The Effects of Differential Observing Responses on the Acquisition of Observational Learning

THESIS

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Abstract

This study examined the effects of differential observing responses within an observational learning procedure on the state name identification skills of two children with autism. The differential observing responses were a) vocal imitation of a peer with a matching to sample response, and b) vocal imitation of a peer with a pointing response. An alternating treatment with an embedded reversal design showed that for one participant, both observing responses resulted in the acquisition of states’ names. For the second participant, the vocal imitation plus pointing response resulted in faster acquisition of see-say state naming. Limitations, implications for practitioners, and directions for future research will be discussed.
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Chapter 1: Literature Review

Observational learning is demonstrating novel operants by observing peers engaging in a behavior and contacting the contingencies without the observer actually experiencing the contingencies immediately (Catania, 1998; Taylor & DeQuinzio, 2012). Novel operants involve new responses emitted in a new situation. Consider, for example, a child who sees a peer put homework in a bin and hears the teacher respond, “Yes, thank you! That is where your homework goes.” After that, the child, having not experienced the contingent praise himself, puts his homework in the bin. In this case, the child observed a peer emitting a response and contacting the reinforcement contingency, and in this way learned to emit the desired behavior in a given situation (i.e., putting completed homework in the proper location).

Typically developing children often acquire new responses after watching another person emit that response and then receive contingent consequences without direct instruction (Deguchi, 1984). Because typically developing children often learn by observing others instead of being explicitly taught, some consider observational learning to be a behavior cusp (Pereira-Delgado & Greer, 2009).

Observational learning can promote instructional efficiency during whole group instruction. Many children with autism receive intensive, one-on-one direct instructional therapy and need personal aides in the classroom. This intensive approach can be expensive for schools and caregivers (Matson, Adams, Williams, & Rieske, 2013; Smith,
Observational learning is important for children with autism because it can reduce instructional time by allowing these students to observe and learn from their peers’ learning, thereby also reducing costs. Children with autism may lack socially significant behaviors and may exhibit difficulty discriminating context cues. By teaching them to observe and imitate, observational learning may also lead to socially relevant behaviors and social integration opportunities.

Researchers have identified three separate skills that are needed in order for observational learning to occur. In order to learn through observing others, one must be able to (1) engage in delayed performance, (2) attend to stimuli, and (3) discriminate between contingencies (Taylor & DeQuinzio, 2012).

Varni, Lovaas, Koegel, and Everett (1979) compared the effects of watching an adult model perform a specific behavioral sequence (i.e., observational learning) on the acquisition of a novel skill among children with and without autism. Their results showed that children with autism did not acquire the novel operants through observing others as did their typically developing peers. This suggests that children with autism may have deficits in the skills needed for observational learning.

Many children diagnosed with autism do not imitate readily (Smith & Bryson, 1994). An imitative behavior is a new behavior emitted immediately following a novel antecedent event (Cooper, Heron, & Heward, 2007). A review of 21 studies involving 281 children with autism concluded that younger children in particular do not imitate like their typically developing peers (Williams, Whiten, & Singh, 2004). In a study comparing the performance of typically developing children, children with intellectual disabilities,
and children with autism, Sigman and Ungerer (1984) found that the children with autism showed clear deficits in imitation.

A more advanced imitative skill is the ability to perform a behavior after a delay (Garcia, 1976). Delayed performance has been defined as “behavior that can be performed later and in the absence of the model whether or not it is performed at the time of modeling” (Deguchi, 1984, p. 84). For example, if one claps her hands in front of a baby for the first time and the baby immediately claps his hands, he has just imitated a novel or new behavior. If the baby does not clap his hands right away but claps a minute later, it would be considered delayed performance. However, no research to date has been conducted to determine whether children with autism have this skill. Future research is needed in the assessment of delayed performance skills among children with autism.

Delayed performance is one of the three prerequisites to observational learning (Deguchi, 1984; Taylor & DeQuinzio, 2012). In the example where a child saw his peer put homework in a certain spot and receive reinforcement for it, the child would have put his homework in the same spot when finished, if he had imitative and delayed performance skills. Deficits in delayed performance in some individuals with autism can impede acquisition of novel, adaptive skills via observational learning.

In order to discriminate between contingencies, one must differentiate between consequences such as reinforcement and punishment (DeQuinzio & Taylor, 2015). Discriminating contingencies relates to observing consequences that follow other peoples’ behavior as well as one’s own behavior, and then adjusting future performance accordingly. For example, if a student answers a question and the teacher says, “No, that
is wrong,” discriminating between contingencies allows the student to learn that his answer was incorrect rather than correct and that response will therefore decrease in the future presentation of that instructional antecedent (Taylor & DeQuinzio, 2012). Within the context of observational learning, the skill of discriminating between contingencies is important because it informs the person whether he or she should repeat the behavior that was emitted by the model.

Discriminating contingencies is critical for observational learning in academic as well as in nonacademic or social contexts. Attending to peers’ responding to others can help the observer know how to behave and react to his or her peers. For example, if a child sees a peer throw a basketball at another child and the peer subsequently receives negative attention from the other students, the observing child may learn through observation not to throw a basketball at someone (Taylor & DeQuinzio, 2012). Observational learning may allow a child to learn, without directly contacting contingencies, which behaviors are likely to be reinforced or punished by his peers simply by observing his peers’ reactions to each other.

