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Using LED Lights as Prompts to Teach Receptive Identification to Preschool Children with Autism

Allison Pavlicek
Western Michigan University

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Using LED Lights as Prompts to Teach Receptive Identification to Preschool Children with Autism

Stephanie M. Peterson
Principal Investigator

Allison Pavlicek
Student Investigator

Nicole Henriksen
Student Investigator

Protocol for
Human Subjects Institutional Review Board Application
Western Michigan University
**ABSTRACT**

The purpose of the study “Using LED Lights as Prompts to Teach Receptive Identification to Preschool Children with Autism” is to implement a different prompting procedure than traditional least-to-most prompting procedures in teaching. One prompting procedure commonly used in discrete trial training classrooms involves least-to-most prompting in the form of gestural and physical prompts to guide children to make correct responses during teaching procedures. To specifically teach receptive identification skills, an apparatus with LED lights will be used as a prompting device to vary light intensities on stimuli that the child will choose from. This alternate method of prompting may enable children to acquire the skill to discriminate between stimuli in less time and with more accuracy than the traditional prompting procedure. The LED lights will spotlight the stimuli presented and fade in stages, ranging from all stimuli illuminated to one stimulus illuminated, depending on the number of prompts needed to reduce attention paid to extraneous elements in the environment. A multiple baseline design will be implemented with a preschool child with autism to see the effects of using this LED lighting as a prompt to teach the receptive identification skill. In each baseline phase, the task will be presented to the child; however no prompting will occur and only correct responses will result in reinforcement. Baseline data will be assessed against the intervention data to observe any changes in incorrect or correct responses. Data will be analyzed by reviewing videotapes of the sessions and recording the number of correct and incorrect responses made by the child, along with the specific object stated by the tutor. With the LED apparatus being used to prompt the child, this data will track the child’s progress in learning to identify target objects in the receptive identification procedure.

**PURPOSE / BACKGROUND INFORMATION**

Autism is a developmental disability that is becoming more prevalent in recent years (Russel, Ford, Steer, & Golding, 2010) According to Bailey, Phillips, and Rutter, “autistic spectrum disorders are conceptualised as consisting of a triad of impairments in social interactions and communication, as well as restricted interests and repetitive behaviour” (as cited in Russel, et. al., 2006, p. 643). Statistics state that one to four individuals out of 1000 have autism (Baird, et. al., 2006). Autism diagnoses are classified on a spectrum, ranging from mild to severe, and individuals can benefit most from early intervention. Early intervention has been found to be most effective if begun soon after diagnosis, typically at around three to four years old (Matson, Wilkins, & Gonzalez, 2008). In accordance with these findings, discrete trial training is a treatment for autism, which provides direct evidence of progress for the individual (Hayward, Eikeseth, Gale, & Morgan, 2009). Applied behavior analysis and discrete trial training can be implemented with preschoolers; therefore, it also follows with the early intervention guidelines. The behavioral techniques in discrete trial training are used in classrooms with children with autism in preschool settings in order to decrease problem behaviors and to increase learning of typical skills and behaviors (Green, 2001).

Green (2001) states that having the ability to discriminate between objects and match objects contributes to other key tasks involving communication, social skills, and other areas. According to Principles of Behavior, the occurrence of a response more frequently in the presence of one stimulus than in the presence of others is called stimulus control, which usually occurs as a result of a discrimination training procedure (Malott, 2007). Procedures involving
stimulus control include: oral naming, following instructions, and matching. Matching varies in type, as well, such as identity matching under specified circumstances, object-picture matching, picture exchange communication, and receptive identification. The following study will focus primarily on gaining stimulus control with a receptive identification procedure. Receptive identification involves a stimulus being stated verbally, in which the child must then select the correct stimulus from an array of objects presented in front of him or her (Green, 2001).

In some discrete trial training procedures, such as the previously mentioned receptive identification procedure, a least-to-most prompting method can be implemented by the child’s tutor in order to prompt correct responses. Green describes these prompts as extra-stimulus prompts because they include gestural and physical movement from the tutor to initiate correct responding by the child (2001). For example, a child’s first incorrect response would require the tutor to point to the correct stimulus among the three presented. A second consecutive incorrect response of the same stimulus would require the tutor to provide a partial physical prompt for the child to touch the correct stimulus. The final prompt would be a full physical prompt to touch the correct stimulus.

With least-to-most prompting widely used in discrete trial training classrooms, it still does not provide every child with autism with the ability to master the skill at a quick rate. For those children who do not learn receptive identification within a time period specified by the child’s teacher, alternate methods of teaching and prompting may be used. The following study will focus on a method using LED lights. These lights emit bright light more than ordinary incandescent light bulbs and can be dimmed quickly in comparison (Muthu, Schuurmans, & Pashley, 2002). The study will compare the effectiveness of LED lights used to bring attention to the stimuli being presented in the receptive identification procedure against the running of the procedure without the lights. This prompting method would most likely work best for those children who struggle with the skill because of an inability to focus on the teaching stimuli, perhaps because of distractions and extraneous stimuli irrelevant to the task.

In a dimmed room, a person would direct his or her attention to any light source presented. Based on this intuitive conclusion, the LED lighting should serve the same purpose to direct attention to instructional stimuli for a child with autism.

The LED lights used in the study will serve as prompts with a lesser prompt being presented first and more direct prompts thereafter, which is comparable to traditional prompts in discrete trial training. The levels of the prompting differ; however, the purpose will be the same: to give the least amount of guidance necessary to teach the skill and then provide less and less of this guidance with time. Analyzing the data from trials of the receptive identification procedure will indicate whether LED light prompting can produce this result.

PARTICIPANT RECRUITMENT

The participant in this study will be between three and five years old and will have had difficulty in successfully completing receptive identification tasks as identified by his/her teacher. He or she must have a diagnosis along the autism spectrum and be currently attending a preschool with a discrete trial training focus in order to be eligible. One participant will be sought out for the study; however, up to five participants will be recruited. A letter (see Appendix 1) will be given to selected students’ parents or guardians after the staff has confirmed that the children meet the established criteria and after the parents’ or guardians’ permission has
been granted to release identifying information to the investigators. Priority will be given to prompt replies received by the deadline given on the letter.

Parents or guardians of potential participants can contact the student investigator by the phone number or email provided in the recruitment letter in order to express their interest for their child’s participation in the study, to receive further information, and to set up an optional visit in which the LED apparatus can be shown at the school setting and its use can be fully explained.

INFORMED CONSENT

An informed consent form will be required for participation in the study. An HSIRB approved informed consent form (see Appendix 2) will be sent out to the parents or guardians after the initial phone call or given to the parents during the optional apparatus viewing, based on which they prefer. The consent form will outline the reasons for the study, how the child might benefit from participation, intervention procedures, and any possible risks of the study. Parents will be asked to respond within a week, if possible. In addition, an assent procedure (see Appendix 3) will precede the start of the first session to determine whether the child “agrees” to participate.

RESEARCH PROCEDURE

Setting and Materials

The study will take place in a darkened room, preferably one without windows or other light sources. A lamp with adjustable settings will be positioned approximately three feet from the participant and will provide a constant light source at a dimmed setting, in which the surroundings can be seen to some extent. Also, there will be a table and two chairs (one for the tutor and one for the child). The LED apparatus will be positioned on the table (see Appendix 4), with stimuli used in the discrimination procedure and reinforcers available in the room for the tutor to use during the procedure as well. For data collection purposes, a video camera on the ‘night cam’ setting will be situated in the room so that both the tutor and the child can be seen, along with the LED apparatus.

The LED apparatus is a black wooden box that has two doors on its side, allowing it to be opened for use (see Appendix 4 for a diagram). The inside of the apparatus is split evenly into three compartments by wooden dividers, with each compartment containing an LED light installed in the ceiling of the box. During the sessions, objects placed in each of the three compartments can be illuminated at different degrees, depending upon the prompting level. The degree of illumination will be determined by designated notches on the LED control switch, which is attached to the apparatus and can be held by the tutor running the procedure.

