

EVALUATION OF A VERBAL BEHAVIOR ANALYSIS PROGRAM FOR A  
PRE-SCHOOL AGED CHILD WITH AUTISM

by  
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### Abstract

Verbal behavior analysis (VBA) has been found to improve the receptive and expressive language skills of children with autism (Dawson et al., 2010). The purpose of this study is to further evaluate VBA and its ability to develop language skills of children with Autism. To do so, researchers partnered with a VBA program in eastern North Carolina that is designed for preschool-aged children with a diagnosis on the autism spectrum. The study participant was a three-year-old male who had been diagnosed with autism and was enrolled in the VBA program. Researchers were provided with the child's performance data and evaluated three language goals: (1) ability to echo, (2) ability to complete fill-in statements, (3) ability to complete intraverbal exchanges. Overall, it was found that the child, who initially had little to no verbal abilities, had achieved mastery of his echoic and fill-in goals and is on track for reaching mastery of the intraverbal goals. Researchers concluded that the VBA program has effectively developed the language skills of this child with autism.

Evaluation of a Verbal Behavior Analysis Program for Pre-School  
Aged Children with Autism

In the United States, current estimates from the Center for Disease Control (CDC) indicate that one in 68 children have been diagnosed with autism (Center for Disease Control and Prevention, 2014). This disorder is characterized by a lack of communication skills, failure to reciprocate in social interactions, intellectual disability, and prevalence of stereotyped and repetitive behavior (American Psychiatric Association, 2013).

Language is an essential aspect of learning; however, language development is also a known deficit associated with autism spectrum disorder (ASD) (Boucher, 2003). In fact, research has indicated that 20-50% of children with autism do not develop speech (Lord, Risi, & Pickles, 2004). Therefore, many early intervention programs prioritize developing verbal skills to reduce this learning barrier caused by language deficits. Therefore, this study intended to evaluate an applied behavior analysis program to examine the effectiveness of their intervention techniques on improving children with autism's language skills.

### **Literature Review**

While there are various approaches to early intervention, literature over the last half century has consistently found that applied Behavior analysis (ABA) has several positive outcomes and can improve the outcomes of children with autism.

O. Ivar Lovaas, the pioneer of ABA, spent his career researching this approach to early intervention and has been described as one of the most influential researchers within the field of autism (Ozerk, Dalby, Eikeseth, & Ozerk, 2016). One particular study conducted by Lovaas examined the impact of behavior therapy on 20 children with

autism who were identified as severely disturbed. This study concluded that behavior therapy resulted in an increase in appropriate behaviors (speech, play, and social non-verbal behaviors) and a reduction of inappropriate behaviors (self-stimulation and echolalia). The study also found that after eight months of treatment, spontaneous social interactions and use of language increased. Every participant also experienced some form of improvement but level of improvement varied (Lovaas, Koegel, Simmons, & Long, 1973). A second study by Lovaas found that children who had been exposed to early behavioral intervention for 40 hours a week had a significantly higher IQ than their counterparts, who had only 10 hours a week, and almost half could be mainstreamed into regular classrooms (1987).

A more recent study found similar results using the Early Start Denver model (ESDM), an intervention for children with autism based in ABA theories. The study compared two randomly assigned groups. The first group was given twenty hours a week of ESDM therapy, received yearly assessment, parental training of ESDM therapy, and any community interventions chosen by the parents. The second group was given typical intervention techniques that included yearly assessments with intervention recommendations and referrals to community providers. After two years, these groups were compared and the ESDM group was found to have higher cognitive abilities and greater development of receptive and expressive language. Researchers also found the ESDM and typical groups to have similar levels in adaptive behavior after one year. However, after two years the ESDM group maintained their adaptive behavior abilities while the typical intervention group showed a decline (Dawson et al., 2010).

### **Applied Behavior Analysis to Verbal Behavior Analysis**

As seen above, the work of Lovaas and other applied behavior analysts showed great potential in their intervention procedures, especially for improving language delays of children with autism. In the 1980's, applied behavior scientists began to integrate B.F. Skinner's theory of Verbal Behavior with the motivational aspects of ABA intervention. Thus, the field of verbal behavior analysis (VBA) was developed (Greer & Ross, 2008).

VBA is a subfield within ABA that identifies methods for developing functional verbal skills. The term verbal is not limited to vocal production but also includes other attempts to communicate, such as gestures and sign language (Greer & Ross, 2008). VBA uses Verbal Behavior Milestone Assessment and Placement Program (VB-Mapp) resources to examine a child's current skill level and to identify language goals (Barnes, Mellor, & Rehfeldt, 2014).

As mentioned earlier, B.F. Skinner was key in the creation of VBA. One essential aspect of Skinner's theory was his proposed definitions of verbal operants, which are categories of verbal behaviors based on their functional purpose (Ingvarsson, 2016). Examples of verbal operants include manding, tacting, intraverbal, echoics, and autoclitics.

