

The Effects of Model, Lead, and Test Technique with Visual Prompts Paired with a Fading Procedure to Teach “Where” to a 13-Year-Old Echolalic Boy with Autism

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Abstract The purpose of this case study was to determine the effectiveness of using visual prompts with a model, lead, and test technique paired with a fading procedure. This was implemented to teach a student how to appropriately answer “Where are you?” The participant in this study was a 13-year-old boy, with low functioning autism who was also echolalic. This study took place in the participant’s self-contained special education classroom and at nine various locations at his school. The participant was taught to answer correctly when prompted to nine different places throughout his school. The participant was able to maintain this skill, when visual prompts were systematically reduced during the fading and no longer provided during the two no prompts conditions. Other personnel in the school were very satisfied with the outcomes.

Keywords Autism · Visual prompts · Echolalia · Fading · Location skills · Direct instruction · Adolescent

Children with autism represent an ever-expanding group of children considered by many professionals as some of the most severely disabled. Children with autism lack both expressive and receptive language, display restricted and repetitive patterns of behavior, and have poor social interaction skills (American Psychiatric Association 1994). The

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number of children with autism has quickly become the largest growing group of students needing and receiving special education services (Heward 2006; Nelson and Snow-Huefner 2003). Teaching persons with autism language and communication skills has emerged as a very important area of research and viewed by most as a very important functional skill (Heward 2006; Lovaas 1981).

The use of various prompting procedures to assist children with autism has resulted in a growing body of evidence-based research (Gast and Wolery 1987). There are primarily three different prompting strategies. First, there is a very clear set of procedures outlining the use of self-auditory prompts. These prompts are recorded auditory cues that pace the student through the tasks. Such procedures have allowed children with autism to transition between tasks (Taber *et al.* 1998). Picture prompts have also been employed in classroom settings. The use of such prompts can be very simple to very complex. Picture prompts can also be presented via a computer and then presented as part of a picture strip or album. These picture-prompting procedures have been successful across a wide variety of behaviors and skills (Alberto and Troutman 2006; Steed and Lutzker 1997, 1998; Wacker and Berg 1983).

Another type of prompting often employed by teachers is the system of least prompts (SLP). These procedures require the teacher to provide the S^D (prompt, question, problem to solve, etc) and employs the least intrusive prompt and then allows the student to respond. The teacher then provides more and more prompts or assistance until the student responds correctly (Alberto and Troutman 2006).

The model, lead, and test procedure for error correction was developed as part of the teacher procedures of Direct Instruction (Engelmann and Becker 1982) The lead aspect of this component is when the student and instructor go over the item missed together. For example, when a student makes an error the teacher immediately corrects the error, has the student respond to the original item missed (test), and then the instructor retests the student until the error is corrected (Morgan and Jenson 1988). Error correction continues until the model, lead, and test procedure is similar to the model, lead and retest procedures that are part of the Direct Instruction curricular in reading, math, and spelling (Marchand-Martella *et al.* 2004; Watkins and Slocum 2004). It has also been implemented with other instructional procedures (Lignugaris-Kraft 2004; Delli Sante *et al.* 2001).

The purpose of this study was to determine the effectiveness of using visual prompts with a model, lead, and test technique. This was later paired with a fading procedure to teach a student with autism to answer “wh” questions. We particularly targeted “Where are you?” This was carried out to teach the child about his environment and his place in it. Another purpose to evaluate the use of the model, lead, and test procedure from Direct Instruction with a student with autism.

Materials and Methods

Participant and Setting

The participant of this study was a 13-year-old male with low functioning autism, and echolalia. The participant in this study was formally diagnosed with autism at

the age of 4. This was done by a physician. This same physician likewise had concerns regarding the participant's mild behavioral difficulties. The participant was chosen for this study based on the recommendation of his classroom teacher. Teaching the child to be aware of his immediate environment was a major IEP (individual education plan) objective that he needed to meet.

