12-31-2015

Remediation of Prompt Dependence to Promote Independent Skill Acquisition for Children Clinically Diagnosed With Autism Spectrum Disorder

Julianne Lasley
Nova Southeastern University, julianne.lasley@gmail.com

Remediation of Prompt Dependence to Promote Independent Skill Acquisition for Children Clinically Diagnosed With Autism Spectrum Disorder

by
Julianne Lasley

An Applied Dissertation Submitted to the
Abraham S. Fischler College of Education
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Education

Nova Southeastern University
2015

Approval Page

This applied dissertation was submitted by Julianne Lasley under the direction of the persons listed below. It was submitted to the Abraham S. Fischler College of Education and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Nova Southeastern University.

Christine Reeve, PhD Committee Chair	Date
John W. Billings, EdD Committee Member	Date
Lynn R. Schrum, PhD Dean	Date

Statement of Original Work

I declare the following:

I have read the Code of Student Conduct and Academic Responsibility as described in the *Student Handbook* of Nova Southeastern University. This applied dissertation represents my original work, except where I have acknowledged the ideas, words, or material of other authors.

Where another author's ideas have been presented in this applied dissertation, I have acknowledged the author's ideas by citing them in the required style.

Where another author's words have been presented in this applied dissertation, I have acknowledged the author's words by using appropriate quotation devices and citations in the required style.

I have obtained permission from the author or publisher—in accordance with the required guidelines—to include any copyrighted material (e.g., tables, figures, survey instruments, large portions of text) in this applied dissertation manuscript.

_____
Signature

Julianne Lasley
_____
Name

8/25/15_____
Date

Abstract

Remediation of Prompt Dependence to Promote Independent Skill Acquisition for Children Clinically Diagnosed With Autism Spectrum Disorder. Julianne Lasley, 2015: Applied Dissertation, Nova Southeastern University, Abraham S. Fischler College of Education. ERIC Descriptors: Educational Assessment, Autism, Instructional Effectiveness, Prompting, Behavior Modification

Prompt dependence can be a serious problem for individuals diagnosed with autism spectrum disorder or intellectual disabilities. The ability to perform skills independently is important for a high-quality life and assimilation in the community among many other things. Assessments of instructional strategies may be an effective tool for identifying instructional strategies that decrease one's reliance on prompts.

An alternating treatment design was used to evaluate the effectiveness of an assessment of instructional strategies on independent responses during auditory-visual discrimination tasks. Assessment conditions included positional prompt, gestural prompt, physical prompt, and identity matching to sample. The most effective instructional strategy was identified as the strategy that corresponded to quickest acquisition of independent responses.

Results of the assessment demonstrated differences in individual learning patterns for each of the 3 participants. However, the differences observed in the assessment among instructional strategies were not significant. Implications of these results do suggest to educators that conducting an assessment of instructional strategies may be a useful strategy for identifying differences in learning patterns. Limitations and directions for future research are also discussed.

Table of Contents

Figures

Chapter 1: Introduction

Individuals diagnosed with autism spectrum disorder (ASD) exhibit deficits in social-communication skills as well as restrictive and repetitive behaviors. Included in the repetitive-behavior domain of autism symptoms are the unusual sensory responses that are prevalent in individuals diagnosed with ASD (Grzadzinski, Huerta, & Lord, 2013). Stimulus overselectivity may be a result of these unusual responses to external stimulation (sensory responses). Stimulus overselectivity can also result in slower acquisition of conditional discriminations (Koegel & Wilhelm, 1973). Slow acquisition rates may result in many maladaptive issues, including exhibition of challenging behaviors, lack of skills to achieve independence in daily life, and stigmatization from the community (McClannahan & Krantz, 1997; Ploog, 2010). Some children diagnosed with ASD struggle with learning these skills due to prompt dependence (Fisher, Kodak, & Moore, 2007; McClannahan & Krantz, 1997).

Prompts are used during teaching to assist the learner in making the association between the correct response and reinforcer delivery. Prompts are cues that may operate directly on the response, such as a physical prompt to guide one's hand towards the correct response, or a stimulus prompt, such as making the correct choice bigger than the other choices. Prompt types may be placed in hierarchies at times in accordance with the level of intrusiveness of the prompt. For example, a highly intrusive prompt may be a physical prompt, such as guiding one's hand towards the correct choice, whereas a verbal prompt in which one is told the correct answer may be considered minimally intrusive (Cooper, Heron, & Heward, 2007).

Prompt dependence may be defined by instances in which a more intrusive prompt is needed to evoke correct responding for a longer than normal period of time or

failure to acquire the discrimination without the higher order prompting (Fisher et al., 2007). Prompt dependence has been demonstrated to be an issue when teaching children diagnosed with ASD or intellectual disabilities (Fisher et al., 2007; McClannahan & Krantz, 1997). Prompt dependence occurs when a more intrusive prompt is needed to evoke correct responding. For example, a child may learn to flush a toilet but only if someone points to the knob or gives him or her a verbal prompt like "Flush" each time. If the child does not learn to flush the toilet independently (i.e., without these prompts), it may be considered prompt dependence.