Independent Variable/Treatment

An LED apparatus will be used to prompt correct responses during receptive identification procedures. Two levels of prompting will be possible for each trial, in which the increasing light intensity will be used to gradually direct the child’s attention to the correct stimulus with each successive prompt.
Stimulus Preference Assessment

To remain consistent with the implementation of learning procedures throughout the child’s day in the preschool setting, the preference assessment will follow the same guidelines as the procedure used by the participant’s regular tutors. Three toys and/or edibles that were found to be reinforcing previously will be kept and set aside. To identify more reinforcers, the tutor and child may be allowed a period of play time in the play room at the preschool, by giving the child an opportunity to choose from a toy box, or by talking with the child’s tutors, teachers, and/or parents about items that have been reinforcing for the child prior to the experimental session. Once seven additional toys and edibles have been selected, all ten items will be presented to the child by random assortment on the table in front of him or her. The child will be told to “pick one,” and a preference should be chosen and written down on the preference assessment sheet as a ranked order of preference (see appendix 6). If the child does not select any item within the allotted time, the tutor can interact with the array of items in order to stimulate interest in the child to begin choosing or to continue to choose from the array of toys and edibles. Ten toys and edibles will be chosen by the child; however, if any stimuli are not chosen, other items must be substituted and a re-ranking can be done by the tutor.

Prior to the first preference assessment, the classroom teacher and/or parents will be consulted about food allergies to avoid an edible reinforcer that could trigger an allergic reaction.

Probes

During the intervention phase, each session will begin with probe trials of each of the three stimuli in the set. During the probe trials, the lamp positioned three feet from the child will be on its highest setting with all other lights off, and the tutor will begin the receptive identification procedure as it’s traditionally taught in the discrete trial training classroom. In order to assess how well the child has maintained the skill between sessions, no prompts will be delivered during probe trials. However, if a correct response is made during a probe, reinforcement will be delivered so that learning of the receptive identification procedure is not put on extinction. Then, the next probe trial would be implemented until all three stimuli had been used.

Data will be collected on whether or not a correct response was made and which object was used in the instruction to “Touch ______.” Probe data will be recorded on the original data sheet (see appendix 5). This data will determine if the child is making progress in learning receptive identification when not under the treatment conditions.

Receptive Identification Procedure

In the baseline phase, the child would be presented with the three stimuli for the specified stimuli set, which will be situated on the table in front of them with the LED apparatus out of reach of the child. The lamp will be on its full setting with all other lights off. The tutor will begin the receptive identification procedure as it’s traditionally taught; however, no prompting will be provided in order to receive a true understanding of the child’s current understanding of the skill without the possibility of influence from traditional prompting. If a correct response is made during baseline, reinforcement will be delivered with verbal praise, and the next baseline trial will begin thereafter. When incorrect responses are made during baseline, the tutor will move on to the next trial.

For each session during the intervention phase, the lamp positioned three feet from the child will be on at a dim level, so that three objects placed in the apparatus can be viewed faintly
by both the tutor and the child. One object will be in the center of each compartment, with each of the three LED lights turned on to fully illuminate the objects. The child will be sitting in a chair directly in front of the apparatus on the table. The tutor will be sitting in a chair to the side of the apparatus but next to the child. The tutor will say, “Touch _____,” which will be the discriminative stimulus for the child to touch the object specified. If the child touches the correct object within three seconds, he or she will receive a reinforcer identified during the preference assessment. If the child fails to touch the correct object within three seconds, the tutor will lower the LED lights to half the illumination for the two incorrect objects. Next, the tutor will say, “Touch _____,” repeating the discriminative stimulus. If the child makes a correct response within three seconds, the tutor will then move on to the next trial. If the child fails to respond correctly again, the tutor will turn off the LED lights that illuminate the two incorrect objects. The tutor will then say, “Touch _____,” repeating the discriminative stimulus for the final time. If the child makes a correct response within three seconds, the tutor will then move on to the next trial. If the child makes an incorrect response, the tutor will also move on to the next trial, since this is the final level of prompting with the LED apparatus.

Data Collection/Dependent Variables

Three kinds of data will be collected throughout the phases of the study: the number of correct responses made during each session without prompting, the level of prompting required for a correct response (unless a correct response is not made), and which object is stated as the discriminative stimulus for each trial. Data for probe trials will differ from other trials because no prompting will occur; therefore probe trials data will only state whether or not a correct response was made and which object is used as the discriminative stimulus.

Correct responses are defined by the student touching or pointing to the stimuli stated by the tutor within three seconds on his or her first attempt (see Appendix 5 for a data sheet). Incorrect responses include any action that is not a correct response, excluding instances when the child initially chooses the incorrect stimulus and self-corrects by switching to the correct stimulus. Mastery of the skill occurs when the child responds correctly for eighty percent of the teaching trials in a session for three consecutive sessions or responds correctly during ninety percent for two or more consecutive sessions. If a child fails to reach mastery after 20 consecutive sessions, the study will discontinue and the child will be referred back to his or her original tutor to continue the traditional prompting procedure for learning receptive identification, where other individual modifications can be made by the original tutor or teaching staff to aid in the child’s progress.

Data collected for the levels of prompting will differ between the baseline and treatment phases, since baseline prompting will not involve prompting, while treatment phases using the LED apparatus will involve three levels of prompting with variations in the illumination of the LED lights.

Because a video camera will be used for each session, data will be recorded by the tutor during the sessions on data sheets, and then the sessions will be reviewed for inter-observer agreement after the original sessions take place (see appendix 5 for data sheet).

Duration of the Study

The study will begin after a participant has been recruited at the beginning of the academic school year and will continue until he or she has mastered the receptive identification
skill (correct responses of 80% or higher in three consecutive sessions or 90% or higher for two consecutive sessions). If the child has not mastered the skill by mid-December, the traditional prompting method will have to be implemented to return the teaching of receptive identification procedures over to the child’s original tutors.

**Design**

A multiple baseline design will be used for the study, in which a baseline phase will precede a treatment phase. Three sets of stimuli will be used, where each set of stimuli will consist of three different objects that the participant has not had extensive exposure to previously. Three sessions will take place each day, with one session of each set of stimuli lasting between five and ten minutes. The order of the sets of stimuli will be randomized, and all sessions will begin in baseline at the beginning of the study. After Set One shows consistent baseline percentages with at least three consecutive sessions of 33% correct responses or lower, the next Set One session can begin with the treatment phase. Set Two can move into the treatment phase when it has reached the same stabilized baseline criteria as Set One and when Set One has reached stability in the treatment phase with at least three consecutive sessions. Set Three can move on to the treatment phase when it has reached the same stabilized baseline criteria as Set One and Set Two and when Set Two has reached stability in the treatment phase with at least three consecutive sessions (see appendix 7 for examples of graphs).

**Data Analysis**

Data will be recorded by the tutor during each session and will also be analyzed for inter-observer agreement and treatment integrity by videotape. Videotaped data will be recorded by a research assistant who will be trained in distinguishing between correct versus incorrect responding to remain consistent with the data recording of the tutor. The research assistant will view the videotapes to mark the data sheets accordingly. In further analyzing the data, comparisons may be made in looking at the number of correct responses made during baseline phases of the study compared to the number of correct responses made during the treatment phases of the study.

**Inter-Observer Agreement**

To ensure consistency in data collection, inter-observer agreement will be checked for 33% of the data recorded each day. As stated, data will be recorded by the tutor on the original data sheet during each session (see appendix 5). However, a second observer will also need to agree on at least 80% of the original data for each IOA session conducted. The second observer will record IOA data on separate data sheets while watching the videotaped sessions and will not have access to the initial data recorded. IOA will be calculated by the formula: number of agreements / (number of agreements + disagreements) x 100.