The participant attended in a self-contained classroom, within a program for children with autism and severe behaviors. This program served as a transition program to assist students with severe behavioral difficulties to transition back into their neighborhood schools. The study took place in a charter school located in a large urban district in Eastern Washington. The participant attended this school 5 days a week from 9:00 A.M. to 3:00 P.M. The participant's classroom peers consisted of six intermediate (fifth–seventh grade) aged students, all of whom had behavior concerns and autism. The classroom was staffed by one certified special education teacher, three instructional assistants (IA's), and first author (a student teacher from a local university). On Thursdays and Fridays there was an additional practicum student from another local university. Research was conducted, at different places throughout the school, every day at various times throughout the school day. Most sessions were conducted, usually at 9:10 A.M. 2:40 P.M. or at the 10:30 A.M. recess. A session usually took between 7 and 13 min to conduct each school day. The first author taught and recorded data for each session. When reliability of measurement was gathered, an IA or another student teacher in the building assisted in data collection. For these measures a separate but simultaneous record was made.

Materials

A small dry erase board and marker, for the visual prompts, and the data collection sheet and pencil was required.

Dependent Variable and Measurement Procedure

The dependent variables measured in this study were correct responses and error responses given by the participant when asked "Where are you?" For this study a correct response was when the participant answered "Where are you?" with: "At the (place)" or "In the (place)", within 5 s, on the first trial at the place. In the beginning of the study the first set of five places were introduced, so there were five different correct responses, then on the fourth week of the study a second set of places were introduced, so there were the original five responses and an additional four responses that were possible corrects. For example when the researcher took the participant to the gym, the correct response to "Where are you?" would be "At the gym". An error response was when the participant gave an answer other than, "At the (place)" or "In the (place)", when asked "Where are you?" For example if the participant repeated the question, did not reply within 5 s, or responded "At the gym" when he was really at the parking lot, or made any other response, this was recorded as an error.

Data were taken everyday that the participant was in school, for four and a half weeks. The participant was in school all but 1 day while this study was being

conducted. These data were collected at different times throughout the school day. After the second week of the study, the school had spring break so no data were collected during that time. Formal data collection resumed for week three as soon as school started again.

Data Collection and Interobserver Agreement

For this study, an event recording system was employed to record correct and errors. The data collection sheet had the day across the top and the places being worked on down the side. If the participant gave a correct response on the first trial and within 5 s of the question, the data collector would put a/through the box that corresponded for that day and place. If the participant gave an error response the data collector made a 0 in the box that corresponded to the day and place.

Interobserver agreement was collected 40% of the time, over 22 occasions of data collection. Each time interobserver agreement was taken; the first author took primary data while an IA or another student teacher within the school, took data for reliability purposes. Interobserver agreement was always collected simultaneously but independently, so when reliability was being taken an IA or another student teacher would go along with the author and participant to the different places throughout the school and record the responses. At the end of the study the data sheets were compared to calculate the number of agreements versus disagreements to get the percentage agreement per day. An agreement between data collectors was when primary and reliability markings for each respective day and place had the same marking. A disagreement between data collectors was when there was a discrepancy between the primary and reliability markings for each respective day and place. Dividing the number of agreements, by the number of agreements plus disagreements, and then multiplying the quotient by 100 yielded the percent of agreement or reliability. Reliability for this study was 100%.

Experimental Design and Conditions

An ABCD single-subject-baseline design (Kazdin 1982) was used to evaluate the effects of using visual prompts and a fading procedure to learn “Where are you?” The four phases of this study were baseline, visual prompts paired with a model. lead test procedure, a fading procedure, and a no prompts phase. They were employed with both set 1 and set 2 locations.

Baseline

During baseline, the author went to nine different places around school with the participant and asked “Where are you?” The participant was to respond how ever he could but could have no prompts. The author acknowledged each response and recorded the response as correct or error. The first author then split the nine places down in to two sets; Set 1: small playground, big playground, Amanda’s room, parking lot, gym; Set 2: hallway, kitchen, bus, office. Baseline was taken on Set 1 for 2 days, and later for Set 2 for 2 days.

