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Simple Visual Discrimination Training for a Child with Autism and Exceptional Learning Difficulties

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Learning Difficulties

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Abstract

One of the most basic pre-requisite skills for learning is simple visual discrimination. Unfortunately, the literature is lacking in how to teach simple visual discrimination to children with difficulty learning. To address this problem, the current study set out to teach a child with autism, and exceptional learning difficulty, simple visual discrimination. To do this, the researchers used a simple reversal design using a prompt fading strategy. To shape the independent behavior of selecting the correct stimulus in the presence of two other stimuli, the researchers started by reinforcing touching the stimuli when there were no other distractor stimuli present, phase one, and once mastery was reached, adding in a distractor stimulus (phase two). Once mastery criteria was reached for phase two, the third distracter stimulus was added (phase three). Next, the correct stimulus was switched to each of the other stimuli to help achieve generalization of the discrimination skills. The results of this study were positive, with the child mastering the procedure for each of the stimuli in between 43 and 46 sessions. This study expands the literature on effectively teaching children with Autism and exceptional learning difficulties discrimination.

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Learning Difficulties

Simple discrimination is a prerequisite skill that is necessary for many of the skills we use in day-to-day life, and without which will subsequently lead to further struggles in education and a diminished quality of life. Unfortunately, "many individuals with autism and related disorders do not learn such skills readily from exposure to typical teaching procedures", and thus require specific extra training (Green, 2012). Trial and error training can cause an increase in problem behavior, and is often proved ineffective for children who have such exceptional learning difficulties. Gina Green has done substantial research on how best to help children overcome these issues, and teach them conditional discrimination. She recommends having the learner match by pointing, and avoiding having them match by putting same with same to avoid creating extraneous stimuli control of the behavior (Green, 2012). Additionally, Gina Green recommends using at least three comparison stimuli that are consistent throughout a block of trials (2001).

Other research has shown that, in order for learners to learn matching, simple visual discrimination components must be taught first (Saunders & Spradlin, 1993). Saunders et. al. conducted three studies on the best way to teach conditional matching, and found that only with such component training did their subjects acquire conditional discrimination (1993). This study was a replication of previous research by Saunders and Spradlin, which similarly found that only after training each individual relation did the

subjects acquire the target skill and were able to generalize that skill to novel stimuli (1989).

Currently there is a lack of general knowledge on how to most effectively train complex conditional discriminations in students with autism and exceptional learning difficulty. The goal of this study was to further investigate the most effective ways of teaching simple visual discrimination to a student whom ineffective instructional methods have led to difficulties and delays in the acquisition of these skills, based on the methods of Dr. Gina Green and Saunders and Spradlin. This research will also further the literature and provide new tools for practitioners struggling to get their learners to acquire these necessary skills.

Method

Design

This study was conducted using a reversal design; the rationale being that the learner needs to be able to generalize simple discrimination skills before attempting to acquire the more complex discrimination skills such as identity matching and arbitrary matching.

Independent Variable

The independent variable (IV) in this procedure was whether or not the learner had been exposed to each shape as the designated discriminative stimulus for reinforcement (S^+).

Dependent Variable

The dependent variable (DV) was the number of correct trials out of ten per session during phase one, and twelve per session during phases two and three. A response

was considered correct if the student oriented herself to the stimulus, and then touched the correct stimulus. For example, if the designated discriminative stimulus for reinforcement (S^+) was the circle, the correct response would be looking at and touching the circle. An incorrect response for the circle S^+ would be touching the circle, but not orienting to it within ten seconds, or orienting to and touching a different stimulus shape like the triangle.

Participant

The participant for this study was a four-year-old female student, Jasmine*, with an Autism Spectrum Disorder. Jasmine was selected for this intervention because she was struggling to progress through the early-childhood curriculum and had shown exceptional difficulty in matching-to-sample tasks. Jasmine was chosen because this intervention would benefit children with these attributes most significantly.

Settings and Materials

In this study only one set of materials was used. The set contained three different shapes, a square, circle, and a triangle, all approximately four inches in diameter. These shapes were made of black foam, and affixed with Velcro to a rectangular white foam board, approximately 6 inches in height and 18 inches in width.

This study took place in an early education classroom at the WoodsEdge Learning Center in Kalamazoo, Michigan. This classroom is divided into booths using moveable walls, approximately four feet tall. The booths contain a small table and two chairs. For the purpose of this study only one chair was used with the table. All materials not used in the procedure, such as the extra chair, were removed from the booth and placed out of sight of the learner.