**Treatment Integrity**

To ensure that the receptive identification procedure is being implemented correctly and reinforcers are being delivered appropriately, treatment integrity data will be recorded for 33% of the data recorded each day. The treatment integrity data will consist of a checklist that a trained research assistant will complete upon watching videotaped sessions of the randomly selected trials from each day (see appendix 8 for the checklist). In order to support treatment integrity, the total percentage of sessions with correct implementation based on the checklists will need to
be 80% or higher. If this percentage is not reached, an analysis of the procedural implementation will need to be conducted to correct the errors being made during sessions.

**Dissemination**

Findings from the study will be analyzed in a written honors thesis with the potential to be submitted for scholarly publication. Presentations may be made to those with an interest in autism or education.

**RISKS AND COSTS TO AND PROTECTIONS FOR PARTICIPANTS**

**Risks and Costs**

A child of preschool age may experience some discomfort in being in areas without full illumination. In the study, it is necessary to conduct the procedures in a dimly lit room instead of a fully lit room in order to most effectively use the LED lights as prompts for successive incorrect responses. If full lighting was present in the room from an overhead light or even from a bright lamp, the child may not take as much notice of the differing levels of illumination coming from the LED lights.

Since the participant in the study must fit the criteria for attendance at a preschool classroom for children with autism, receptive identification skills will be part of the curriculum at some point in attending the preschool. Therefore, participation in the study should not involve additional risk of missing instructional time for the participant because the skill would be taught with the normal tutor any way. No additional costs or time will be required for the parents or guardians of any child involved in the study.

**Protections**

If a child shows signs of fear or discomfort when he or she is in the dimly lit room, action would be taken to alleviate the fear or discomfort for the child. The tutor or another investigator would look for signs such as crying, whimpering, requesting to leave, clinging to the tutor, or covering of the eyes, among other behaviors that would signal fear or discomfort. Initially, the tutor would attempt to calm the child by speaking to him or her in a kind, neutral voice to explain what is happening and what is going to happen. If further panic or an absence of calmness occurs, the dim light could be adjusted to a higher setting; however, it is important that the tutor and other investigators distinguish fear and discomfort caused by dim lighting from tantrums and outbursts from attempts to escape tasks. To distinguish between fear or discomfort from attempts to escape the task, the tutor will re-adjust the lamp to a higher setting to observe if less problem behaviors occur. If the problem behaviors continue, the child may be reacting more to the task presented. Any individuals implementing the procedures in the study will have had prior experience with individuals with developmental disabilities and will not only have had prior training in how to handle tantrums and other problem behavior but will be able to use reinforcers and other techniques in ways to prevent problem behaviors from occurring. In addressing instances of a child trying to escape from the task by tantrumming, the tutor may re-position him or herself, the student, or the apparatus or may try to use different reinforcers so that the child is motivated to make responses. If problem behaviors continue further after five minutes of the tutor attempting to redirect the child’s attention, the session will end.

As stated, the light may be less dim if fear or discomfort is present for the child, but if the full effect of the LED lighting cannot be visualized, the session may have to be discontinued for
the day with one additional attempt on a different day. If the child cannot tolerate the dimmed lighting conditions after two attempts, he or she will be ineligible for further participation in the study and will return back to the traditional method of learning with his or her original tutor so that learning can continue to take place.

**BENEFITS OF RESEARCH**

A participant may benefit from the study by learning receptive identification skills if he or she completes the described procedure. The prompting method may also allow a participant to learn receptive identification more quickly and more accurately than the traditional method used to teach skills in discrete trial training. Specifically, a child may be able to focus better on individual stimuli during future discrimination tasks like the ones presented during the receptive identification procedure in the study.

Not only is there potential for a participant to benefit from the research, but classroom tutors and teachers may be able to implement similar prompts for a variety of procedures by modifying the one used in the study. Depending on the outcome of the study, LED prompts in a variety of forms can be used with children who have autism, especially if it is effective with certain children struggling to focus on stimuli. Classroom teachers could implement LED prompting for these children in order to teach them a skill at a quicker rate than they would typically learn. Success with LED prompting could even lead to benefits for other populations of individuals learning tasks, such as those with other developmental diagnoses or typically developing children, as well. Results from this study have the potential to branch out and initiate future research projects in various fields that could involve autism, learning, children, receptive identification, LED illumination, and developmental disability populations.

**CONFIDENTIALITY OF DATA**

All videotaped material from sessions will be kept confidential and locked up when not in use. A coded number will be assigned to the participant, which will be used on data sheets and labels on videotapes. Only the child in the study and the tutors or investigators will be filmed. Only those affiliated with the project will have access to the videotapes or data sheets. Parents/guardians and/or school staff can access results summaries when available, if one or both parties request this information; however, school staff may only receive this information if the child’s parents/guardians agree to release the summary information. Confidentiality will be maintained with results made public from the study by using alternate names and by not disclosing other information that may identify the child, such as his or her school. After four years, data on video tapes and data sheets will be removed from their locked location in the principal investigator’s lab and properly destroyed.
REFERENCES


Dear Parent / Guardian,

As a student investigator at your child’s preschool, I am contacting you to see if you would like your child to take part in a study. The study will try to help preschool children with autism pay attention better when being taught a new skill. It is common for preschool children with autism to struggle with learning new skills, especially if they do not pay enough attention to teaching materials. The study will use special lighting called LED lights to light up choices presented to the child. This may help him or her to make a correct answer.

The skill that will be taught involves choosing a correct object when the child is asked to pick from three objects placed in front of him or her. The skill being taught is typically taught in your child’s preschool classroom. With your consent, the investigators involved in the study would like to see if your child could benefit from participation. Each session will last between five and ten minutes, with three sessions per day for a few days per week. The study will conclude when the child has learned the new skill or by mid-December.

If you have any questions or if you would like further information about how your child can participate, please contact Ali Pavlicek by phone at 701-590-2964 or by email at Allison.l.pavlicek@wmich.edu or contact Stephanie Peterson at 269-387-4479 or Stephanie.peterson@wmich.edu. A day and time may also be set up to view the LED device to be used in the study.

Sincerely,

Dr. Stephanie Peterson, Principal Investigator
Department of Psychology
Western Michigan University

Allison Pavlicek, Student Investigator
Department of Psychology
Western Michigan University
Appendix 2: Informed Consent

Western Michigan University
Department of Psychology
Principal Investigator: Stephanie Peterson, Ph.D., BCBA
Student Investigator: Allison Pavlicek

Using LED Lights as Prompts to Teach Receptive Identification to Preschool Children with Autism

Your child has been invited to be in a study called, “Using LED Lights as Prompts to Teach Receptive Identification to Preschool Children with Autism.” Below you will find information about the study, how your child can be a part of it, risks, benefits, and details about protecting your child’s results.

Purpose: In the study, the investigators aim to teach a preschool child with autism to identify objects. In the past the child will have struggled learning this task while being guided with traditional methods in the classroom. This study looks to teach your child the skill while using special LED lights as prompts to help your child to make a correct choice. These lights give off more bright light than regular light bulbs and can be dimmed more quickly. The goal is to use the new method to teach the skill when the other method was not working. Since your child has spent time trying to learn the skill with the traditional method, another goal would be to teach the skill more quickly than the traditional method could teach.

In the beginning, your child’s teacher played a role by contacting you, since he or she thought that your child could benefit from being in the study. The investigators were then able to send you a letter after permission was given to the teacher to identify your child as a possible participant. The results from the study may or may not be shared with the classroom teacher, depending on your decision. It is also optional for specific information to be given to the research team about your child’s learning history before the study if you agree to this.

Duration: Children will be invited to be in the study as early in the school year as possible, and all sessions will be finished by mid-December. Your child will be in the study until he or she understands the skill being taught. If your child does not learn the skill by the end of the study, the traditional teaching method will be used by your child’s original tutors to continue to try and teach the skill to him or her.

The Child Will Be Asked To Do the Following During the Study: In the first phase, three items will be in front of him or her, and your child will be asked to identify one of them. In this phase, your child will not get help from the tutor. If he or she makes an incorrect choice the items will just be mixed up and the tutor will ask him or her to identify a different object. Your child will get praise, play time, or a bite of food for correct choices.