Visual Prompt and Model, Lead, Test Procedure

The first intervention was a model, lead, test procedure paired with a visual prompt. The author took the participant to each place and asked “Where are you?” Then the first author would show a white board with the correct answer on it, i.e. At the small playground, and carry out a model, lead, test procedure with the visual prompt available the whole time. During this phase the participant was asked “Where are you?” four times and this completed the trial for that place. After each correct response verbal praise and/or tickles were given to the participant. The first author would then move on to the next place and repeat this procedure. This procedure was the second phase for both sets of places.

Fading Procedure

This procedure was used once the visual prompt procedure was firm (three consecutive trials with at least 80% accuracy). During this procedure the first author started with the full answer showing on the white board, and on every question during the trial erase a word, starting with the last word. For example the author would ask “Where are you?” with at the small playground showing on the board, the participant would answer with “At the small playground” then the author would erase playground and ask again. The author would continue to erase words in order, if the participant answered the previous question in the trial correctly. Verbal praise and/or tickles were given for each correct response. If the participant didn’t answer correctly the full prompt was added again. At each place “Where are you?” was asked four times with the fading procedure in place. When the participant started become more firm (at least 60% accuracy), the author would start with just the prompt At/In the _____, and then from there the author faded to nothing on the board to no board. At this point participant was ready for the next phase.

No Prompts

This was the final phase in this study. This served as a generalization probe across untrained settings (Stokes and Baer 1977). The purpose of this phase was to see if the participant has acquired the concept of “Where are you?” In this phase no prompts were provided, and different (untrained) places were employed, When asked “Where are you?” the participant was to respond. If the participant could not correctly answer for the first trial, this response was scored as an error. Then the first author would ask the question again and verbally model the answer. When then asked the question three more times to complete the trial. If the participant made a correct response on the first try, verbal praise and/or tickles were given then that trial was over and the author and participant went to the next place.

Results

The data indicates improvement in his responding to “Where are you?” This was especially evident when visual prompts were employed, and during the fading

procedure. During two sessions of baseline for Set 1 and 2 sessions of baseline for Set 2, the median number of correct responses to “Where are you?” was 0.0. This was compared with Set 1’s 12 sessions of a visual prompt and fading procedure resulting in a median number of correct responses to “Where are you?” of 5, an average of 4.75, with scores ranging from 4 to 5. With five being the maximum correct. And Set 2’s five sessions of visual prompting and fading procedures resulting in a median number of correct responses to “Where are you?” of 4, an average of 4, with no range in scores, four was the maximum correct for Set 2. The final phase of the intervention was no prompts, and Set 1 had eight sessions of no prompts resulting in a median number of correct responses to “Where are you?” of 4, an average of 4 and a range of 3–5. Set 2’s no prompt phase, had a mean and median of 4.0 for corrects.

During two sessions of baseline for Set 1, and Set 2, the median number of learning opportunities for the concept of “Where are you?” was 5.0. This was compared with Set 1’s 12 sessions of visual prompts and fading procedure resulting in a median number of learning opportunities for the concept of “Where are you?” of 0, with scores ranging from 0 to 1. And Set 2’s five sessions of visual prompt and fading procedure resulting in a median number of learning opportunities for the concept of “Where are you?” of 0. For Set 1’s no prompt phase, of eight sessions, the median number of learning opportunities was also 0, with an average of .8, and a range of 0–2. Set 2’s three sessions of no prompting, had a median number of learning opportunities of zero.

Results from Fig. 1 show an accelerating data path that remains stable, from the number of correctly answered “Where are you?” This was replicated during the visual prompt and fading procedure phases. Generalization to new settings was observed across both sets.

A statistical analysis of the outcomes using a repeated measures Analysis-of-Variance was carried out. A significant difference for treatments was found ($F=26.375$; $df=7$; $p=0.0002$). The Fisher PLSD follow up tests were significant for fading vs baseline, baseline vs visual prompts; baseline vs fading, and baseline vs no prompts for Set 1. For Set 2, significant Fisher PLSD follow up tests were found for baseline vs. visual prompts, and baseline vs. fading, and baseline vs. no prompts.