Little research has been conducted to test whether children with autism can learn to discriminate between contingencies when directed at the behavior of another. However, the research that has been conducted has shown promising results. Pereira-Delgado and Greer (2009) found that two children with autism were minimally successful in learning by observing others; yet, the children were effectively taught to discriminate between accurate and inaccurate responses of peers, thus facilitating the outcomes of observational learning. The dependent variable was two sight words that were already in...
the participants’ repertoires, but not in the peers’ repertoires. The participant observed as
the teacher presented and the peer responded to each word, and the consequences that
were provided by the teacher. Then, the participant responded accordingly when
presented each word and received either reinforcement or corrective feedback. In the
second phase of this study, the words were unknown to the peer and known to the
participant. In this stage, the participant had the opportunity to respond to the peer’s
response before the teacher. In the last stage, words were unknown to both the peer and
participant, and the participant had the chance to respond before the teacher. Results
showed that following the three-stage monitoring intervention, participants had a higher
level of correct responding.

In a similar study, DeQuinzio and Taylor (2015) were successful in teaching four
children with autism to discriminate contingencies through explicit instruction. When an
adult model emitted an incorrect response after being asked, “What’s this?” and was
given negative feedback, the participants were taught to say, “I don’t know” in response
to the same stimulus. When the adult model emitted a correct response after being asked,
“What’s this?” and was given positive feedback, participants were taught to repeat the
response the adult model gave. However, when testing generalization with a new set of
stimuli, only one participant demonstrated discrimination.

Being able to focus and sustain attention is important. Without attending to a
stimulus when a peer is modeling the correct response, observational learning cannot
occur. Observational learning requires orienting towards the stimuli, sustaining attention
on the stimuli, and shifting attention from the stimuli to the consequence following an individual’s response (Patten & Watson, 2011).

Children with autism have deficits in their skills of attending to instructional stimuli, so much that it may have serious negative effects in their social, communicative, and academic lives. Areas of attending in which children with autism demonstrate deficits include orienting, sustaining, shifting, and joint (Patten & Watson, 2011). All of these attending skills are necessary for social interactions and academic learning. Typically developing children use eye contact, physical gestures, joint attention bids, and other attentional responses necessary for social and instructional interactions so that they may share experiences with others (Mundy & Neal, 2001).

Given the role of attending skills in observational learning, they present as a necessary behavior for teachers to monitor. There are currently many different methods of measuring attending which require differential observing responses (DOR) (Fisher, Kodak, & Moore, 2007; Leekam, Hunnisett, & Moore, 1998; Patten & Watson, 2011). DORs occur when the child emits a different response for each stimulus (Dube & McIvane, 1999).

Differential observing responses have been used to reduce overselectivity and restricted stimulus control. Many children with autism respond to a part of a relevant cue in the environment, instead of the whole stimulus (Lovaas, Koegel, & Schreibman, 1979). For example, if a child learns to tact “dog” when given a picture of a dog and then he tacts all animals with fur as dogs, the feature of being furry has restricted stimulus control over the response “dog.” Another example is when the child is presented with the
words, “cat,” “cab,” and “car,” and a picture of a cat and is told to match it to the word, but he pairs it with an incorrect word. This incorrect response is likely under the control of irrelevant stimuli (i.e., the first two letters “ca”) rather than the critical stimulus (i.e., the third letter, “t”). Researchers have conducted studies determining the effects of different DORs to minimize overselectivity and restricted stimulus control. Walpole, Roscoe, and Dube (2007) found that a DOR of matching-to-sample of the whole word and partial word helped a child with autism distinguish between words that had overlapping letters. When matching the word “cat” the researchers had the participant first match the letter “t” among an array of three letters (i.e., “t”, “r”, and “n”) and then match the word “cat” among an array of three words that have two overlapping letters (i.e., “cat”, “car”, and “can”). Dube and McIlvane (1999) required participants to emit a matching-to-sample response when given two stimuli simultaneously. During baseline, three individuals with intellectual disabilities were presented two stimuli (e.g., AB) and asked to match one of the stimuli to a comparison among an array (i.e., A, B, and C). During the procedure, the participants were shown the two stimuli (i.e., AB), and asked to match to the corresponding stimuli (i.e., AB, BC, and CA), while the stimuli was still presented. Immediately after, the participants were shown both stimuli (i.e., AB) then asked to match one of the stimuli among an array of three (i.e., A, B, and C), with the stimuli being removed. When presented with the stimuli simultaneously, the participants were then able to match to the corresponding stimuli; however, when the DOR was removed, responding returned to baseline scores (Dube & McIlvane, 1999).
Ensuring children are attending to the target stimulus is a critical component of the evaluation of observational learning; therefore, many authors have used a variety of differential observing responses. Much research has been conducted with children with developmental disabilities. Shoen and Ogden (1995) demonstrated the effects of a writing response versus a visual response on reading sight words during group lessons with one child with an intellectual disability and two who were considered at-risk for academic failure. For all three children, results showed that the number of sessions to mastery criteria was fewer when the specific attentional cue of writing the word was implemented. Griffen, Wolery, and Shuster (1992) examined the effects of observational learning on three children, with moderate intellectual disabilities, ages 3–13, when turning a page in a recipe book for a peer. The peer was learning how to make the recipe, and the observing students were turning the pages for the peer. Each observer learned how to make the recipe with at least 85% accuracy on the steps, without direct instruction. In a similar study, Werts, Caldwell, and Wolery (1996) successfully taught three children with developmental delays to complete response chains after viewing a peer model complete the chain while also vocally describing each step he was completing. The combination of visual and auditory prompts was effective in facilitating skill acquisition. Mechling, Gast, and Krupa (2007) studied the effects of watching peers learn words via SMART Board on the observational learning of three students diagnosed with moderate intellectual disabilities. Students ranging in age from 9-10 learned to read and match target words through constant time delay (CTD) and SMART Board technology when sitting in a group. The experimenters then probed the students on
matching and reading each other’s words (i.e., observational learning). All students were able to read and match some of the observational words, some reaching 100% accuracy.