The next stage is the phase with the LED lights. At the beginning of each session your child will be tested to see if he or she has learned the task. The tutor will ask your child to identify an object and he or she will be given one try to choose the correct item out of the three presented.
This will be done two more times with the other two items. After these first three ‘test’ choices, a box with LED lights will be put on the table, and a lamp three feet from your child will be on a low setting so that the items in the LED box can be seen a little bit. This time, your child will choose between the items in the box, and all items will be lit up by the LED lights. If your child chooses the correct object he or she will get praise, play time, or a bite of food. An incorrect choice will result in the two incorrect items being lit up halfway and the correct choice being lit up fully. If an incorrect choice is made again, only the correct item will be lit up.

**Risks:** A child in preschool may not be comfortable in a room without normal lighting. The study will have your child and the tutor in a darker room than is normal in order to use the LED lights to help your child learn the task. If the room had bright lighting from a light or from a lamp, your child may not notice the different lights within the LED box.

Everyone in the study would always look for signs if your child seems afraid or unhappy when he or she is in the darker room. The tutor or another investigator would look for crying, whimpering, asking to leave, holding onto the tutor, or covering his or her eyes, etc. that might suggest that your child is afraid or unhappy. First, the tutor would try to calm your child by kindly telling him or her what is happening and what is going to happen. If your child doesn’t calm down, the light in the corner of the room could be set to be brighter. It is important that the tutor and other investigators know the difference between fear and unhappiness from the darker room or from your child trying to not do work. The tutor may set the lamp to be brighter to see if your child calms down. If the problems continue, your child may be trying to get out of doing the work. Everyone in the study will have had training in how to handle a child’s crying and other problem behaviors. The investigators will also try to stop problem behaviors from happening by using his or her favorite things while the study is going on.

If the room must be bright for your child to work on the task, the session may have to stop for the day. Your child can be given another chance on a different day, but if your child still cannot work on the task after two tries, he or she will be removed from the study and will go back to the traditional learning method with his or her original tutor so that learning can continue.

Your child may miss out on some class time while in the study, but the skill being taught in the study is taught in most preschool classrooms for children with autism. You will not need to pay money or give time to the study, unless you choose to view the LED light box.

**Benefits:** Your child may learn the skill being taught if he or she is a part of the study. The teaching method may have your child learn the skill more quickly and more accurately than the traditional method. Your child may also be able to focus better when he or she is given tasks like the ones in the study that require him or her to make a choice.

Classroom tutors and teachers may also be able to use similar teaching methods. LED lights can be used with children who have autism, especially if it helps certain children who struggle with paying attention when learning tasks. Classroom teachers could use this method for children to teach them a skill at a quicker rate than normal. Success with this method could even benefit others learning tasks, like those with other disabilities or children without disabilities, too.
**Conditions of Leaving the Study:** If your child is a part of the study, you can stop him or her from being in the study at any time. Your child will not be forced to do tasks at any point and he or she will not be punished in any way for leaving the study.

**Confidentiality:** All sessions will be videotaped so that results of in-session data can be checked by a second data recorder. All videotapes from sessions will be kept locked up when not being used. A coded number will be made for your child, which will be used on data sheets and videotape labels. Only those working on the project can view the videotapes or data sheets. You and/or school staff can see results summaries, if they ask for this information. School staff may only get this information if you agree. Results from the study may be published in academic journals or be shared at presentations, but different names will be used and no other information that may identify your child will be given. After four years, videotapes and data sheets will be destroyed.

If you have any questions about the study, please contact the student investigator Ali Pavlicek at 701-590-2964 or Stephanie Peterson at 269-387-4479. You may also contact the chair of the Human Subjects Institutional Review Board at 269-387-8293 or the Vice President for Research at 269-387-8298 if you have questions during the study.

This consent document has been approved for use for one year by the Human Subjects Institutional Review Board (HSIRB) as indicated by the stamped date and signature of the board chair in the upper right corner. Do not participate in this study if the stamped date is older than one year.

I have read this informed consent document. The risks and benefits have been explained to me. I agree to have my child take part in this study.

Check box for consent of past learning tasks/information about your child to be released to the investigators before the start of the study: □

Check box to give consent for scores to be reported to his or her teacher: □

_____________________________
Name of Child

_____________________________
Name of Parent/Guardian

_____________________________ Date:
Signature of Parent/Guardian

*This consent document has been approved for use for one year by the Human Subjects Institutional Review Board as indicated by the stamped date and signature of the board chair in the upper right corner. Do not participate in this study if the stamped date is older than one year.*
**Appendix 3: Child Assent Script / Form**

Tutor / investigator to Child:

1. Tutor positions him or herself in front of the child and smiles while making eye contact in an attempt to hold the child’s attention briefly.

2. Tutor says, “My name is _____. Would you like to play with some toys and do a little bit of work with me?”

Assent will be determined by both the tutor / investigator and by a staff member, such as a classroom teacher. Assent will only be confirmed by the following indicators:

- Verbal agreement to participate by the child saying, “yes,” “uh huh,” or other phrasing
- Nonverbal agreement by the child smiling, nodding his or her head, or grabbing the tutor’s hand
- An absence of disagreement by the child, without signs of tantrums, refusal, or other behaviors triggered by the invitation to participate in the study.

[ ] Child indicated agreement to participate.

[ ] Child indicated disagreement to participate.

______________________________  __________________________
Tutor / Investigator Signature     Date

______________________________  __________________________
Classroom Staff Signature         Date
Appendix 4: LED Apparatus Diagram/Description
## Appendix 5: Data Sheet

Data Sheet: Using LED Lights as Prompts

<table>
<thead>
<tr>
<th>Date of Session:</th>
<th>Participant Code:</th>
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<thead>
<tr>
<th>Tutor / Investigator Initials:</th>
<th>Date of Data Recording:</th>
<th>Data Recorded By:</th>
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<table>
<thead>
<tr>
<th>Circle Data Type:</th>
<th>Circle Phase:</th>
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</thead>
<tbody>
<tr>
<td>Primary</td>
<td>Baseline</td>
</tr>
<tr>
<td>IOA</td>
<td>LED Prompting</td>
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</table>

<table>
<thead>
<tr>
<th>Set Number:</th>
<th>Session:</th>
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</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Trial Number</th>
<th>Object</th>
<th>Correct on First Try</th>
<th>Incorrect on First Try</th>
<th>Level of Prompting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probe 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Probe 2</td>
<td></td>
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<tr>
<td>Probe 3</td>
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<tr>
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<td>8</td>
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## Data Sheet Continued: Using LED Lights as Prompts

<table>
<thead>
<tr>
<th>Trial Number</th>
<th>Object</th>
<th>Correct on First Try</th>
<th>Incorrect on First Try</th>
<th>Level of Prompting</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Total Correct:**

Percentage of Correct Responses on First Try: __________

Percentage of Correct Responses with Initial Prompt: __________

Percentage of Correct Responses with Final Prompt: __________

**Percent Correct:**

__________
# Appendix 6: Preference Assessment Sheet

Preference Assessment Sheet

<table>
<thead>
<tr>
<th>Participant Initials:</th>
<th>Date:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Session:</th>
<th>Tutor / Investigator Initials:</th>
</tr>
</thead>
</table>

Reinforcer Ranking: (Ten Edibles & Toys)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
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<tr>
<td>2.</td>
<td></td>
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<tr>
<td>3.</td>
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<tr>
<td>4.</td>
<td></td>
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<tr>
<td>5.</td>
<td></td>
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<tr>
<td>6.</td>
<td></td>
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<tr>
<td>7.</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 7: Multiple Baseline Design Graphs with Hypothesized Data

Baseline Intervention

Set One

Set Two

Set Three

Session Number
### Appendix 8: Treatment Integrity Checklist

<table>
<thead>
<tr>
<th>Procedural Question</th>
<th>Implemented Correctly (Tallies)</th>
<th>Implemented Incorrectly (Tallies)</th>
<th>Total Correct</th>
<th>Total Incorrect</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Session begins with probe trial (full lighting and no prompting).</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Stimuli positioned differently from previous trials.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Sd stated in neutral voice without gestures or other signals.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4. LED lights adjusted to appropriate setting to prompt after incorrect responses.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Reinforcer delivered within five seconds after each correct response.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Date of Session: ________________________