Discussion

Through the implementation of a model, lead, test, procedure with visual prompts paired with a fading procedure, the participant’s ability to answer “where are you?” increased. The implementation of this program was successful in teaching the participant “where” questions. The use of least prompts also extends and replicates the work of others (e. g. Billingsley and Romer 1983; Earles *et al.* 1998; Steed and Lutzker 1997, 1998; Taber *et al.* 1998) using various prompting procedures. It also provides a partial replication of the model, lead, and test procedures described in the Delli-Sante *et al.* (2001) with a children with learning disabilities.

These procedures were practical and effective. They were clear and straight forward enough, that most care providers or teachers should be able to implement them.

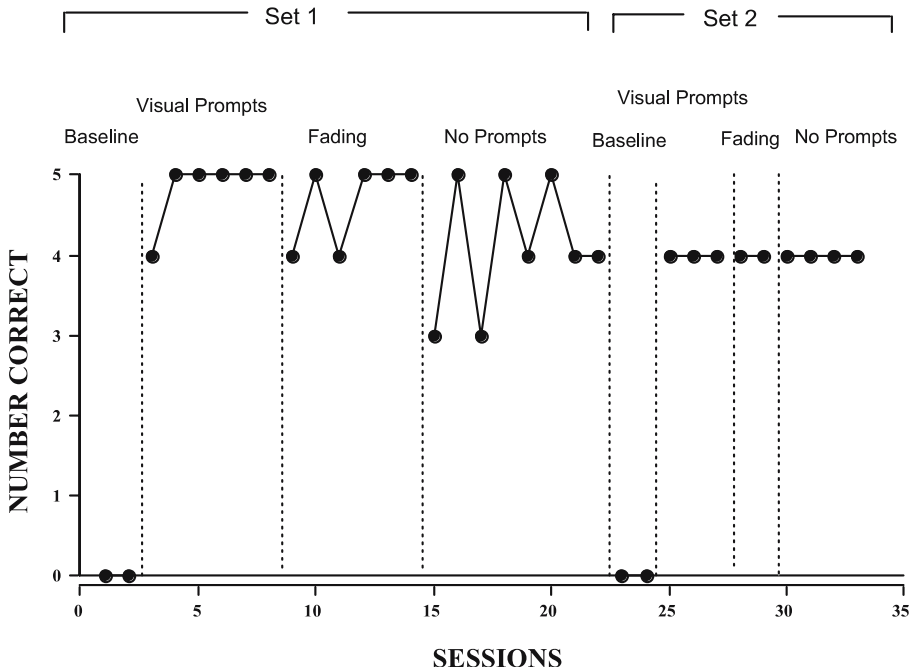


Fig. 1 Results of Set 1’s “where are you?” responses out of a possible five for all four phases for baseline, visual prompt, fading prompts, and no prompts and for Set 2 out of a possible four

On certain days, it was difficult to take the time to take the participant to all the places in the school. Also on certain school days it was difficult to leave the classroom. On other days, classroom activities ran long so the participant would have to go on his “where walk” at recess. The participant enjoyed going on his “Where are you?” walk. This appeared to be a natural reinforcer for him and thus it was easier to get him to respond and participate. When the participant was correct the first author also provided him with verbal praise and tickles.

This procedure was not only successful in teaching the selected places employed in the study, but appeared to generalize the concept of “where” to other places in the school. This was documented on the last day of data for the study. The first author decided to pick a place not employed in the training. The first author and participant went in to a bathroom located in the school that had never been employed. The researcher asked “Where are you?” and the participant answered with “At the potty.” This provides some possible evidence that the participant understood the concept of “where” and had generalized these skills to other non-trained places (Stokes and Baer 1977). Seven school days later, first author employed an additional places not used in the training (the quiet room. When he was asked and he answered correctly to “Where are you?” The participant responded “The quiet room.” We also probed his behavior but across other individuals. This was assessed by having persons other than the first author ask “Where are you?” at the different times though out the study. These individuals included people passing by in the hall or playground, and other adults who were employed at the school. This was assessed during the no prompts stage. This stimulus change could account for the variability in corrects for Set 1.