More recently, research has been conducted with children with autism to assess their acquisition of observational learning. Most of the existing literature has included differential observing responses to facilitate the acquisition of observational learning; however, the types of attending prompts have varied across studies. Among the least intrusive prompts to make the stimuli more prominent and evoke DORs were those used in a study conducted by Charlop, Schreibman, and Tryon (1983). Participants included four low-functioning children with autism, and the peer models were also children with autism. The authors demonstrated that when taught by a peer model, the participants were able to master the target skill and the skill generalized better than when taught by trial-and-error. They used a simple vocal prompt (i.e., “pay attention”) when it was observed that the child’s attention was wandering. Ledford, Gast, Luscre, and Ayres, (2007) used two different attending prompts to help children with autism learn to read words through observation. A general attentional cue (i.e., “Look,”) and a specific attentional cue (i.e., “Tell me the letters,”) were used to evoke observing responses and enhance the outcomes of observational learning. Results showed that five of the six participants learned 100% of at least two of the three word sets. The two cues were not separated and therefore it is unknown whether both were necessary to attain the same rate of acquisition of sight words.

Similarly, Taylor, DeQuinizio, and Stine (2012) taught 3-5 year-old children with autism observational learning by using a vocal imitation and matching to sample response
prompt. In the training condition, a peer read a word, then the experimenter asked the participant what the peer said. The participant was then required to match a chip to the correct stimulus on the table in front of him or her. An exposure setting condition was then presented during which a peer model was presented without a DOR procedure. In other words, the participant was not told to imitate or match, he just sat and listened. The participants acquired the skills quicker under the monitoring condition than in the latter situation, and accuracy remained higher during maintenance probes for those words taught during training session compared to the exposure words.

There is a gap in the literature on assessing the effects of different attending responses on the outcomes of observational learning among children with autism. Many studies have taught observational learning to children with autism but have not narrowed down the least intrusive attentional prompt needed in order to acquire observational learning. In order to promote generalization, one should incorporate the stimuli that the learner will most likely come in contact with in the generalization setting (Cooper, Heron, & Heward, 2007). Incorporating the least intrusive prompt into instruction can help to facilitate acquisition of novel responses through observational learning, and it may be easier and more efficient to fade the stimulus prompt when a least intrusive prompt is used.

The purpose of the current study was to examine the effects of two different observing responses: (a) a vocal plus matching-to-sample response, and (b) a vocal plus a pointing response. Research suggests that the use of an attending prompt to make the stimuli more prominent and to evoke observing responses can help improve observational
learning. Research also suggests that observational learning can improve the ability of children with autism to learn in a group setting by looking to peers for help, thus potentially reducing instructional time and financing and facilitating an easier transition into inclusive settings (Charlop-Christy, Le, & Freeman, 2000). Children with autism struggle to attend, engage in delayed performance, and discriminate between contingencies when not directly contacting those contingencies. Improving observing behavior can help them with these goals. The goal of this study was to extend the research on observational learning by replicating the study conducted by Taylor et al. (2012), by examining whether children with autism can obtain the skill of observational learning with the vocal and match-to-sample observing responses. In addition, the purpose of this research was to extend Shoen and Ogden’s (1995) findings by comparing different observing responses among children with autism. The study aimed to address the following questions:

1. What are the effects of using a vocal attending response plus a matching-to-sample response versus a vocal plus a pointing attending response on the acquisition of novel skills through observational learning?

2. What are the effects of OL on maintenance in the presence of a peer model but the absence of the observing responses?

3. What are the effects of OL on maintenance in the absence of the peer model and observing response?

4. What are the effects of using peers with autism within the classroom to serve as models on the acquisition of novel skills?
Chapter 2: Method

Participants and Setting

In order to participate in this study, the participants had to (a) be 6 to 10 years old, (b) be diagnosed with autism, (c) have echoic skills, (d) have matching-to-sample skills, and (e) have IRB-approved parental consent. The participant and peer were selected from a private permanent charter school that served over 275 children with autism and developmental disabilities in the Midwest region of the United States. Three children with autism participated in this study: one peer and two participants. The participants, Liam and Sam, were 10-year-old boys. The peer to Liam, Opal, was a 10-year-old girl. Opal was the peer in the beginning with Sam, but then Liam became the peer after he reached mastery for the study as a participant. Liam and Opal were in the same classroom for half of the school day, and Liam and Sam were together with other students during free time, specials, and lunch. All sessions took place in a room furnished with tables and chairs, but devoid of people outside of the study, and were implemented by the first author. Training sessions occurred in the mornings before classroom instruction began and in the afternoons before the students went home. Three to 10 sessions occurred per week.