**Manding.** The functional purpose of this verbal operant is to request and it is driven by the motivating operation. For example, a child may mand for a specific toy or food they have been deprived of (Ingvarsson, 2016).

**Tacting.** This verbal operant could also be described as labeling. This operant requires the child to identify a nonverbal stimulus in the environment. For example, the

child states “bus” when a bus drives by. This operant is maintained by generalized reinforcement (Ingvarsson, 2016).

**Intraverbal.** Intraverbal behavior is the act of appropriately responding to antecedent prompts. For example, if prompted with “how old are you?” the correct intraverbal response would be to say your age (Dickes & Kodak, 2015). This contrast with what children with autism typically might do which is to repeat the question (echoing) instead of appropriately answering the question.

**Echoics.** Echoic goals would include the successful ability of the child to mimic sounds and words created by others in the environment. While this is one of the simplest language skills, research has shown that increasing echoic repertoire can also lead to the development of other language skills such as tacting, manding, and asking questions (Williams, Carnerero, & Perez- Gonzales, 2006). Echoic behavior is also functionally similar to intraverbal operants (Ingvarsson, 2016). Echoic skills develop the speech production that then allows a child the vocal ability to perform other verbal operants. Therefore, developing echoic abilities is an essential to acquiring other verbal operants.

**Autoclitics.** This verbal operant refers to language that influences the behavior of the listener (Ingvarsson, 2016) and modifies the effect of simpler operants on the listener (Greer & Ross, 2008). For example, a listener would seek further information if someone were to say, “I think the concert is Friday” but would not seek further information if someone were to say, “The concert is Friday.”

### **Verbal Behavior Analysis Research**

VBA has been proven effective in teaching children with autism multiple functions of language through the utilization of reinforcers (Sundberg & Michael, 2001).

One study, with participants who were younger than three years old and had been diagnosed with autism, found that participants could learn verbal behaviors through stimulus-stimulus pairing. Researchers would pair target sounds with a preferred edible item and found that this would increase the frequency of target sound production. Thus, the child was able to develop his ability to mand for objects. One child continued to have high production of target sounds even after reinforcement was removed (Miguel, Carr, & Michael, 2002).

In a second study, researchers were able to utilize VBA techniques to teach children with autism to perform the verbal operant of manding for information regarding an item's location. Researchers also found that participants were able to generalize learned verbal behaviors to untrained stimuli and in the natural environment (Sundberg, Loeb, Hale, & Eigenheer, 2002).

A third study successfully taught 3 nonverbal, pre-school aged children with autism to mand for information. This study concluded that the development of a mand repertoire was a starting point for echoic training and may also lead to tacting. Researchers also found that through the VBA intervention, negative vocal behavior decreased rapidly through reshaping vocalizations to acceptable verbal operants (Drash, High, & Tudor, 1999). Therefore, VBA interventions have been shown to positively impact the verbal proficiency of children with autism.

### **Language skills in this Study**

The language goals assessed in this study are echoic, fill-in statements, and intraverbal. Fill-in goals would require the child to accurately complete sentences in a manner that is logical and appropriate. Successful completion of this verbal skill may

require the utilization of tacting or manding. For example, a teacher could state “I want the \_\_\_\_” and the child would have to complete the statement with the item they desire (manding). A second example would include the teacher prompting with “The \_\_\_\_ wagged its tail” and the child would have to fill-in the statement with “dog” (tacting). Fill-in goals are also a building block for developing intraverbal skills.

This study evaluated a VBA program’s ability to teach the aforementioned goals. These three goals are worthy of evaluation because they require the development and utilization of multiple verbal operants. The three goals also require verbal operants to build on and interact with one another. This study is unique in that ABA and VBA interventions are individualized to the child. Therefore, this study serves as a pilot case study to examine the effectiveness of the program for this individual.

### **Methodology**

For the project, I have partnered with Behavior Consultation and Psychological Services (BCPS), a local VBA center that develops customized intervention plans for children with autism to meet their social, behavioral, and communication needs. The

### **Setting**

BCPS offers a half-day program for pre-school aged children with autism. There are currently five children enrolled in the half-day program. Each child has been evaluated using the VB-MAPP and has a defined list of goals. The teachers in the program, who are also ABA and VBA technicians, address these goals using ABA and VBA techniques in the daily activities of the program. This includes activities such as play, story, and snack time.

**Participants**

The participant of this study was a three-year-old male who was enrolled in BCPS's program. This child had no prior treatment before beginning at BCPS and treatment began before the child was officially diagnosed with autism spectrum disorder. The participant's initial evaluation indicated he was delayed in his expressive and receptive language skills, showed relative weakness in his tacting ability, and had a tendency to avoid interactions with peers. The child's mother is dedicated and implements ABA strategies in the home.

