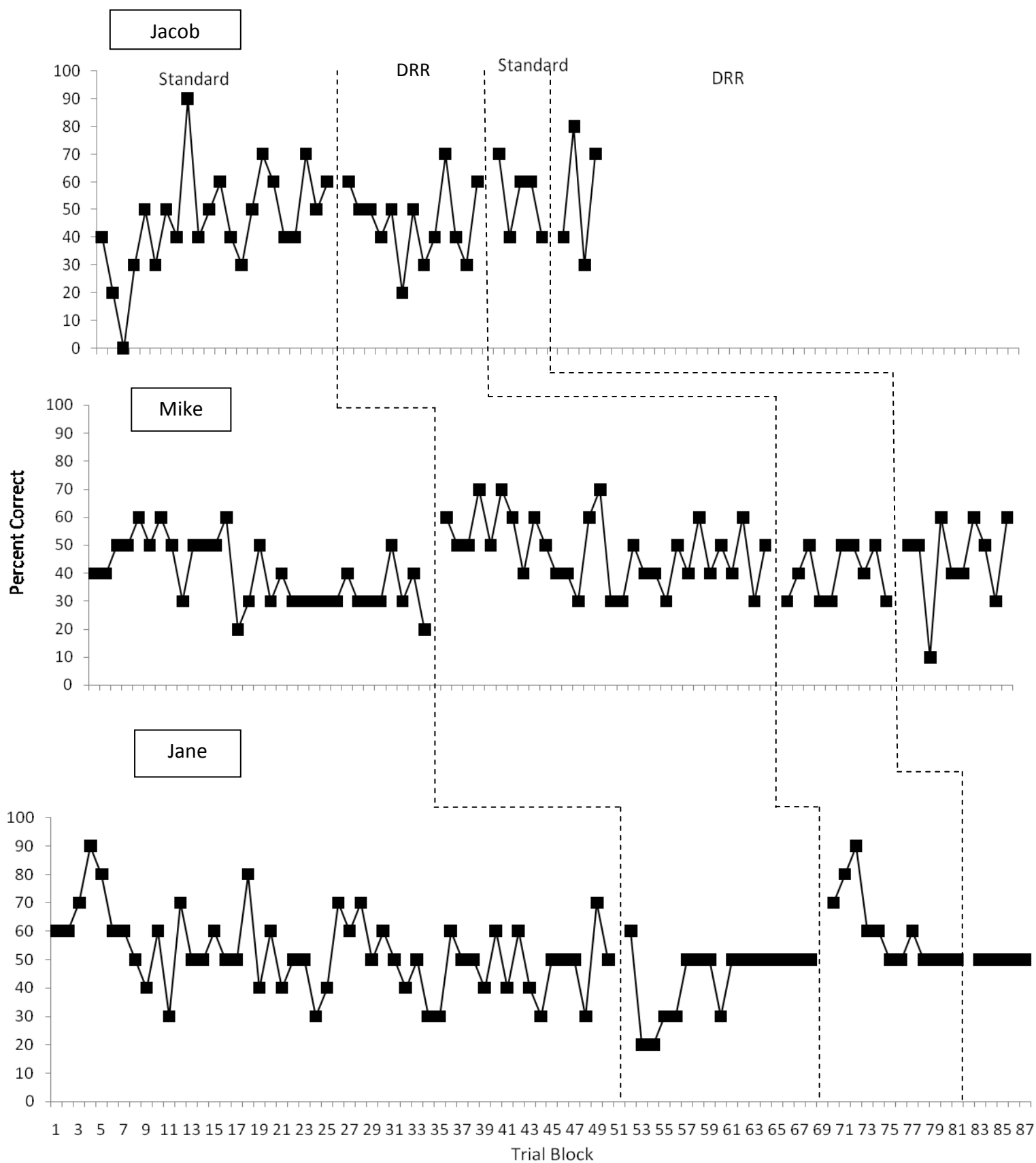


Figure 5. Performance during conditional position discrimination teaching condition for participants at ABLA level 6.

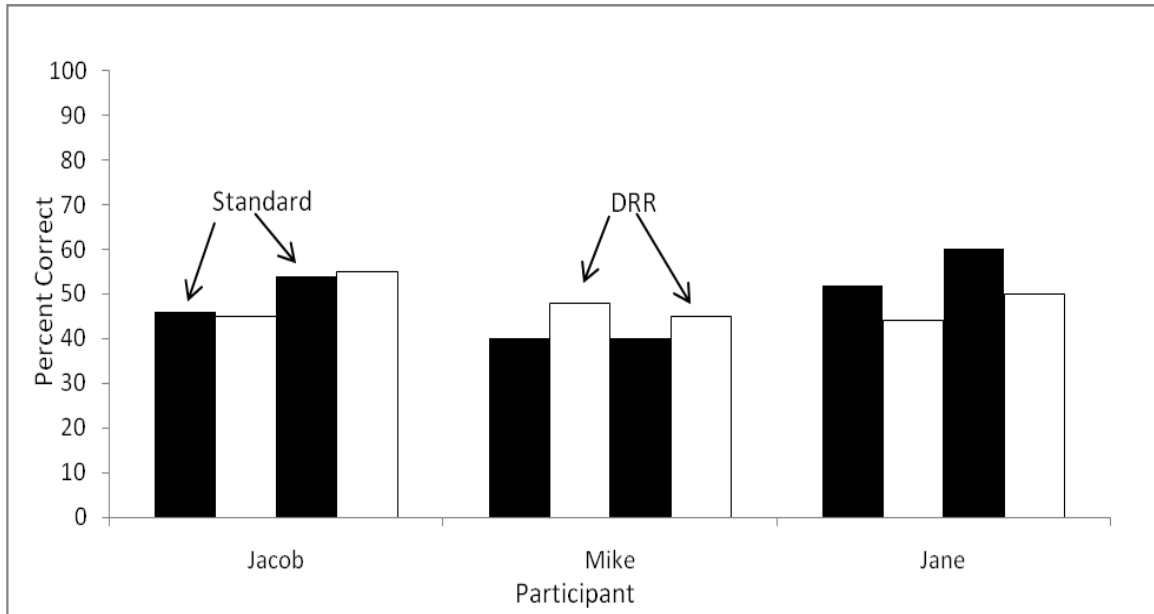


Figure 6. Mean score of each phase of conditional position discrimination teaching for Jacob, Mike, and Jane.