Participant Initials: __________________

Tutor / Investigator Initials: __________

Date of Data Recording: __________________

Data Recorded By: ______________________
<table>
<thead>
<tr>
<th>Treatment Integrity Checklist Continued</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent Correct (Out of Total):</td>
</tr>
<tr>
<td>Percent Incorrect (Out of Total):</td>
</tr>
<tr>
<td>Percent Correct greater than 80%?</td>
</tr>
<tr>
<td>Percent Incorrect less than 80%?</td>
</tr>
</tbody>
</table>
Proposing Research: An Undergraduate’s Learning Experience

By: Allison Pavliceck
Undergraduate Psychology Student
Lee Honors College
Western Michigan University
December 8, 2010
HSIRB Protocol
Project Spotlight: Using LED Lights to Increase the Efficiency and Effectiveness of Discrimination Training of Children with Autism
Ron Van Houten, Ph.D., Principle Investigator (PI)
Nicole Cambridge, B.S., Student Investigator (SI)

Abstract

As the classification of autism changes, the number of children diagnosed with autism continues to rise. To date there are approximately 25,800 children from the ages of 3 to 22 or roughly 1 in 150 with autism according to recent CDC statistics. As this is becoming a larger problem, the research for further breakthroughs in their educational system is falling behind in incorporating new techniques as well as the use of our current technology that could be helpful in more effective methods of teaching. As the use of prompts and fading continues to assist, further improvements in prompting and fading need to be developed. Because children with autism have been found to be less responsive to their environment, removing extraneous stimuli in the environment for children with autism could be the link to producing efficient and correct learning of discriminations. This proposal is intended to examine the effects that LED lights spot lighting may have in the assistance in proper discrimination training. Just as spotlights direct the audience’s eyes in a theater, the use of small spotlight might be effective in directing the visual behavior of children with autism. A multi-element design will be employed to compare the use of LED spotlights to traditional lighting with preschool children with autism. The study will consist of comparing a traditional technique used to teach object discriminations to the use of LED lights to prompt scanning of the objects before making the requested response.

Purpose/Background Information

Prompts and the use of fading have been seen as set techniques use in training discriminations of objects. (Green, 2001) As we advance in technology, it is surprising that the techniques still used to teach the rising number of autistic children has not advanced at the same rate as other areas. In 2005, Nevin, J. A and colleagues discussed attending to conditioned discriminations, which lead to the consideration that attending could be a key factor in autistic children learning object discriminations. Hence removing extraneous stimuli may be the link in producing more correct responses and a more efficient learning system. How does one go about prompting such an environment while promoting errorless training? Terrance (1963) published articles on errorless learning with pigeons and was able to teach perfect errorless learning by the use of light to prompt the correct response and then fading of the prompt light. The pigeons were able to perfectly discriminate even after the light faded back into the normal setting. Errorless learning can be applied when individuals are not learning effectively or efficiently from other procedures. With the use of the LED spotlights, this type of procedure should prevent the child from making an incorrect response during discrimination trials. By having little or no errors, the child will receive a higher proportion of reinforcement while reducing the amount of time to reach the mastery criteria. Subsequent work has demonstrated that fading is also an effective technique with children and adults.
Lighting is very effective at directing looking behavior in a dark room. If an autistic child follows the light, then the child could be taught using the errorless learning technique. One other advantage of this technique is that it reduces frustration during discrimination training by eliminating errors. The use of a light as a prompt will direct the child’s gaze in the direction that is required in order to make discriminations. This should proceed over a verbal or psychical prompts that are intrusive and should speed up the learning sessions to reach mastery criteria.

The reasoning of the LED lighting over regular lights is the concentration of focused light one can obtain. By isolating the light directly over the objects in training, there will be less spillover of illumination to confuse the child. By having only one object lit at one time, the child will focus his or her gaze at the target object that is being trained which aids in quicker learning and hopefully errorless learning.

**Subject Recruitment**

Participants in this study will be students from the pre-kindergarten class at Croyden Avenue School. Between 2-3 children will be recruited to participate in this study, which will be stated in a letter home asking for participation in the study. A letter (see Appendix 1) will be given to selected students after we assess from the staff students that they have met our criteria. Selection criteria for inclusion in the study include: students that have difficulty making proper discriminations between objects. Priority will be given to prompt replies received by the deadline given on the letter.

**Informed Consent Procedure**

An inform consent form will be required for participation. After receiving their recruitment letter, a phone meeting or in person meeting will be set up to answer any questions the parents might have. A HSIRB approved inform consent form (see Appendix 2) will be either sent out to the parents prior to the telephone call or given to the parents based on which meeting they preferred. The consent form will outline the reasons for the study, how their child might benefit from participation, the treatments of the study, and any possible risks of the study. Parents will be asked to respond within a week if possible. In addition, an assent procedure (see Appendix 3) will be followed at the start of the first session to determine whether the child will “agree” to participate.

**Research Procedure**

*Participants & Setting*

Parents will be invited by a recruitment letter to have their child participate in the study. Inform consent forms will then be sent or given (depending on their preference) to their parents /guardians. Participants must have difficulty making discriminations between objects.

The study will be conducted in the room adjacent to the pre-kindergarten classroom at Croyden Avenue School. The area where the study will be conducted will include a dimming lamp, desk and chair for the student, chair for the tutor, and a specially designed LED light box (will elaborate in the independent variable sections).
Dependent Variables (Measures)

Correct Responses: Correct responses are defined as the child pointing or indicating knowledge to the correct object on request on the first attempt (see Appendix 5 for data sheet).

Number of Sessions to Mastery Criteria: The number of sessions (ten trials equal to one session) it takes the child to reach either eighty percent for three or more consecutive sessions or to reach ninety percent for two or more consecutive sessions (see Appendix 5 for data sheet).

Independent Variable (Treatment)
The independent variables will be the use of a new strategy for discrimination training that will utilize LED lights with dimmer switches to improve discrimination over standard discrimination training approaches. An apparatus will be constructed for the use of the LED lights in the treatment condition.

Apparatus
The apparatus consists of a black box and LED lights (see Appendix 4 for a diagram). One or two objects depending on whether we are testing with one object or probing with two objects, will be placed in the open box, which will be painted matted, black to absorb the excess LED light not illuminated the object. There will be divider that will go close to the top of the box. A LED light with a collumninator mounted to it will be assembled into each section of the box and will be able to be switched on, off, or dimmed from behind by the student investigator. This will allow for the object(s) to be illuminated from either compartment.

Inter-Observer Agreement
For 25% of observation sessions, IOA will be conducted. A second observer will sit in on a session and record their responses. IOA will be measured as a percent using the formula: (agreements / agreements + disagreements) * 100. There should be a minimum of 80 % of IOA agreement for each IOA session conducted.

Treatment Integrity
For randomly selected sessions, a second investigator will sit on the session to ensure that the same procedures and vocalizations are used as described within the standard and LED conditions. The second person will need to be check 25% of sessions to make sure the answers are being recorded property, objects requested and that physical objects are being randomized throughout the session, as well as ensuring that the reinforcer is given immediately after a correct response. A checklist will be used for the second observer to indicate that all procedures are following protocol.

The reinforcer used will be those selected and used by Croyden teaching staff. The staff uses a reinforcer assessment procedure to determine which food item works best with each child. Food allergies are taken into consideration and preliminary eliminate any problematic foods.

Methodology
The research will involve a multi-element design. A multi-element design involves giving three treatments each day with the order of treatments randomly determined each day. (See Appendix
In addition to the tutor scoring the child’s correct or incorrect responses, IOA will be used for treatment integrity.