Experimenter
The experimenter was a graduate student attending a large university, working toward her master’s degree in applied behavior analysis. During her undergraduate program she received her moderate/intensive intervention specialist licensure. At the time of the study, she had four years of experience working with children with autism and other developmental disabilities.

Materials

Twenty-four pictures of America with outlines of the states were printed on 17.78 cm by 11.43 cm cards (see Appendix A). Each picture represented one of the eight states targeted for the study (i.e., the state was shaded grey), and each of the eight states was represented on three separate cards, for a total of 24 cards. All states were unknown to the participants, determined through a preassessment described below. A small kitchen timer, data collection sheets, and a pencil were also used. In addition, the experimenter downloaded the Motivaider® application on her iPhone®, and this was used with one participant to signal the experimenter to provide noncontingent reinforcement (i.e., praise) on a fixed-interval (FI) schedule.

Definition and Measurement of Dependent Variables

The dependent variable was the percentage of correct responses during testing. Correct responses were defined as the student independently saying the state correctly within 5-s when presented with the stimulus and asked, “What state?” Peer responses and the participant’s monitoring responses during the training condition were also recorded. Correct responses by the peer were defined as the peer independently saying the state correctly within 5-s when presented with the stimulus and asked, “What state?” An
incorrect response by the peer was defined as the peer saying the incorrect name of the
stimulus or giving no response within 5-s. Correct monitoring responses by the
participant were defined as the participant independently saying the state correctly within
5-s when asked, “What did she say?”, independently touching the state within 5-s when
asked/gestured to “point” (V+P), and independently matching the correct state in an array
of four different states (V+MTS). Incorrect monitoring responses were defined as the
participant incorrectly naming the state, and needing least-to-most physical guidance
when pointing and matching when not responding independently within 5-s.

**Inter-observer agreement (IOA)**

A second trained observer collected data for at least 33% of all sessions. IOA was
calculated by point-to-point agreement during intervention and testing sessions for
participant responses. An agreement was counted if the experimenter and observer both
marked a response as correct or incorrect. A disagreement was counted if one marked a
response as correct and the other marked it as incorrect. Total agreements were divided
by the number of agreements plus disagreements and then multiplied by 100 to convert it
to a percentage. The mean agreement for correct response across phases was 99.4%
(range 92% to 100%) for Liam and 99% (range 92% to 100%) for Sam.

**Procedural Fidelity**

In order to assess the integrity with which the experimenter implemented the
intervention, an independent observer used a task analysis of the session and recorded a
correct response each time the experiment accurately implemented one of the
corresponding steps prescribed on the task analysis. Procedural fidelity was assessed for
at least 33% of all sessions for Liam and Sam. It was calculated by dividing the number of steps completed accurately by the total number of steps and then multiplying by 100. Mean accuracy for Liam was 100%, and 99.86% (range 99% to 100%) for Sam. The experimenter used the procedural fidelity checklist as a guide to implement each session (see Appendices B and C).

Pre-Test

Eight states that were unknown to the participants were used in the intervention. The experimenter presented a picture map of America, with a state shaded grey to the participant three times in a random order. If he named the states incorrectly all three times, it was considered unknown and used in the study. For Liam, Set A consisted of Alabama, Indiana, Iowa, and Kentucky, and Set B consisted of Wisconsin, Arkansas, Missouri, and Illinois. For Sam, Set A consisted of Alabama, Indiana, Iowa, and Virginia, and Set B consisted of Wisconsin, Arkansas, Missouri, and Illinois.

Peer Training

The peer sat at a table with the experimenter sitting on the opposite side. The experimenter used an “I do, You do” procedure to teach the peer the states, followed by a 30-s timing during which the peer went over the state cards and named each one independently. During the instruction, the experimenter held up the stimulus, asked, “What state?”, immediately gave the correct response and then said, “Your turn, what state?” A correct response was followed by praise from the experimenter. An error correction procedure including vocal prompting was planned contingent upon incorrect responses, but during the actual peer training sessions no incorrect responses were given
by the peer. The experimenter followed this procedure with one set of states three times prior to the 30-s timing. This continued until the peer named all states correctly during the 30-s timing across three trials. Then the second set of states was introduced in the same manner.

A brief mastery review was conducted with the peer before each intervention session with the participant began. The experimenter held up each state to the peer and asked, “What state?” If the peer answered correctly for each state, the experimenter proceeded with the intervention with the participant. If the peer answered incorrectly, the experimenter implemented an, “I do, You do” procedure three times for that state, and then the peer was asked to go through the pile of 12 states and name them. This mastery review session continued until the peer named the states independently with 100% accuracy.

**Experimental Conditions**

**Baseline (peer model only).** The peer and participant sat next to each other with the experimenter sitting on the opposite side of the table. The experimenter showed the peer the stimulus and asked, “What state?” Each of the four states was presented in a random order three times. The experimenter never instructed the participant to look or pay attention. The peer was praised after giving a correct answer. The testing condition occurred one min after the 12 presentations of the stimuli. The experimenter sat on the opposite side of the table from the participant, showed the participant the stimulus, and asked “What state?” The experimenter gave no feedback to the participant on whether he
was correct or incorrect. Correct and incorrect responses were recorded. Starting with the second participant, noncontingent praise was given during testing sessions every 10 s.

