Increasing the Echoic Repertoire of a Child with Autism Using an Imitation and Echoic Sequence

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Increasing the Echoic Repertoire of a Child with Autism
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INCREASING THE ECHOIC REPERTOIRE OF A CHILD WITH AUTISM USING AN IMITATION AND ECHOIC SEQUENCE

A prerequisite to many things in life is the ability to communicate. Although this may mean many different things, such as verbal language, sign language, written language, and even icons, there must be some form of communication that may be utilized to get needs across. Many young children with autism spectrum disorder (ASD) are non-verbal, however there are also many children with ASD who have the ability to say words but are still not independently speaking. Reinforcing approximations to word sounds has been previously used as an effective way of increasing the child’s verbal repertoire (Shane, 2017). The present study evaluated whether Ross and Greer (2003)’s method of using imitation to build momentum and then presenting an echoic was an effective form of increasing verbal responses among a preschool-aged child diagnosed with ASD. The study is a changing-criterion design, that decreased the number of physical imitation prompts presented prior to the echoic. Prior to this study the participant had a high rate of physical imitation responses, but utilized few coherent words. He did not respond to any echoic probes during baseline. The intervention increased the participant’s frequency of echoics, resulting in an increase in spoken language.

*Key words:* autism, echoics, imitation
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**Introduction**

In order for needs to be met, people must have a mode of communication. Identifying methods to increase communication skills in children with autism is often a goal during behavior intervention. Although there are many means to increase communication, vocal-verbal language is common outside of the classroom; and therefore, if an individual shows signs that they are able to vocalize, this should be a major focus of their programming. Determining a way to increase independence in vocal language could allow for more time to be spent on acquiring other skills as well as increasing communication skills, better preparing the individual for later life.

Prior research completed describes predictors that can be used to determine whether or not an individual will be successful in a treatment used to increase vocalizations (Chenausky et al., 2018). Predictors can include babbling, echolalia, and the repetition of words, phrases or word fragments heard in the environment. The study found that there are indicators of success in regard to implementation of a verbal procedure. This research is significant due to its ability to determine when intervention will be helpful and effective. Implementing too early can cause the procedure to become aversive to the individual and can result in a waste of resources that could be spent elsewhere, as well as affect the relationship between the individual and the interventionist(s).

In addition to increasing echoic behavior, the present research aimed to increase the individual’s instances of vocalizations as well, therefore increasing the number of opportunities the client had to echo. Research regarding increasing vocalizations suggests that reinforcing successive approximations will result in an increased number of attempts at vocalization (Shane,
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2017). Shane’s research matters because procedures can be time consuming, and knowing what was successful in the past can provide evidence that the treatment is empirical.

Previous research on imitation and echoics started with gross motor imitation before presentation of the echoic, attempting to find out whether starting with imitation (a previously acquired skill) would result in behavioral momentum (Ross & Greer, 2003). This study found that creating behavioral momentum was beneficial and resulted in an increased number of correct echoic responses in more than one individual.

The present research will allow us to further support or reject the concept of behavioral momentum, and whether it is an effective way to teach echoic behavior. Everyone uses some form of communication to get their needs met, and speech is one of the more common ways to do this. Therefore, teaching speech to a child who is showing the precursors of speech (e.g., babbling, verbalizing simple words) is one of the main goals for their further schooling.

Methods

A single participant aged 3-years-old and diagnosed with ASD was selected from KRESA West Campus’s applied behavior analysis classroom. The participant was chosen due to his verbal repertoire; however, the participant had no echoic behavior skills during baseline to ensure that any performance after the intervention could be related to the intervention.

The study was performed in the classroom, as well as a playroom and a hallway where the participant and other children could play and run. The booth located inside of the classroom consisted of a table in the far corner and two chairs. Trials were run throughout the building as the participant engaged in day-to-day activities.
Catalyst, a tablet program, was used for data collection as well as a supplemental data sheet. Reinforcers included tangibles and edibles that the participant showed interest in. This included chips, toy cars, and attention.