Procedure

This study was run five days a week for approximately 30 minutes a day, and consisted of two separate segments. During the session, the prompter sat directly behind the learner, while the instructor placed in front of her a board with three shapes on it (a square, circle, and triangle). The student was then prompted to touch the designated S^+, whose position changed every trial to avoid training side bias. The prompting protocol was a form of errorless learning with five levels of prompting. The first level (1A) was hand over hand, followed by hand over wrist (1B), the third level (1C) was hand over forearm, and the fourth (1D) was hand behind the upper arm. The final level of this prompting strategy (1E) was independent responding. For prompting levels 1A-1D, the criterion for moving to the next level was 10 correct trials out of ten, or 100%. If the learner made an error and scored below criterion, the session was immediately terminated, and prompting level was returned to the previous level, with the exception of the independent responses. For level 1E, the learner was allowed to make two errors during the first two trials, though any incorrect two responses in a row or three overall incorrect trials after these initial two trials were cause for termination of the session. Correct responses were immediately reinforced with an edible; incorrect responses were followed by the removal of all materials. Data were taken on a pre-made data sheet with nine separate session charts (see appendix A). Each separate session chart had three columns, one for trial number, S^+ position, and whether a correct or incorrect response was made; and the chart had 10 rows, one for each trial (Appendix). During the independent level, criteria for mastery was three consecutive sessions at 90% or higher. After the learner had mastered a shape, the experimenters began training one of the other

shapes in the same way. The progression of shapes was square, triangle, and finally the circle. For the first shape, the experimenters started with only the S^+ and no distracter stimuli (the other shapes), then once the learner mastered this (phase 1), a single distractor stimulus was added (phase 2), and finally, once the student could discriminate between the two stimuli at mastery criteria, the third and final distractor (phase 3) was added to the board. This training was only done for the initial training shape, not for the reversals. Once mastery criteria were reached, the learner moved on to work on another project.

Results

This experiment aimed to determine how behavioral therapists can best teach simple visual discrimination to learners with autism and exceptional difficulty learning. The experimenters found that the method used was successful in teaching simple visual discrimination. When training the first shape, the square, it took 44 sessions to achieve mastery criteria. She achieved 100%, 90%, and 90% during her last three sessions, with an average of 8.7 correct responses per session. For the second shape, the triangle, it took 45 sessions to achieve mastery criteria at 90%, 100%, and 90% in the last three trials. The average number of correct responses per session for this reversal was 7.1. The final reversal was the circle, which took 43 sessions to master, with the final three sessions scoring a 90%, 90 %, and respectively 100%. This reversal averaged 6.9 correct responses per session.

Figure 1 shows the session data for the initial training of the square. Each vertical line represents a phase change where the prompting level changed, and is labeled by the corresponding prompt levels letter, A, B, C, D or E. In addition to the letter, the number

in each phase corresponds to the initial distractor stimuli phase. Figure 2 shows the data

for the first reversal, with the Triangle as the designated S^+. The lines indicate a change in

prompting level, which correspond with the designated letter of the prompt hierarchy.

Figure 3 is the data from the final reversal, using the circle as the S^+, with the lines again