**Intervention (peer model plus DOR).** The intervention procedure was similar to that of baseline except that the participant was asked to engage in one of two observing responses: a vocal plus matching response (V+MTS), and a vocal plus pointing response (V+P). The participant and peer sat next to each other with the experimenter sitting on the opposite side of the table. Each intervention session consisted of 12 trials, with a set of four stimuli presented in a random order, each presented three times.

In the V+MTS condition after the stimulus was presented, the peer was asked, “What state?” and then praised for a correct answer. Then the stimulus was shown to the participant. The experimenter asked the participant “What did she say?” and then requested the participant to initiate a match-to-sample response. There was an array of four stimuli, and the participant was given a sample stimulus and asked to match it to the comparison stimulus among the array. If the participant correctly answered the vocal question, he was praised. If not, the experimenter told the participant, “Try again; listen,” and the peer was asked to name the state again. The experimenter then asked the participant again and praised him for a correct answer. If an incorrect answer was given again, the experimenter moved on to the next trial. If the participant provided a correct vocal answer and an incorrect match-to-sample response, a least-to-most prompting procedure was to be used to prompt the correct response. To prompt a correct response, the experimenter would have started with a pointing prompt to the correct card, followed...
by hand-over-hand physical guidance; however, this procedure was not used because the participants did not emit incorrect responses during the intervention.

V+P followed the same procedure as V+MTS except that after the participant was asked what the peer said, the experimenter requested him to point to the stimulus, instead of emitting a matching response.

The testing condition occurred 1 min after each intervention session and the procedure of testing was the same as that in baseline.

**Maintenance.** The experimenter tested Liam to assess if the skill of labeling the states maintained on the day when the intervention was completed and one week later. Sam was probed for maintenance two days after reaching mastery and 11 days later. To assess, the experimenter sat on the opposite side of the table as the participant, held up a card and said, “What state?” Each state was presented three times for a total of 12 trials. Sam received noncontingent praise during maintenance on an FI 10-s schedule.

**Experimental Design.**

An alternating treatments and reversal design was used to evaluate the effects of two observing responses (V+MTS and V+P) on the acquisition of target skills through observational learning. V+MTS consisted of a vocal plus a match-to-sample response with Set A. V+P consisted of vocal plus a pointing response with Set B. The order of the two treatment conditions was counterbalanced throughout. Each session consisted of 12 trials, with each state being presented three times. One min after each session, a testing session occurred that was used to determine mastery. For Sam, in order to minimize multiple intervention interference, the experimenter isolated the treatment that was
reaching mastery quicker. That is, the experimenter began only using V+P to bring Set B to mastery and, subsequently, Set A to mastery. Upon reaching mastery with both sets, the experimenter reinstated baseline conditions (i.e., peer model only) with the participants to determine whether their responses during testing sessions were controlled by the observing responses. Sam received noncontingent praise on an FI 10-s schedule.

Social Validity

Upon completion of the study, the experimenter gave the participating teachers a 5-point rating scale asking them about the goals, procedures, and outcomes of the study (see Appendix D). Additional space was provided for them to write any other comments regarding areas not addressed within the questions. Questionnaires were collected by a third party in order to preserve anonymity. When asked whether their students had opportunities to learn by watching a peer and whether it would be beneficial, two teachers marked mostly/completely and the third marked neutral and very little. Two teachers were neutral when asked if observational learning would increase the efficiency of one-on-one instruction and the third marked completely. All three teachers marked neutral or mostly when asked whether observational learning would increase efficiency of group instruction. When asked how feasible would it be to implement these procedures, two teachers marked neutral while the third marked mostly. All three teachers believed the time requirements and materials necessary were mostly/completely reasonable. Responses ranged from neutral to completely regarding whether the students observed others more frequently after participating in the study and whether the participating students required less one-on-one instruction.
Chapter 3: Results

Figures 1 and 2 show the percentage of trials with correct responding for Liam and Sam in each phase, respectively. For Liam, the percentage of trials with correct responding was 0% in the first baseline session, and he subsequently went into treatment. Liam named more states correctly during the testing condition following V+MTS for the first two intervention sessions, and then he named more states correctly following V+P during the next two sessions. Overall, there was an increasing trend for both treatments, with very little vertical distance between the two. Overlapping data points occurred throughout intervention until the last four sessions when responding during V+P reached 100% accuracy at Session 9 and correct responding during V+MTS went from being stable at 75% to reaching 100% accuracy at Session 11. Two days later, the accuracy maintained at 100% in the return to baseline, during which observing response prompts were removed and only peer modeling was presented. Maintenance probes occurred after the first session of the return to baseline and a week later. The percentage of correct responding during the test condition maintained during the probes for both sets of states.

In baseline, Sam was naming Kentucky correct on all three opportunities, and in order to allow for accurate comparison between the two treatments, Kentucky was replaced with Virginia after the third session. The percentage of trials with correct responding was 0% across two baseline sessions before intervention began. During intervention, Sam correctly named more states in the testing condition following V+MTS
for the first three sessions. On Session 4, accurate responding decreased following V+MTS, and increased following V+P. After the seventh session, having had four sessions showing higher accuracy following V+P, the experimenter isolated V+P. Sam immediately named all states in Set B with 100% accuracy. The experimenter then applied V+P to Set A. The percentage of states named correctly increased from 42% following V+MTS to 92% following V+P with Set A. Mastery was reached after three sessions in isolation with V+P. Percentage correct continued at 100% when the experimental condition returned to baseline. Maintenance probes occurred two and 11 days after baseline. Accuracy continued at 100% with Set B at the first probe, but decreased to 75% for Set A (with one state being wrong all three times). Set B decreased to 75% and Set A returned to 100% during the second maintenance probe.