Multi-element design
The child will participate in an alternative treatments design of three conditions with each treatment once a day. The order of conditions will be randomly assigned each day and the placement of the objects will be randomly alternated throughout each session to not promote memorization of the placement of the items. The investigators will be looking at the number of first time correct responses, and the length of time to reach mastery criteria. Every four conditions, a probe will be introduce to verify if the object is learned and that the student can discriminate between the learned object and a secondary object.

Treatment A: LED Condition - respondent conditioning + No Extraneous Stimuli
The child will have one object placed in front of him / her in the divided box as previously mentioned (See Appendix 4 for a diagram). The student’s tutor will then say, “touch _____” and immediately the student investigator will illuminate the target object for four trials. A correct response of the first request will be followed by a reinforcer that has been found to be effective for the child (information will be gathered from the student’s teacher or tutor). We will follow the Croyden procedure for the delivery of reinforcers. An incorrect response will follow with a prompt to point to the correct item. This is done by a procedure called least to most prompting in order to get the correct response that will earn a reinforcer. The procedure goes in order as 1) the child will be first prompted by the tutor saying the target object 2) tutor naming and pointing to the target object to 3) the tutor physically moving the child’s hand to touch or point the target object. The first response will be what is recorded on the data sheet (see Appendix 5 for data sheet). Regardless if the child later points to the correct object after correction, the trial will still be recorded as incorrect. Ten trials equal one session. This procedure will be repeated, for a total of twenty trials or two sessions per day of recording. Every four trials, a second object will be introduced as a probe to see if the child recognizes the discriminative stimulus compared to second object. Now, the child will have two objects placed in front of him / her in the divided box as previously mentioned (See Appendix 4 for a diagram). The student’s tutor will then say the target object; “touch _____” and immediately the student investigator will illuminate both the target object and the second object, which will randomly be switched in the divided box. The LED condition for Treatment A will end when the child has reached mastery criteria of 80% or higher for 3 consecutive sessions or 90% or higher for 2 consecutive sessions.

Treatment B: LED Condition - No respondent conditioning + No Extraneous Stimuli
The child will have one object placed in front of him / her in the divided box as previously mentioned (See Appendix 4 for a diagram). The student investigator will illuminate the target object and immediately the student’s tutor will then say, “touch _____” for ten trials. A correct response of the first request will be followed by a reinforcer that has been found to be effective for the child (information will be gathered from the student’s teacher or tutor). An incorrect response will follow with a prompt to point to the correct item. This is done by a procedure called least to most prompting in order to get the correct response that will earn a reinforcer. The procedure goes in order as 1) the child will be first prompted by the tutor saying the target object 2) tutor naming and pointing to the target object to 3) the tutor physically moving the child’s
hand to touch or point the target object. The first response will be what is recorded on the data sheet (see Appendix 5 for data sheet). Regardless if the child later points to the correct object after correction, the trial will still be recorded as incorrect. Ten trials equal one session. This procedure will be repeated, for a total of twenty trials or two sessions per day of recording. Every four trials, a second object will be introduced as a probe to see if the child recognizes the discriminative stimulus compared to second object. Now, the child will have two objects placed in front of him/her in the divided box as previously mentioned (See Appendix 4 for a diagram). The student’s tutor will then say the target object; “touch _____” and immediately the student investigator will illuminate both the target object and the second object, which will randomly be switched in the divided box. The LED condition for Treatment B will end when the child has reached mastery criteria of 80% or higher for 3 consecutive sessions or 90% or higher for 2 consecutive sessions.

*Treatment C: Traditional Condition – No respondent conditioning + Extraneous Stimuli*

The child will have one object placed in front of him/her in the lit room. The student’s tutor will then say, “touch _____” for ten trials asking the child to point to the target object for ten trials. A correct response of the first request will be followed by a reinforcer that has been found to be effective for the child (information will be gathered from the student’s teacher or tutor). An incorrect response will follow with a prompt to point to the correct item. This is done by a procedure called least to most prompting in order to get the correct response that will earn a reinforcer. The procedure goes in order as 1) the child will be first prompted by the tutor saying the target object 2) tutor naming and pointing to the target object to 3) the tutor physically moving the child’s hand to touch or point the target object. The first response will be what is recorded on the data sheet (see Appendix 4 for copy of data sheet). Regardless if the child later points to the correct object after correction, the trial will still be recorded as incorrect. Ten trials equal one session. This procedure will be repeated, for a total of twenty trials or two sessions per day of recording. Every four trials a second object will be introduced as a probe to see if the child recognizes the discriminative stimulus compared to second object. Now, the child will have two objects placed in front of him/her in the lit room. The student’s tutor will then say the target object; “touch _____”. The traditional condition for Treatment C will end when the child has reached mastery criteria of 80% or higher for 3 consecutive sessions or 90% or higher for 2 consecutive sessions.

*Data Analysis*

The standard conventions of visual inspection will be used to evaluate the results of each technique of the two children. Basic statistics of mean comparisons of the treatments and number of sessions to obtain mastery skills may be used.

*Dissemination*

Results of the study will be used as educational research, and will be submitted to a scholarly journal. Results could also be presented at professional conferences and/or meetings.

*Risks and Costs to and Protections for Subjects*

Known risks and cost to the research participants will be minimal. The subjects will be placed in a room with very dim lighting. The reasoning for the low lighting is to capture the most effective use of the LED lights. In order for the treatment to properly work, the room must be
dim to ensure the bright contrast of the LED lights on the objects for discrimination training. Since the participants are of pre-kindergarten age precautions will be taken to assure they are comfortable in the room before proceeding. The overhead light in the room will be shut off, but a lamp will be on at a comfortable setting as the participant enters and will be slowly dimmed, by use of a dimmer switch, to an appropriate low setting to achieve the full effect of the LED lights, but light enough to not frighten the child.

At any time the child does not feel comfortable (i.e., crying, hesitate to walk into the darken room, turns back to the door, hold onto their tutor), the student investigator will bring up the light of the lamp slowly until the child is comfortable. If the new setting can still allow for full LED effect, then the new light will take effect; however, if the light is too bright after bringing it up, the student investigator and tutor will work with the child slowly, by allowing the child to warm up and feel comfortable to the room before lowering the lamp to the next low level until the lamp can be reduced in light level to a lower setting both comfortable to the child as well as reaching the full potential of the LED lights. This is essentially the method used to treat fear of the dark in children and it is known to be effective and unobtrusive because of the very gradual change employed.

The tutors have been taught how to deal with frustration using standard educational techniques employed by the public school and will advise how to continue the session if frustration with the student occurs. However, the use of the LED spotlights, prevent the child from making an incorrect error during discrimination trials thus preventing frustration of incorrectly responding. By having fewer to no incorrect responses, the child will be positively reinforced more while reducing the amount of time to reach the mastery criteria as well as reducing the amount of time in the room.

There should be no costs to the child. The time spent away from the normal classroom will still be spent teaching the child part of the normal curriculum of the day, therefore the child will not miss out of any lessons of the day.

In addition, as the study will be conducted at the child’s school, there will be no additional time or cost of transportation to the parent/guardian of the child in participating.

Benefits of Research

There can be numerous benefits of the use of LED lights in teaching discriminations. When properly used in a controlled setting, students with autism may benefit by elevating their scanning skills with the assistance of the LED lights as prompts. While the lights should help shape scanning, the percentage of incorrect responses should decrease as the child has now looked at all of the objects before making a response instead of the possibility of not properly train to scan all object and thus missing an object before emitting a possible incorrect response. As the identification of objects should be mastered more rapidly, the transfer of scanning all options without the use of a light should help in producing error-less or few errors in learning, which should assist in, accelerate the curriculum.

The use of LED lights in teaching would be beneficial to the staff in teaching these discriminations. Any slight modifications to a school’s curriculum that would be easy to adapt at
a low cost to promote faster and more efficient learning may be a major benefit to educators of children with autism.

If the LED light technology is effective, it can be disseminated into the research community. This may spur a new line of research among the behavior analysis community leading to future research in the teaching of other discrimination (teaching to recognize picture of objects, pairing word cards to objects) within the autism community. LEDs that produce better scanning can be applied into other areas of research and could be used with other populations to solve other types of problems related to attention and discrimination. The technology may be applicable to other situations involving difficulty scanning, focusing or following a distinct sequential order of directions for problem solving (learning certain math skills).