showing the changes in prompt level corresponding to the letter of the prompt hierarchy.
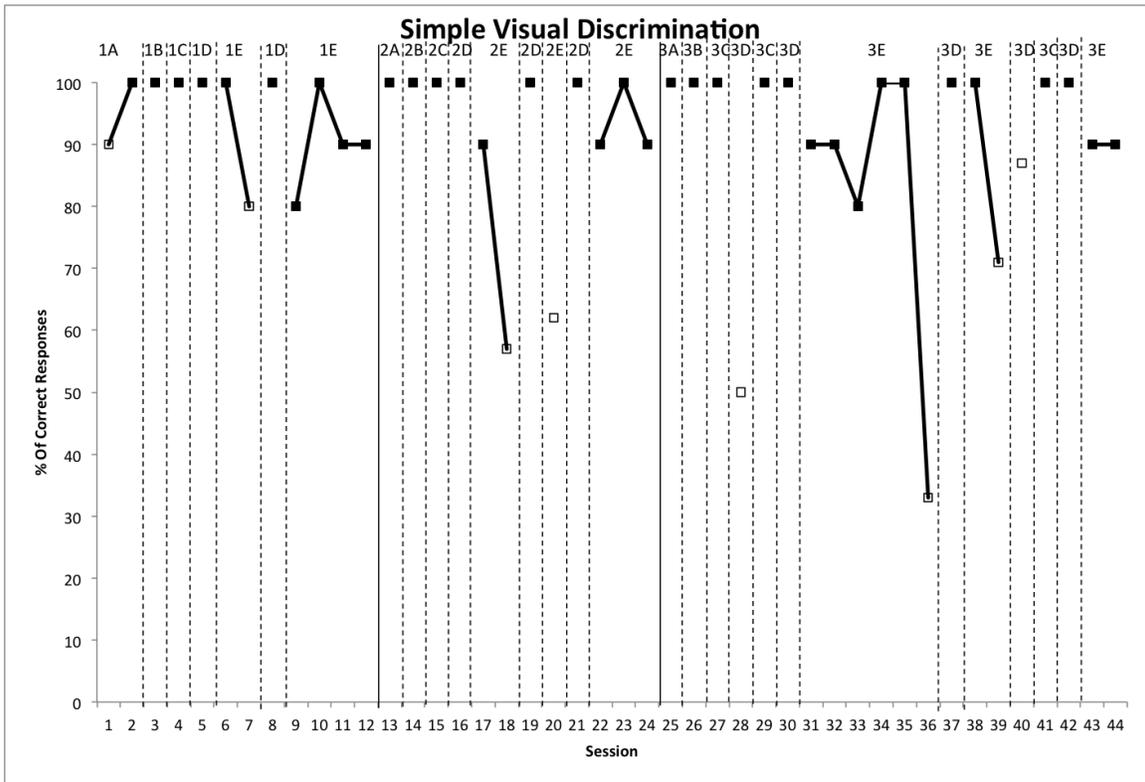
Legend: ■ =Completed Session   □ =Terminated Session

Figure 1
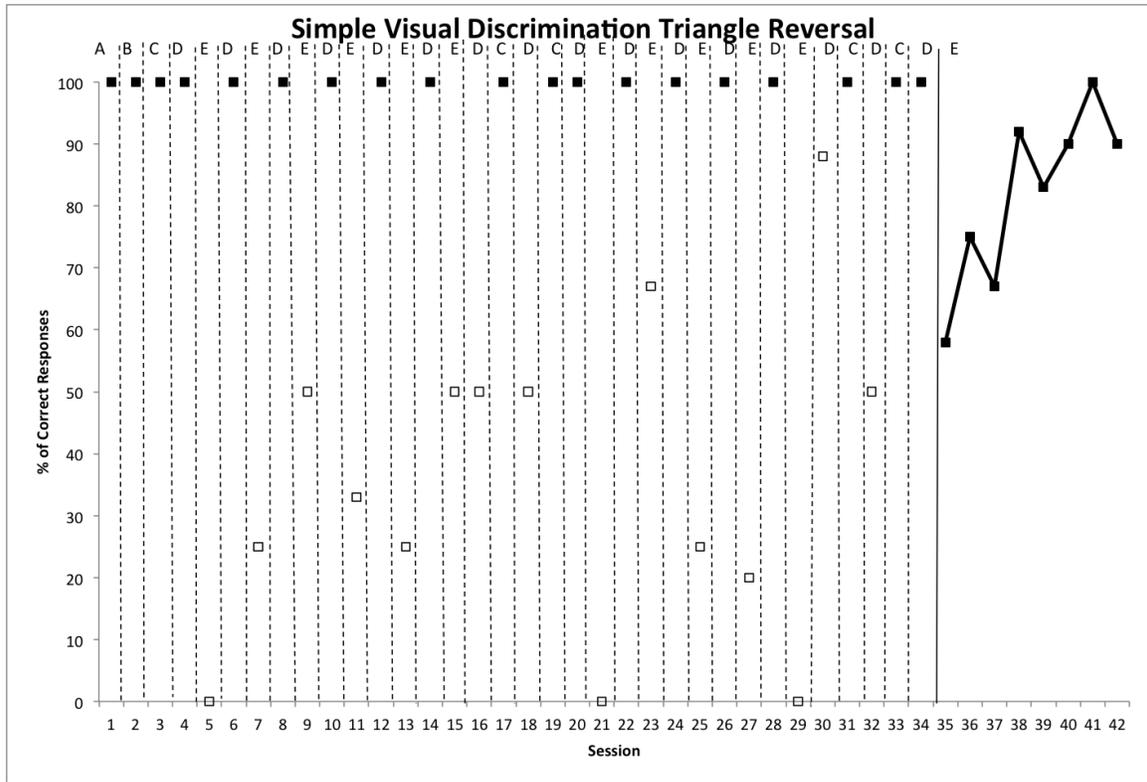
Legend: ■ =Completed Session   □ =Terminated Session