**Figure 1**: Percentage of states named correctly across all phases for Liam
Figure 2: Percentage of states named correctly across all phases for Sam
Chapter 4: Discussion

Given that many children with autism have skill deficits necessary for observational learning, it is important to teach prerequisite skills. The purpose of this study was to determine the comparative effects of using a vocal attending response plus a matching-to-sample response versus a vocal attending response plus a pointing attending response on the acquisition of observational learning. This study effectively showed that for Liam when either observing response plus a vocal were emitted, he was able to learn from the peer; however, conclusions regarding which response combination was more effective are not warranted, as results were undifferentiated. Although the target skill reached mastery with V+P two sessions before V+MTS, these data do not clearly indicate that a vocal plus pointing response is more beneficial than a vocal plus matching-to-sample response. For Sam, only the echoic plus pointing response resulted in the target skill reaching mastery. Although V+MTS was initially more effective, V+P produced higher accuracy across more sessions. When the two sets were implemented in isolation with V+P, accuracy immediately improved for both sets. A possible explanation could be that V+MTS produced negative treatment interference effects, meaning that the results of V+P were hindered by the effects of V+MTS. When V+MTS was terminated, results improved immediately for V+P. Another possible explanation could be that noncontingent praise was delivered for Sam during testing conditions. Liam did not
receive noncontingent praise, which may have extinguished his answering behavior. That is, the peer received praise contingent upon correct answers, but the participant did not receive praise for correct responding during testing. Not receiving praise may have influenced his attending and responding. Providing noncontingent praise for the second participant may have yielded different results. For Sam, the findings may be more appropriately summarized by stating that a vocal plus a pointing response boosted the acquisition of novel stimuli via observational learning.

A conclusion that may be drawn from these results is that a vocal plus a pointing response could be used to help teach observational learning to children with autism. Past research has shown that differential observing responses have helped to reduce overselectivity (Walpole et al., 2007). Walpole et al. found that a matching-to-sample response of the critical letters helped their participant attend to the critical stimuli when reading words. The current study replicated those finding in that a differential observing response of a vocal plus pointing helped facilitate participants’ attention to critical stimuli.

These results also show that requiring a vocal plus observing response may facilitate maintenance of skills taught via observational learning for at least one week. In addition, the results of this study indicate that participants may in turn act as peer models after reaching mastery of skills taught via observational learning. Liam acquired the names of the states through learning from a peer and was able to accurately retain the names of the states, subsequently becoming the peer model for Sam.

Limitations
Although there are several promising implications of this research, several limitations should be noted. One limitation is that a treatment was not isolated with Liam. When isolating the treatment with Sam, the experimenter stopped the V+MTS with Set A, and implemented V+P only with Set B. When Sam reached mastery with Set B, the V+P was implemented with Set A. There is no way to determine whether one treatment was affecting the other in the absence of this isolation. Isolating a treatment may have shown to what extent the effect of one treatment was attributable to the other treatment that was in effect concurrently.

A second limitation is that there was only one baseline data point for Liam. Although this data point suggested that he did not observationally learn within one session, it is possible that he may have acquired some names of states during a second baseline session.

A third limitation is that the study did not evaluate any generalization of observational learning that may have occurred. Although results indicated that the participants learned to identify the states, it is unclear whether this skill would have occurred in other settings (e.g., the classroom, home) or with different stimuli. This is an important limitation to note because observational learning is important within classroom settings and being able to generalize this skill to other contexts in life could expand their learning. It is encouraging, however, to note that two teachers indicated “mostly” on the social validity survey that the student participants had begun observing their peers more frequently. This may suggest that the participants’ ability to engage in observational learning had generalized to the classroom.
Lastly, a fourth limitation is that both treatment conditions involved a package approach in that both incorporated a vocal response and an observing response. It is unclear whether the treatments were effective because of the vocal response, the observing response, or both. The responses were not tested in isolation; however, if only one was needed, it would further reduce instructional time.

**Future Research**

Future research is needed to address the limitations of the present study. To evaluate generalization, one could collect data on observational learning prior to the onset of intervention. After the intervention, data could be collected again to determine whether the participant has started to learn by observing his peers.

In order to determine the separate and combined effects of a vocal response, an observing response, and a vocal plus observing response on observational learning, one may conduct a component analysis to determine the comparative effects. Future research could also examine whether one observing response may have allowed the participant to practice the correct response more. For example, the experimenter noticed that during the V+P procedure, Sam would vocally repeat the state name while pointing. This may have led to a quicker rate of acquisition for that procedure because it allowed him to practice the correct response more often.

Future research could also examine the effects of observational learning in a group format for this population. Instead of focusing only on a participant and a peer, future research could address how observational learning and the prerequisites can be taught in a group setting. This research may be beneficial for teachers of children with
autism in classroom settings where two-on-one (i.e., participant, peer, and teacher) instruction is not feasible.