Baseline data were collected regarding four different speech-related goals. The first goal was to teach the skill of echoing a vocal prompt, which was prompted throughout the baseline periods. When opportunities were presented, the researcher prompted the participant to repeat an echoic. Echoics were one word referring to the participant’s current reinforcer. Data were taken regarding whether the echoic was emitted correctly (response made within one presentation of the model without additional prompting), or incorrectly (no response made within three presentations), or an approximated response that did not contain the correct vowel sound(s). For the purpose of the intervention, approximations were considered correct. Additionally, baseline was taken on the frequency of coherent speech sounds. Coherent sounds were words that could be understood by an observer who had no experience with the participant. Non-coherent sounds included any sounds that could not be understood by an observer who had no experience with the participant. Baseline data were also taken on which coherent sounds were made specifically, including where they were made and when they were made. For example, if the participant said “Hello” clearly enough that an observer would understand, data would be taken on the word, the time of day, and what was going on during the instance. Lastly, data were taken based on the Early Echoic Skills Assessment (EESA) section of the Verbal Behavior Milestones Assessment & Placement Program (VB-MAPP), including which word sounds were able to be completed by the participant. This gave us an idea of the participant’s abilities and told us whether or not there were specific sounds that the participant is unable to make.
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Three sessions were included during baseline. The first of which was one and a half hours on a Monday, the second one was a half an hour long on a Tuesday, and the final one was one and a half hours long on that Wednesday. Each of the sessions were completed in the morning, during the participant’s regular hours at the school. Subsequent sessions were conducted Monday through Friday from 8:15 to 11:15 in the morning.

The intervention was a changing criterion design, where each phase involved decreasing the number of imitation targets presented before the echoic. The objective of the project was to increase correct echoics. Differential reinforcement was used to increase correct responses. Correct responses were reinforced using tangibles or an edible, based upon the motivation of the participant, and social reinforcers were contingent on the correct responses to the final echoic response. Reinforcement was also contingent on approximations of the final echoic presented, however the reinforcement included the tangible item or edible, and a less exciting social reinforcer. Incorrect responses were not reinforced, and instead an extra learning opportunity (ELO), or a previously mastered target, was presented.

The dependent variable for the present study was individual performance on an echoics procedure. Performance was based on criteria listed below.

- Correct: Response made within three presentations of the $S^D$ in full, including all vowels and consonants and no extra vowels or consonants
- Approximation: Response made within three presentations of the $S^D$, containing the correct vowel sound(s), however either incorrect consonant sounds or incorrect number of syllables
- Incorrect: No response made within three presentations, or a response that did not contain the correct vowel sound(s)
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The independent variable was the treatment used to achieve an echoic repertoire. The treatment included presentation of two gross motor imitation skills prior to the presentation of the echoic. The echoic was based upon the participant’s current motivating operation (MO). For example, if the individual was interested in playing with the toy bus (interest could be determined by reaching for the item, grabbing the item, or pointing at the item), the echoic target was for the individual to say “bus”. The five targets include bus, car, help, ball, and go.

The intervention included three phases. The first of which started with two gross motor imitation skills before the presentation of an echoic. The second phase included only one gross motor imitation skill before the presentation of an echoic. The final phase included only the presentation of the echoic, without gross motor imitation skills. Mastery criterion required three sequential days performing at least 80% or higher in correct or approximate responding.

Results

The hypothesis for the present research stated that implementation of an imitation procedure preceding the presentation of an echoic would increase the individual’s independence in echoic speech. Intervention was initiated in order to increase the number of words the individual could emit independently. Increasing echoics would increase the total number of coherent words, which is important because being understood is vital to having your needs met. Echoic skills equip the individual with a way to learn more words, effectively increasing the number of things the individual can ask for. The intervention was successful in increasing correct single-word echoics.

During baseline the individual correctly responded to echoic targets during 0% of the presented opportunities, and was able to reach mastery of the procedure within 35 sessions (Figure 1). Prior to implementation of the procedure the individual engaged in spontaneous
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speech sounds approximately 13 times per five minutes at about 20% coherent, and at the end of the procedure the individual engaged in spontaneous speech about 40 times per five minutes, however the percentage of coherent speech stayed relatively the same (Figure 2). Utilizing the first two sections of the EESA, the individual correctly responded to 0 of the targets before the procedure was implemented, however received a 19.5 out of 50 possible points after mastery of the procedure.

Prior to beginning the intervention, the individual had a number of one syllable and two syllable words in his repertoire, however he did not have vocal manding, tacting or echoing in his repertoire. He also had gross motor imitation skills prior to the implementation of this study. Upon completion of the study, the individual was able to respond correctly to single-syllable echoic stimuli without the presentation of gross motor skills prior to the presentation of the echoic. Upon completion of the study, the participant was responding correctly or approximating during 100% of the trials presented.
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**Figure 1:** The figure above depicts the results of the echoics intervention. The session number is depicted on the X-axis and the percentage of correct responses, including approximations, is depicted on the Y-axis.

**Figure 2:** The above figure depicts the frequency of spontaneous speech sounds per five minutes on the right hand axis, as well as the percentage of coherent speech sounds on the left hand axis.
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Discussion

The hypothesis for the present research states an imitation procedure preceding the presentation of an echoic will increase the individual’s echoic speech. The hypothesis was supported, as seen through the increased rate of echoic responses following the implementation of the procedure.