A week after formal data collection, a follow up session was conducted. The first author and classroom teacher would ask the participant where he was at different times and places throughout the school day. For each of these occasions he responded correctly. These findings provide some initial evidence that these procedures could be maintained across different settings, and individuals.

The school officials were very pleased with the participant's progress and that an individual education plan (IEP) goal had almost been met. The classroom teacher indicated she would continue with the "Where are you?" questions. Due to the ending of the first author's student teaching we were unable to introduce "Where did you go?" near the end of the study.

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References

- Alberto, P., & Troutman, A. (2006). *Applied behavior analysis for teachers* 7th ed. Upper Saddle River, NJ: Pearson.
- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* 4th ed. Washington, DC: APA.
- Billingsley, F. F., & Romer, L. T. (1983). Where are the generalized outcomes: An examination of instructional objectives. *Journal of the Association for the Persons with Severe Handicaps*, 11, 176–181.
- Delli Sante, A., McLaughlin, T. F., & Weber, K. P. (2001). The use and evaluation of a Direct Instruction flash card strategy on multiplication facts mastery with two students with ADHD. *Journal of Precision Teaching and Celeration*, 17, 268–75.
- Earles, T. L., Carlson, J. K., & Bock, E. (1998). Instructional strategies to facilitate successful learning outcomes for students with autism. In R. L. Simpson, & B. S. Myles (Eds.), *Educating Children and Youth With Autism* (pp. 75–77). Austin, TX: Pro-Ed.
- Engelmann, S., & Becker, W. C. (1982). *Theory of instruction: Principles and applications*. New York: Irvington.
- Gast, T., & Wolery, M. (1987). Severe maladaptive behaviors. In M. Snell (Ed.) *Systematic instruction for people with severe handicaps* (3rd ed.) Columbus, OH: Merrill.
- Heward, W. L. (2006). *Teaching exceptional children: An introduction to special education*. Upper Saddle River, NJ: Pearson.
- Kazdin, A. E. (1982). *Single case research designs: Methods for clinical and applied settings*. New York: Oxford University Press.
- Lignugaris-Kraft, B. (2004). Applying direct instruction principles to new content. In N. E. Marchand-Martella, T. A. Slocum, & R. Martella (Eds.) *Introduction to Direct Instruction* (pp. 280–303). Boston, MA: Pearson.
- Lovaas, I. O. (1981). *Teaching developmentally disabled children: The me book*. Austin, TX: Pro-Ed.
- Marchand-Martella, N. E., Slocum, T. A., & Martella, R. (2004). *Introduction to direct instruction*. Boston, MA: Pearson.
- Morgan, D., & Jenson, W. L. (1988). *Teaching behaviorally disordered students: Preferred practices*. Columbus, OH: Merrill.
- Nelson, C., & Snow-Huefner, D. (2003). Young children with autism: Judicial responses to Lovaas and discrete child training debate. *Journal of Early Intervention*, 26, 1–19.
- Steed, S. E., & Lutzker, J. R. (1997). Using picture prompts to teach an adult with developmental disabilities to independently complete vocational tasks. *Journal of Physical and Developmental Disabilities*, 9, 117–133.

- Steed, S. E., & Lutzker, J. R. (1998). Recorded auditory prompts: A strategy to increase independent prevocational tasks by mentally retarded adolescents. *Behavior Modification, 23*, 152–168.
- Stokes, T., & Baer, D. M. (1977). An implicit technology of generalization. *Journal of Applied Behavior Analysis, 10*, 349–367.
- Taber, T. A., Alberto, T. A., & Fredrick, L. D. (1998). Use of self-operated auditory prompts by workers with moderate mental retardation to transition independently through vocational tasks. *Research in Developmental Disabilities, 19*, 127–145.
- Wacker, D. P., & Berg, W. K. (1983). The effects of picture prompts on the acquisition of complete vocational tasks by mentally retarded adolescents. *Journal of Applied Behavior Analysis, 16*, 417–433.
- Watkins, C., & Slocum, T. A. (2004). The components of direct instruction. In N. E. Marchand-Martella, T. A. Slocum, & R. Martella, (Eds.) *Introduction to direct instruction* (pp. 28–65). Boston, MA: Pearson.

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