**Confidentiality of Data**

Individual participant’s data will be recorded on data sheets but the identification of the student will be concealed in the dissemination of the data by a code. Once the data are collected and analyzed, the master list will be destroyed. All other forms will be retained for at least three years in a locked file in the principal investigator’s office in accordance with the requirements and recommendations of the American Psychological Association.
References


Children with early childhood developmental delays often have trouble paying attention to relevant stimuli in their environment—they don’t look at objects in their environment, even when prompted. But all children must learn this skill of looking at relevant visual stimuli before they can learn more complex skills involving visual stimuli. Therefore, we would like to create a procedure to help these children learn to attend to significant aspects of their visual world.

Therefore we would like to see if the procedure we will be developing may be beneficial to your child. We want to do a probe to start by a quick study comparing three training techniques using LED light to the traditional approach at Croyden.

Presently, we will be doing this study to look at different approaches to teaching objects and how to discriminate between them, that could be used in the future at Croyden Avenue School. At present, we will only be able to work with two or three children. The sessions will be about one hour per day and approximately five days per week and may last between 3-15 weeks. The study will end when your child has learned the three objects and can correctly decipher between two objects when asked for the learned object.

If there are any further questions regarding the study or possible participation, please contact Dr. Ron Van Houten at (269) 387 - 4471 or via e-mail at ron.vanhouten@wmich.edu or myself at (850) 212 - 9544 or via e-mail at nicole.m.cambridge@wmich.edu.

If you would like to learn more about participation, please sign below and provide your phone number.

Your Name: ____________________________________________________________

Your Phone Number: ____________________________________________________

Sincerely,

Ron Van Houten, Ph.D
Department of Psychology
Western Michigan University
Office Phone Number: (269) 387 – 447

Nicole Cambridge, B.S.
Department of Psychology
Western Michigan University
Appendix 2: Inform Consent
Western Michigan University
Department of Psychology
Principal Investigator: Dr. Ron Van Houten
Student Investigator: Nicole Cambridge

Your child has been invited to participate in a research project entitled Spotlight: Using LED Lights to more effectively learn to associate objects with the words used to label them. For example when given a choice between several objects, such as a crayon, and an eraser, to pick up the crayon when asked. The purpose of the study is to evaluate the use of LED lights in promoting scanning to reduce errors involved in learning to associate works with objects as well producing faster learning in comparing the special LED spotlighting techniques to a techniques similar to one that is already in place for discrimination training at Croyden.

Your consent for your child to participate in this project means that your child will be taught to touch, pick up, or use certain objects when asked by three different procedures; a procedure similar to the standard Croyden procedure as well as being taught using using two different LED spotlighting methods to aid in assisting the child to make the correct responses. This study will consist of three separate treatments that will be run simultaneously. Your child will learn three separate discriminations, one with each type of teaching method for each research session. The three comparisons for teaching will be 1) stating the object’s name and then spotlighting it with LED and requesting the item, 2) having the object lit with the LED spotlight and requesting the item, and 3) having the item on a table in a lit room and requesting the item.

The study will take place at Croyden Avenue School during the child’s normal school day in a separate room from the rest of the students. The student will not miss out on any normally scheduled lessons, as their object discrimination sessions will now be conducted within the study. Before the first session, the student trainer will ask if your child would like to come into the separated room to play/work with some toys. If your child is willing to go into the other room via a verbal “yes” or smile, head nod, walking towards the room, the student trainer will record that your child gave consent to participating in the study. Any indication, such as crying or pulling away from the student trainer will indicate no consent given and the study will not begin. The child’s tutor will administer the discrimination training sessions individually while the student investigator will be in control of the technical side, the manipulation of the LED spotlights. While using the LED spotlights, the room will need to be dimmed in order to magnify the effectiveness of the lighting procedure. As this might produce discomfort to your child, the student investigator will slowly reduce the level of lighting in the room by use of a dimmer switch at a rate that is comfortable to the child. Your child will be free at any time -- even during the session -- to choose not to participate. If your child refuses or quits, there will be no negative effect on his/her school programming. Although there may be no immediate benefits to your child for participating in a particular session, there may eventually be benefits to child in the continuation with the study. If this study is found to be useful, then new procedures might be able to be used to aid in faster learning of object identification.

Your child’s teacher may provide the researchers with past data of previous learned discriminations prior to the start of the study if consent is given. All object identification data
and information will remain confidential. That means that your child's name will be omitted from all forms and a code number will be attached. The principal investigator will keep a separate master list with the names of the children and the corresponding code numbers. If the researchers find that this study is useful for planning your child's progress, they will share the results with your child's teacher. Once the data are collected and analyzed, the master list will be destroyed. All other forms will be retained for at least three years in a locked file in the principal investigator's office. No names will be used if the results are published or reported at a professional meeting.

The only risks anticipated are minor discomforts typically experienced by children when they are being tested (e.g., boredom, discomfort in a darkened room). The darkened room will be addressed by having a lamp on at a comfortable setting as the participant enters and will be slowly dimmed, by use of a dimmer switch, to an appropriate low setting to achieve the full effect of the LED spotlights, but light enough to not frighten the child.

At any time the child does not feel comfortable, the student investigator will bring up the light of the lamp slowly until the child is comfortable. If the new setting can still allow for full LED effect, then the new light will take effect; however if the light is too bright after bringing it up, the student investigator will work with the child slowly until the lamp can be reduced in light level to a lower setting both comfortable to the child as well as reaching the full potential of the LED spotlights. This is essentially the method used to treat fear of the dark in children and it is known to be effective and unobtrusive because of the very gradual change employed.

In addition, all of the usual methods employed during discrimination training to minimize discomforts will be employed in this study. As in all research, there may be unforeseen risks to your child. If an accidental injury occurs, appropriate emergency measures will be taken; however, no compensation or treatment will be made available to you or your child except as otherwise specified in this permission form.

You may withdraw your child from this study at any time without any negative effect on services to your child. If you have any questions or concerns about this study, you may contact either Nicole Cambridge at (850) 212 - 9544 or Dr. Ron Van Houten at (269) 387 - 4471. You may also contact the chair of the Human Subjects Institutional Review Board at 269-387-8293 or the vice president for research 269-387-9298 with any concerns that you have.

This consent document has been approved for use for one year by the Human Subjects Institutional Review Board as indicated by the stamped date and signature of the board chair in the upper right corner. Do not permit your child to participate if the stamped date is more than one year old.
Your signature below indicates that you, as parent or guardian, can and do give your consent for ______________________ (child's name)

- To be tested with the use of LED lights in a dimmed room

Check box for consent of past data of previous learned discriminations may be released to the researchers prior to the start of the study

☐

Check box to give consent for scores, if found to be useful, to be reported to his/her teacher

☐

____________________   __________________
Signature                        Date

Consent obtained by: _____________________   __________________
Initials of researcher                        Date
Appendix 3: Child Assent Form

Script for Child Assent at Croyden

Student trainer to child

1. Make direct eye contact with child and smile.
2. Prompt the child to look directly at you and listen.
3. Say “We’re going to go play/ work with some toys in this other room for a little bit. Would you like to?”

The student trainer at Croyden will help the experimenter (i.e., student investigator) define assent behaviors for the child and will be present to determine if the child assents to participate in the research study.

Potential Indicators of Assent

1. Absence of dissenting behaviors such as crying, pulling away, or hitting.
2. Smiling, nodding, touching the student trainer, or other physical actions that the trainer or a teacher would indicate as affirmative.
3. Saying “yes,” “uh-huh” or a phrase or sound that the trainer or teacher indicates as affirmative.

☐ Child indicated yes.

☐ Child indicated no.

Student trainer/Student investigator Signature

Date
Appendix 4: Diagram of the divided box
The inside of the box will be painted black to absorb the extra-reflected LED light.