Figure 2
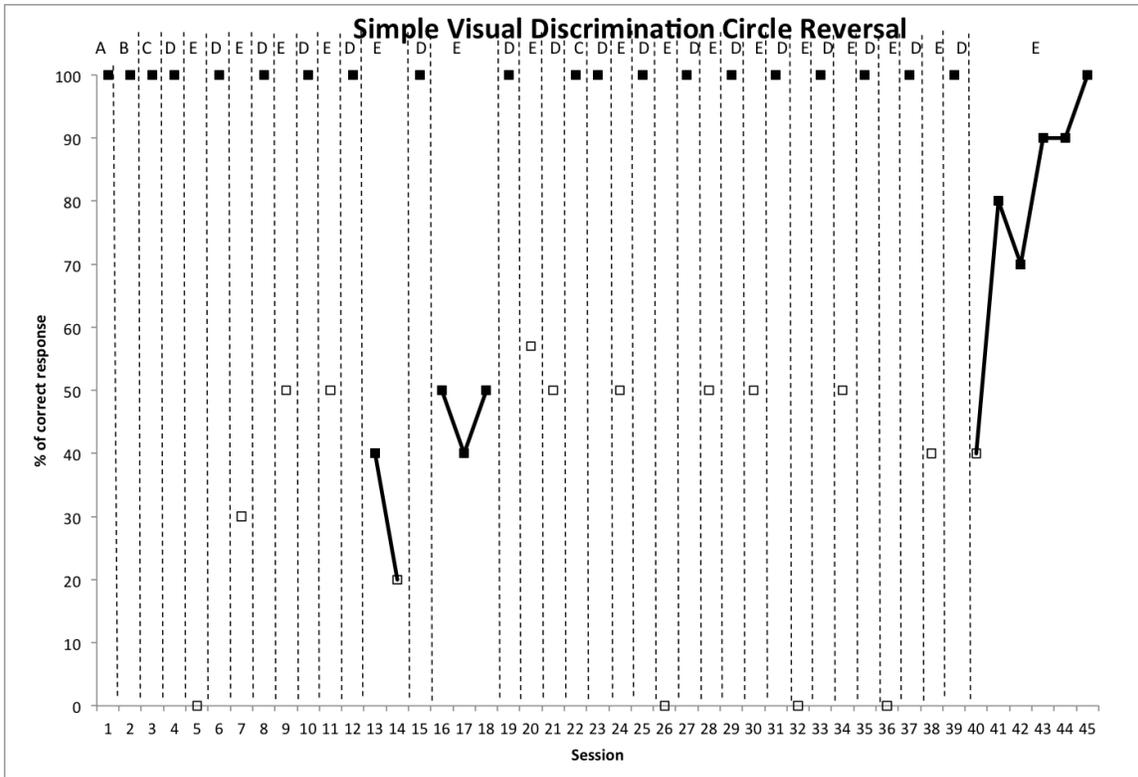
Legend: ■ =Completed Session   □ =Terminated Session

Figure 3

Discussion

The participant, Jasmine, was able to acquire simple visual discrimination, as well as successfully transfer stimulus control to various shapes. Given that instructors were unable to teach this skill with typical matching-to-sample procedures the researchers have concluded that the errorless learning procedure was imperative to the success of this teaching skill. During the reversal phases, the experimenters found it necessary to switch to the trial and error method for the last 6-8 trials. The reasoning behind this was that the learner was failing to contact the contingencies of reinforcement enough for them to influence her behavior.

While this experiment is considered successful, there are some limitations in the design. Though the reversal design demonstrates good experimental control, having a multiple baseline across participants would strengthen the evidence for use of this procedure. A possible confound also comes from the student's schedule. Approximately once a week Jasmine was taken to occupational therapy, and once a month she was taken to speech therapy. During both of these therapies, edibles were used which may have caused variance in motivation, affecting the data. Another drawback to this research is the lack of data on typical teaching procedures used before this intervention, as well as follow-up data on how the acquisition of this skill affected performance on the students other procedures.

This research is pivotal to the field of applied behavior analysis. The literature on helping children with autism and exceptional learning difficulty is lacking, especially when it comes to teaching discrimination skills. This study expands the base from which researchers and practitioners can draw to better help the learners. Future research should examine generalization to novel stimuli, as well as training other forms of discrimination such as tactile or auditory discrimination. Above all, future research should look at replicating this study and disseminating effective teaching methods for all learners across the field of applied behavior analysis.

Appendices

Appendix A: Intervention Data Sheet

Visual Discrimination

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Date_____
Session _____ Phase _____

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