Overall findings of the present research suggest that the implementation of an imitation procedure prior to the presentation of an echoic target is an effective way to gain instructional control over echoics. After beginning the study, targets were adjusted to ensure only five single-syllable words were presented in order to maximize the amount of time spent on those specific targets. Targets were selected based on the individual’s interest in those items. The targets selected included car, bus, ball, help and go. Adding more targets could have taken away from the amount of time that was available for other procedures and for these specific targets being mastered.

Previous research is similar in its findings that behavioral momentum is an effective method of teaching echoics (Ross & Greer, 2003). The research done by Ross and Greer in 2003 was completed with an older age group than the individual in my research and included individuals who had more experience in the classroom, whereas the individual in my research had only recently entered the classroom a few months prior. The present research supported the previous research, as seen by the increase in correct and approximate responding from the individual.

The replications of this research provide further evidence that the treatment originally performed by Ross and Greer is an effective and reliable method of increasing echoic behavior in a non-verbal child diagnosed with ASD. The study helps to focus on younger age groups.
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Possible limitations include the sample size of a single individual and having many technicians who were potentially running the procedure differently, despite the fact that utilizing multiple technicians increases the likelihood of the skill generalizing across technicians. Due to the large number of technicians running this procedure, there was potential for the study to be run differently between individuals and differently from the written procedure. The primary researcher was only available for a limited amount of time, and therefore did not have the ability to observe all the sessions that were occurring in order to ensure treatment integrity. The primary researcher did mitigate the effects by observing the daily data between technicians to ensure that data derived was similar between technicians and did not fluctuate rapidly. When this did occur, the primary researcher observed and retrained technicians as necessary.

A confounding variable that may have created a change in the study was that the individual had just begun working with the researcher at the time of baseline. Prior to running baseline, the researcher had assessed and paired with the individual in order to ensure that there was a relationship established before starting the study. Despite that, there may have been an increase in echoics without the implementation of the study, due to an increased amount of instructional control.

Limitations in this research often have to do with the setting. KRESA is able to provide a setting unique to other research because it allows for multiple locations throughout the school to be utilized for implementation of the treatment as well as completing this in a one on one setting. Having multiple technicians also helps to ensure that the skill is not only under the stimulus control of one technician and can therefore be utilized outside of the classroom by other individuals, such as the caregivers of the individual. One of the goals of this intervention is to increase the individual’s echoics at home, so it is important that the skill is generalized outside of
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the classroom setting. This study could provide further information regarding the implementation and uses of behavioral momentum-based interventions.

A limitation of this study is that there was another procedure that was implemented concurrently with the present research that involved saying “yes” or “no” as appropriate to request an item. This resulted in the individual responding to echoic prompting with “yes”. Upon observing this, the primary researcher ensured that all technicians were requiring that the SD include “say” for the echoics procedure and exclude “say” as part of the SD for the yes/no procedure. Future research may consider limiting verbal prompts to one procedure at a time, ensuring that scrolling will be limited in its effect on the procedure.

Another limitation that was seen during the present research regarded the number of hours that were available for the research. The individual received more than one intervention, resulting in limited time available for the echoics intervention to be implemented. Future research could be conducted with an individual with only one procedure, or with very few procedures allowing for more time to be spent on implementation of this specific procedure.

The final limitation that may have affected the research was the absence of the individual for two weeks following baseline. This limited the number of hours that were spent implementing the research, and when the individual did return the number of technicians that were available to work with this individual one-on-one had decreased, in order to accommodate changes in the classroom. Increasing future sample size may be beneficial in minimizing the effects seen by low attendance. In-home intervention may be beneficial because absences due to transportation and familial factors can be limited.

The individual often arrived at school with a pacifier, which limited the individual’s ability to perform echoics. Prior to the intervention, “my turn” could be mastered to ensure the
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individual is able to take out the pacifier. Additionally, individuals could be selected with the prerequisite of not using a pacifier or taking the pacifier out prior to scheduled intervention time.

The findings help to identify ways to teach echoics as a skill, which allows us to teach language more effectively. This allows the field to support the idea of behavioral momentum and may help save time figuring out effective ways to teach echoics.

Possible research for the future includes increasing the number of individuals that take place in the study, as well as assessing whether the same effects will be seen among individuals of different ages. Replications can be done with similar skills that focus on behavioral momentum. Replications are also suggested to focus on utilizing alternative skills prior to the presentation of the echoic, rather than utilizing the gross motor imitation skills. Suggested skills include direction following, tacting, or matching skills. These skills are all seen as common targets in early intervention.
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References