LED lights w/ calumniators (to filter and concentrate the light) that are to be placed in the center in each section of the box.

Note: the opaque circles around the objects is how we would like the light to be in the box. Lighting the objects, not each section of the box.
### Appendix 5: Data recording sheets

**Spotlight Study Observation Sheet**

- **Observer:** ______________________
- **Date:** ______________________  **Start Time:** ______________________  **Stop Time:** ______________________
- **Phase:** LED / TRADITIONAL
- **Session #** ______________________

<table>
<thead>
<tr>
<th>Trial</th>
<th>Correct</th>
<th>Incorrect</th>
<th>Mastery Criteria</th>
</tr>
</thead>
<tbody>
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<tr>
<td>Probe</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**Percent of Correct Responses** ______________________

---

**PRIMARY / IOA**
Appendix 6: Description of Experimental Methodology & Visual Inspection Techniques

Multi-Element Design
The multi-element design would give each child three teaching methods in object identification with three different objects each day. This design in comparing the efficacy of three teaching methods reduces the impact of variables that may vary daily but is not the same in controlling these variables. A multi-baseline will not be beneficial when one wants to compare two treatments side by side.

The three treatments will be recorded and displayed on the same graph to show the comparisons between the three treatments. The x-axis will be displaying each day of the study with the y-axis displaying the percent of correct responses on the first attempt of the object identification. The visual representation of the data can show an immediate comparison of the three techniques to indicate if one is more effective in producing error less learning faster than the other technique.

The principle investigator and student investigator will continue to update the data into a graphical representation as the study progresses. The visual inspection of the data can provide information on variability and trends. Variability can be viewed and determined if there are multiple gaps in correct responses that are varying greatly from one session to another. Due to the nature of the study to involve learning discriminations, there should be an increasing trend of correct responses as the study progresses.

The graph should appear to look as three upward learning curves with the first LED technique having the highest learning curve, followed by the second LED technique and then the traditional technique.

Each child will complete three sessions with each technique per day at Croyden. The only difference will be a probe every 4 trials. As the student is given aid by the LED lights, the student should start to make connections between the vocalization of the object and the visual representation of the object label more closely over the traditional technique that will produce more correct responses and in turn will reach the mastery criteria faster. This should then be produced in the visual graphs to indicate that scanning of objects functional relates to the number of correct responses on the first attempt and that LED lights may be an effective solution in the teaching of object discrimination.
Proposing Research: An Undergraduate’s Learning Experience

By: Allison Pavlicek
Undergraduate Psychology Student
Lee Honors College
Western Michigan University

Research... Where to Start?
Began searching Spring 2010 for honors thesis topics
- Lab-related?
- Personal interests?
- Graduate student thesis?
Personal topic deadline: End of Spring semester 2010

Research interests
Behavioral psychology
Autism/developmental disabilities
Verbal language/language acquisition
Social stories/pragmatics
Learning
Children
Discrete Trial Training

Using My Resources
Bounced ideas off of Dr. Peterson, Nicole, Shawn, and others from the lab
Read articles from several scholarly journals
- Verbal behavior/speech pathology
- Social stories
Inquired about lab referrals for case study

My Honors Thesis
Focus on psychology major
Research-oriented after lab involvement
Fall 2009
Research familiarity:
- Choice-related grant project scoring
- Integrity data
- Behavioral research methods
- Graduate students’ work in the lab
- Observation of research run at Croyden Avenue School

My Research Interests
Behavioral psychology
Autism/developmental disabilities
Verbal language/language acquisition
Social stories/pragmatics
Learning
Children
Discrete Trial Training

LED Project Pursuit
Lab presented with LED Proposal by Dr. Van Houten
Initially fascinated by device
Wanted to take part in some way
Potential to include five interests:
Behavioral psychology
Autism
Learning
Children
Discrete Trial Training
The Importance of Background Research
- Initial proposal—issues posed with first submission (respondent conditioning...)
- HSIRB letter (initial proposal)
- Unfamiliarity with LED
- Receptive identification
- Reviewing behavioral principals to be discussed in the proposal
- Defining autism

Before Making the Commitment...
- Contacted Human Subjects Institute Review Board
  - Using material from previously submitted proposal
- Contacted Dr. Van Houten’s graduate student
- Tested the LED apparatus
- Requested mentorship from Dr. Peterson and Nicole

Draft One—and Beyond!
- Became familiar with Dr. Peterson’s choice-making grant proposal
  - HSIRB formatting
  - Content/sections to include
  - Appendices/forms
- Began drafting early Summer 2010
  - Intended goal to begin collecting data Fall 2010

Reality Check: Recruitment
- Considered Croyden Avenue School/Woodsedge for recruiting
- Met with Dr. Malott
  - Receptive ID not commonly an issue
- Proposal at a standstill...
  - Other options considered
- Final decision: Mock HSIRB Proposal
  - It’s all about the PROCESS

The Proposal: In a Nutshell
- **Purpose:**
  - Effects of LED apparatus as prompt with receptive ID procedure
- **Participant Eligibility:**
  - Autism diagnosis; difficulty with receptive ID, 3-5 yrs., discrete-trial classroom
- **Setting:**
  - Small room: lamp (adjustable light settings), table, two chairs, LED apparatus, procedure stimuli, reinforcers

...Nutshell Continued
- **Baseline:**
  - Lamp on highest setting
  - No prompting for incorrect responses
  - Reinforcement for correct responses
- **Probes:**
  - Lamp on highest setting
  - Three probes per treatment phase
  - Each object in set probed once
  - No prompting for incorrect responses
  - Reinforcement for correct responses
**Nutshell Continued**

Sd: “Touch ______.”

Treatment Phase Prompting:

1. Initial Set-up: Three lights fully illuminate three objects
2. 1st Prompt: Two lights partially illuminate incorrect objects; one light fully illuminates correct object
3. 2nd Prompt: One light fully illuminates correct object (incorrect objects not illuminated)

**A Venture In Graphing**

Prior Graphing Experience:
- Tutorial during lab meeting
- Three graphing articles

Design: Multiple Baseline
- Each individual graph= different object set
- New set introduced after stability of previous set’s data
- Three sessions each day with randomized set order
- Set One baseline must be at 33% or lower for three consecutive sessions before treatment phase

**The Graph (Hypothetical Data)**

- 13 trials shown to reach mastery of all three sets
- Quicker acquisition by introduction of third set

**Possibilities for Future**

- LED lights with classroom application
- LED lights to prompt children with autism/other developmental disabilities
- Various procedures/skills
- LED lights to teach regularly developing children
- Other populations...
- Other prompting innovations...

**Mastery Criteria:**

- Correct responses for 80% of trials in a session for three consecutive
- Correct responses for 90% of trials in a session for two or more consecutive

- Correct Response: touching/pointing to stated stimuli within three seconds of first attempt
- Incorrect Response: any action that is NOT a correct response (except for self-correction)

**Demonstration**

LED lights with classroom application
LED lights to prompt children with autism/other developmental disabilities
Various procedures/skills
LED lights to teach regularly developing children
Other populations...
Other prompting innovations...
Lessons Learned

Draft one is NEVER the last draft. Draft ten is more like it.

Within the same field, professionals have differing procedures and methods.

A proposal can take about nine months, even without HSIRB submission.

Wording is everything sometimes.

Making a mistake/misunderstanding is a learning opportunity.

Lessons Learned Continued

Patience is not my strong point...but persistence is!

Emails, meetings, etc.

Sometimes the first idea is the best.

Learning occurs with a mock proposal, too!

HSIRB familiarity is beneficial for more than psychology.

Speech pathology class.

Comments/Track changes tool on Microsoft Word=AMAZING!

Reflection

Psychology not a current pursuit for graduate school—but thesis experience still applies.

Procedures, research mindset, communication, independence, professionalism.

Glad to complete my thesis a year early.

Staying involved with the lab—beneficial!

Thank You

Nicole
Dr. Peterson
Lab
Dr. Van Houten/Nicole Cambridge
WMU!

References