**Implications for Practitioners**

Results of this research provide several important implications for practitioners. On the social validity questionnaire, teachers indicated that this intervention would be feasible and that they would be willing to implement it. They also reported that it could be beneficial if used class-wide. For example, if for 10 min each day, teachers required students to work in partners, vocally repeating what their partners said and pointing to the stimulus, the teacher would spend less time throughout the year instructing students one-on-one. Teachers could set up the classroom so that peer models sit next to those students who need more individualized instruction. Opportunities for the individuals to engage in observing responses with their peers could be arranged. This would help the peer review target skills while helping the individual acquire those skills through observational learning.

Another implication for practitioners is determining the least intrusive yet most effective observing response. This study showed that a vocal plus pointing response was equally effective or more effective than a matching response. A pointing response requires fewer materials, less time, and less response effort from the participant. Even though Liam did not show a significant difference in the results of the matching versus pointing response, these factors may support the use of a pointing response over a matching-to-sample response.

**Conclusion**
These results replicated the findings of Taylor et.al. (2012) in that participants were able to acquire the target skill through observational learning when required to emit observing responses. It also extended Shoen and Ogden (1995) in that it compared the effects of two different observing responses.

Observing responses are not the only prerequisites necessary to teach observational learning; there are several other skills needed. Children must be able to attend, imitate, and discriminate between contingencies. Additional research is needed in these areas to further expand the literature on observational learning. The findings of this study are beneficial for teachers and practitioners working with students who have the prerequisite skills but who have not yet synthesized those skills to engage in observational learning.
References


Appendix A

Example of stimulus
Appendix B

Procedural Integrity Checklist of Baseline
<table>
<thead>
<tr>
<th>Date ____________________</th>
<th>IOA __________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant _____________</td>
<td>TX A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Iowa</th>
<th>Alabama</th>
<th>Kentucky</th>
<th>Indiana</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>To peer: “What is it?”</strong></td>
<td>C IC</td>
<td>C IC</td>
<td>C IC</td>
<td>C IC</td>
</tr>
<tr>
<td><strong>Peer Response</strong></td>
<td>C IC</td>
<td>C IC</td>
<td>C IC</td>
<td>C IC</td>
</tr>
<tr>
<td><strong>Researcher praises</strong></td>
<td>C IC</td>
<td>C IC</td>
<td>C IC</td>
<td>C IC</td>
</tr>
<tr>
<td><strong>If incorrect re-does steps</strong></td>
<td>C IC</td>
<td>C IC</td>
<td>C IC</td>
<td>C IC</td>
</tr>
<tr>
<td><strong>Wait 1 minute</strong></td>
<td>C IC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Asks Participant: What is it?</strong></td>
<td>C IC</td>
<td>C IC</td>
<td>C IC</td>
<td>C IC</td>
</tr>
<tr>
<td><strong>Participant Response</strong></td>
<td>C IC</td>
<td>C IC</td>
<td>C IC</td>
<td>C IC</td>
</tr>
</tbody>
</table>

Gives noncontingent praise every 10 s: (ONLY DURING TESTING SESSIONS)

<table>
<thead>
<tr>
<th>10s Y/N</th>
<th>20s Y/N</th>
<th>30s Y/N</th>
<th>40s Y/N</th>
<th>50s Y/N</th>
<th>60s Y/N</th>
<th>1 min 10s Y/N</th>
<th>1 min 20s Y/N</th>
<th>1 min 30 s Y/N</th>
<th>1 min 40 s Y/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 min 50 s Y/N</td>
<td>2 mins Y/N</td>
<td>2 mins 10 s Y/N</td>
<td>2 mins 20s Y/N</td>
<td>2 mins 30 s Y/N</td>
<td>2 mins 40 s Y/N</td>
<td>2 mins 50 s Y/N</td>
<td>3 mins Y/N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>IOA</td>
<td>Participant</td>
<td>TX B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------</td>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Arkansas</th>
<th>Missouri</th>
<th>Wisconsin</th>
<th>Illinois</th>
</tr>
</thead>
<tbody>
<tr>
<td>To peer: “What is it?”</td>
<td>C C C IC IC IC IC</td>
<td>C C C IC IC IC IC</td>
<td>C C C IC IC IC</td>
<td>C C C IC IC IC</td>
</tr>
<tr>
<td>Peer Response</td>
<td>C C C IC IC IC IC</td>
<td>C C C IC IC IC IC</td>
<td>C C C IC IC IC</td>
<td>C C C IC IC IC</td>
</tr>
<tr>
<td>Researcher praises</td>
<td>C C C IC IC IC IC</td>
<td>C C C IC IC IC IC</td>
<td>C C C IC IC IC</td>
<td>C C C IC IC IC</td>
</tr>
<tr>
<td>If incorrect re-does steps</td>
<td>C C C IC IC IC IC</td>
<td>C C C IC IC IC IC</td>
<td>C C C IC IC IC</td>
<td>C C C IC IC IC</td>
</tr>
<tr>
<td>Wait 1 minute</td>
<td>C IC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asks Participant: What is it?</td>
<td>C C C IC IC IC IC</td>
<td>C C C IC IC IC IC</td>
<td>C C C IC IC IC</td>
<td>C C C IC IC IC</td>
</tr>
<tr>
<td>Participant Response</td>
<td>C C C IC IC IC IC</td>
<td>C C C IC IC IC IC</td>
<td>C C C IC IC IC</td>
<td>C C C IC IC IC</td>
</tr>
</tbody>
</table>

Gives noncontingent praise every 10 s: (ONLY DURING TESTING SESSIONS)