Of the five children in the classroom, this one child was selected as the participant due to his treatment goals and their relevance to verbal behavior development. They include: (1) increase echoic repertoire, (2) complete fill-in statements by supplying one, two, or three missing words, and (3) complete various intraverbal exchanges to answer a question.

**Materials**

Data for the project was entered and analyzed through Rethink Behavioral Health, an online data analysis program. This program provides educational resources and training, billing, and scheduling support. It also includes features for data entry based on evidenced-based ABA techniques. This data is then graphed to monitor progress towards treatment goals.

**Procedure**

Researchers received IRB approval before contacting the participant or reviewing any data. The participant's parents were also briefed on the project and asked to sign a

consent form. This consent form allowed researchers access to the child's records and to observe in the classroom.

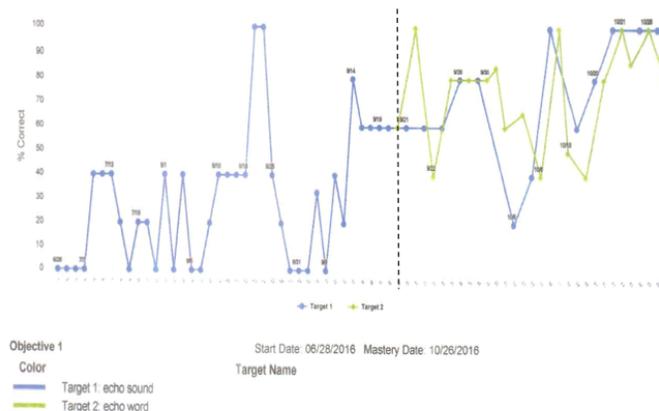
Introduction of the three goals were staggered beginning with the echo goal and then transitioning into the fill-in goal and then intraverbal goal. Baseline performance was recorded for the first two goals. BCPS staff then applied each of the interventions during the daily activities of the preschool program. Interventions occurred in one on one training sessions as well as during group activities. The participant would be prompted to perform the verbal behavior goal. If the child did so successfully, the participant was rewarded with verbal praise or a preferred food.

Results were recorded regarding the child's successful or unsuccessful completion of each verbal goal across trials. The observation recording method was frequency indicated by (+) for correct responses and (-) for incorrect responses. The data was then compiled into percent of correct responses, calculated as number of correct responses divided by the number of trials times 100. These results were then submitted to Rethink to be graphed. Researchers then analyzed these graphs to determine the effectiveness of BCPS at teaching verbal skills. Baseline logic was used to demonstrate the effectiveness of BCPS. This research method was chosen because children with autism don't learn incidentally or with maturation. Therefore, any changes in baseline performance are likely the result of intervention. Baseline logic allows researchers to make a defensible conclusion about the influence of interventions on results for single-subject studies (Riley-Tillman & Walcott, 2007). Therefore, baseline logic is a suitable research methodology for this study.

## Results

### Increase Echoic Repertoire

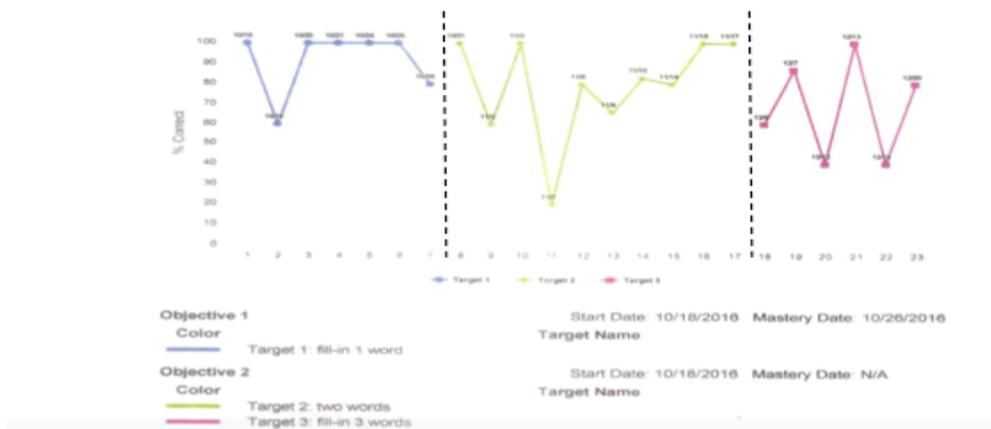
Interventions for this goal began on June 28, 2016. The first target for this goal was to develop the participant's ability to echo sounds. Baseline performance was recorded at 8% accuracy for this target. However, through the intervention, the child slowly developed this skill and has achieved mastery, which was defined as 80% accuracy for 5 trials over 4 sessions. The child performed at 29.34% accuracy for this target before the second target was started. The second target for this goal was to echo words. The participant achieved mastery of this second target in October 2016. The child's average performance for echoing sounds (after implementation of target 2) was 72.31% and average performance for echoing words was 73.61%. Mastery has been maintained.