<table>
<thead>
<tr>
<th>10s Y/N</th>
<th>20s Y/N</th>
<th>30s Y/N</th>
<th>40s Y/N</th>
<th>50s Y/N</th>
<th>60s Y/N</th>
<th>1 min 10s Y/N</th>
<th>1 min 20s Y/N</th>
<th>1 min 30s Y/N</th>
<th>1 min 40s Y/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 min 50 s Y/N</td>
<td>2 mins Y/N</td>
<td>2 mins 10 s Y/N</td>
<td>2 mins 20 s Y/N</td>
<td>2 mins 30 s Y/N</td>
<td>2 mins 40 s Y/N</td>
<td>2 mins 50 s Y/N</td>
<td>3 mins Y/N</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix C

Procedural Integrity Checklists of Treatment A and B
## Treatment A

<table>
<thead>
<tr>
<th></th>
<th>Iowa</th>
<th>Alabama</th>
<th>Kentucky</th>
<th>Indiana</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>To peer: “What is it?”</strong></td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>IC</td>
<td>IC</td>
<td>IC</td>
<td>IC</td>
</tr>
<tr>
<td><strong>Peer Response</strong></td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>IC</td>
<td>IC</td>
<td>IC</td>
<td>IC</td>
</tr>
<tr>
<td><strong>Researcher praises</strong></td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>IC</td>
<td>IC</td>
<td>IC</td>
<td>IC</td>
</tr>
<tr>
<td><strong>If incorrect re-does steps</strong></td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>IC</td>
<td>IC</td>
<td>IC</td>
<td>IC</td>
</tr>
<tr>
<td><strong>To participant: “What did she say?”</strong></td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>IC</td>
<td>IC</td>
<td>IC</td>
<td>IC</td>
</tr>
<tr>
<td><strong>If correct, praise</strong></td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td><strong>If incorrect, says “Try again” and repeats with peer</strong></td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td><strong>Researcher says “Match”, or participant does it automatically</strong></td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>IC</td>
<td>IC</td>
<td>IC</td>
<td>IC</td>
</tr>
<tr>
<td><strong>If correct, praise</strong></td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td><strong>If incorrect, uses least to most physical prompt</strong></td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td><strong>Wait 1 minute</strong></td>
<td>C</td>
<td>IC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Asks Participant: What is it?</strong></td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td><strong>Participant Response</strong></td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>IC</td>
<td>IC</td>
<td>IC</td>
<td>IC</td>
</tr>
</tbody>
</table>
## Treatment B

<table>
<thead>
<tr>
<th></th>
<th>Arkansas</th>
<th>Missouri</th>
<th>Wisconsin</th>
<th>Illinois</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>To peer: “What is it?”</strong></td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
</tr>
<tr>
<td><strong>Peer Response</strong></td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
</tr>
<tr>
<td><strong>Praise</strong></td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
</tr>
<tr>
<td>If incorrect re-</td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
</tr>
<tr>
<td>does steps</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To participant:</td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
</tr>
<tr>
<td>“What did she say?”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If correct, praise</td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
</tr>
<tr>
<td>If incorrect, says “Try again” and repeats with peer</td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
</tr>
<tr>
<td>“Point” or gestures or</td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
</tr>
<tr>
<td>participant does it</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>automatically</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If correct, praise</td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
</tr>
<tr>
<td>If incorrect, uses least to most physical prompt</td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
</tr>
<tr>
<td>Wait 1 minute</td>
<td>C IC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asks Participant:</td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
</tr>
<tr>
<td>What is it?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Participant Response</strong></td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
<td>C IC C C</td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>
Appendix D
The Social Validity Survey
<table>
<thead>
<tr>
<th><strong>Question</strong></th>
<th><strong>Teacher 1</strong></th>
<th><strong>Teacher 2</strong></th>
<th><strong>Teacher 3</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Do your students have opportunities to learn by watching a peer?</td>
<td>Neutral</td>
<td>Completely</td>
<td>Completely</td>
</tr>
<tr>
<td>Would it be beneficial if your students could learn by watching a peer rather than one-on-one learning?</td>
<td>Very Little</td>
<td>Mostly</td>
<td>Completely</td>
</tr>
<tr>
<td>To what extent do you think observational learning would increase the efficiency of your one-on-one instruction?</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Completely</td>
</tr>
<tr>
<td>To what extent do you think observational learning would increase the efficiency of your group instruction?</td>
<td>Mostly</td>
<td>Neutral</td>
<td>Mostly</td>
</tr>
<tr>
<td>How feasible would it be to implement these procedures in your daily instruction?</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Mostly</td>
</tr>
<tr>
<td>Are the time requirements necessary to implement this intervention reasonable?</td>
<td>Mostly</td>
<td>Completely</td>
<td>Mostly</td>
</tr>
<tr>
<td>Would it be feasible to acquire the necessary materials in order to implement the intervention?</td>
<td>Completely</td>
<td>Mostly</td>
<td>Mostly</td>
</tr>
<tr>
<td>Does your student observe others more?</td>
<td>Neutral</td>
<td>Mostly</td>
<td>Mostly</td>
</tr>
<tr>
<td>Have you noticed that you have had to spend less time with your student teaching him one-on-one?</td>
<td>Mostly</td>
<td>Neutral</td>
<td>Mostly</td>
</tr>
</tbody>
</table>