### Fill In Goals:

Interventions for this goal began in October of 2016 and had three separate targets: to achieve the mastery of one-word, two-word, and three-word fill-ins. Baseline data is indicated by the first five data points for one-word fill-ins at 92%. The two-word fill in target was implemented on October 31 and the child achieved mastery by

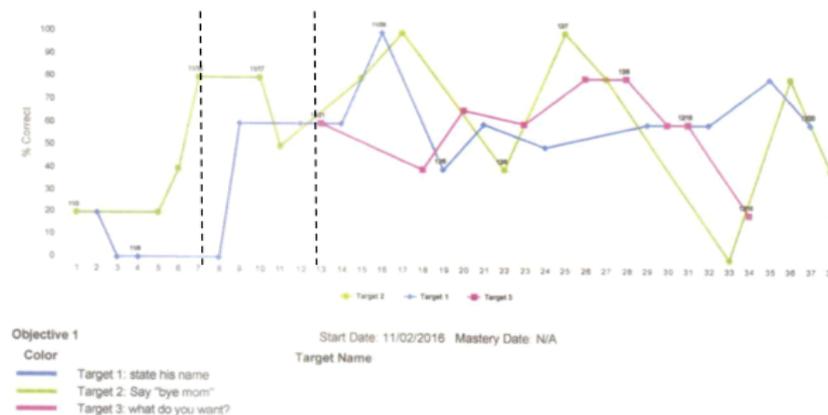
November 17 (78% average performance across 10 trials). The three-word fill in target was implemented on December 6. At the time of data collection, the child had not achieved mastery of this target but is expected to by June 2017. Current average performance is 67.5% accuracy. Mastery will be defined as 80% over 4 consecutive sessions.



### Intraverbal Goals:

This goal was implemented in November 2016. This goal has three targets for the child to achieve mastery (1) stating his name, (2) Saying “bye mom,” (3) and responding appropriately to “what do you want?” However, the child has not achieved mastery for any of these targets. While there is not true baseline for this goal, the variation in performance indicated this skill had not been developed and was challenging for the participant. This can likely be attributed to the increased difficulty associated with intraverbal exchanges and because this goal has only been implemented for two months. However, the participant has shown improvement for the first two targets. Mastery is defined as 80% over 4 consecutive sessions and it is expected that the participant will reach mastery of all three targets by June 2017.

The researcher divided the graph into three separate phases. For the first phase, the child performed at 6.67% accuracy and 40% accuracy for targets one and two respectively. In the second phase, the child's performance improved to 40% accuracy for target one and 65% accuracy for target two. In the final phase, performance for target one improved to 63.3% and maintained at 65% accuracy for target two. Target three had a performance rate of 58.33% over nine trials.



## Discussion

Researchers concluded that BCPS has effectively developed the language skills of this child with autism. This is evident through the child's extensive language development in just a six-month period (June to December). The child was initially able to echo sounds, a very basic language skill, at only eight percent. The child has now progressed to demonstrate, at times, 100 percent accuracy for intraverbal exchanges, a difficult language skill. Overall, previous research had concluded that verbal behavior analysis is an effective approach for language development, and appears to be effective for this child as well.

Researchers also want to highlight that the child's failure to reach mastery of the intraverbal exchange goal may be due to the time of data collection. The goal had only

been implemented for two months when the researcher analyzed the data. Intraverbal exchanges are a difficult skill, especially for children with autism. While they are already require a high development of language skills, it also requires they development of social interactions, which is another area of weakness for children with autism. Due to these reasons, it is possible that a two-month period was not long enough for the child to truly develop the skill. Therefore, lack of mastery may reflect the data collection timing and not the effectiveness of BCPS.

Researchers also believe it is important to note the progression of difficulty used by BCBS. The program begins with very basic language skills and slowly increasing the language goal's difficulty as mastery of lower-level skills is developed. This natural progression appears to be an effective approach for teaching language skills to children with autism.

One limitation of this study is that it is a single-subject research without an adequate design. Due to only having one participant, the results may not be indicative of the general autism population. A second limitation is that the data was not collected by the researcher but by the VBA program. Therefore, the researcher was limited in her ability to control variables.

Suggestions for future research would be to examine other VBA program and evaluate their effectiveness in teaching intraverbal skills to compare with the findings of this project. Other potential projects would be to compare the language development of a typically developing child with a child with autism or the language development of children with autism in a VBA program with children in a different type of early intervention program.

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