Background and Justification

There is an increasing number of children and adults being diagnosed with ASD. From 2007 to 2012, there was a 0.84% increase in the number of school-aged children diagnosed with ASD. In 2007, 1.16% of children were diagnosed with ASD, and 5 years later 2% of children were diagnosed (Blumberg et al., 2013). An increase in the incidence of this disorder also suggests an increase in individuals struggling with prompt dependence.

There are a few potential reasons why prompt dependence occurs so frequently in children diagnosed with ASD. For example, the use of differential reinforcement during instructional teaching procedures can have an effect on the need for prompts (Karsten & Carr, 2009). If a learner's prompted correct behavior is receiving the same magnitude of reinforcement as instances when the learner performs the skill independently, then he or she may continue to rely on the prompt as it requires less response effort and results in the same consequence. For example, if given a choice of running 1 or 5 miles to win $1,000, most people would choose the less effortful response of running 1 mile with the same outcome.

Additionally, the type of prompt used may also have an effect on the continued need for higher level prompting (Carp, Peterson, Arkel, Petursdottir, & Ingvarsson, 2012). The purpose of delivering prompts is to assist the learner in responding correctly and provide an opportunity to deliver the reinforcer contingent on the correct response. Prompt dependence may occur if the learner only attends to the prompt and not the differentiating aspect of the stimuli.

Stimulus overselectivity, a commonly observed phenomenon in individuals diagnosed with ASD, may also contribute to prompt dependency. Stimulus overselectivity was originally described by Lovaas, Schreibman, Koegel, and Rehm (1971) as a person's failure to attend to certain features of stimuli. Subsequent learning will be a challenge if the important aspects of stimuli are not attended to. Stimulus overselectivity is a topic that has been substantially researched (e.g., Cipani, 2012; Dickson, Wang, Lombard, & Dube, 2006). Ploog (2010) demonstrated a link between stimulus overselectivity and prompt dependency. In order to provide a correct response, an individual who does not attend to the relevant aspects of stimuli may become dependent upon other hints. For example, an individual presented with a fork and spoon who does not notice that the fork has four prongs and the spoon has none will struggle with discriminating between the two. If the learner is being taught with a gestural prompt (e.g., a point), he or she may only learn to discriminate the gesture. Learning relevant vocabulary for expressive and receptive communication requires the ability to discriminate relevant variables of items and actions. Therefore, stimulus overselectivity can have a significant impact on language learning. If language is significantly impaired, the inability to communicate may lead to the development of or even an increase in problem behavior exhibition (Ploog, 2010).

Stimulus overselectivity is not only observed with children diagnosed with ASD. It has also been observed in adults diagnosed with ASD (Matthews, Shute, & Rees, 2001) as well as children and adults without an intellectual disability or ASD diagnosis (McHugh & Reed, 2007; Reed & Gibson, 2005). Some studies have suggested it is more frequently observed in individuals diagnosed with ASD (Lovaas & Schreibman, 1971), perhaps because of problems with attending behaviors (Ploog, 2010).

Prompt dependence is a problem during instructional programs for individuals with ASD (Fisher et al., 2007; McClannahan & Krantz, 1997). If individuals do not learn to respond without the assistance of others, then it can have a large impact on their future opportunities for independent living. Previous exposure to different prompt types may have an effect on acquisition in subsequent instructional trials (Coon & Miguel, 2012). Some studies (Kodak, Clements, & LeBlanc, 2013; Lerman, Vorndran, Addison, & Kuhn, 2007) have suggested that conducting assessments to identify which instructional strategy is effective for a particular individual is helpful in improving acquisition rates of independent responding (i.e., unprompted responding). Kodak et al. (2011) validated the use of such assessments. This study demonstrated that, when the assessment identified an instructional approach that was more effective than the others, the more effective identified strategy produced a faster rate of independent skill acquisition. The use of assessments of instructional strategies has been shown to be effective in increasing acquisition rates of various skills. However, more research is needed to determine if assessments of instructional strategies can assist with skill acquisition (Kodak et al., 2011; Kodak et al., 2013; Lerman et al., 2007).

As of 2007, the cost to deliver medical and nonmedical care for individuals with ASD was estimated to be $35 billion (Ganz, 2007). Developing methods to decrease

prompt dependence will help individuals diagnosed with ASD become more independent. Furthermore, decreasing prompt dependency may increase the rate of skill acquisition (i.e., the rate at which skills and concepts are learned). Spending less money on treatment as a result of faster skill acquisition and increasing independence of learners with ASD can have positive implications for many.

The Research Problem

Prompts are helpful instructional strategies for assisting individuals who may exhibit skill deficits in acquiring functional skill repertoires. The use of prompts also can create prompt dependence. There is limited research evaluating assessment practices to develop more effective instructional strategies for individuals who struggle with dependence on prompts (Kodak et al., 2011; Kodak et al., 2013; Lerman et al., 2004). A reliance on prompts for individuals means that, in order to engage in functional skills or responding, they need another individual or a certain environmental arrangement. The additional individual or environmental arrangement requires resources and time. Prompt dependence can inhibit an individual's ability to become as independent as peers.

Statement of the Problem

Local assessment protocols upon which remediation of prompt dependency among children diagnosed with ASD is based need to be further evaluated to support their effectiveness (Kodak et al., 2011; Kodak et al., 2013; Lerman et al., 2007). Additionally, these existing assessment protocols are somewhat lengthy, potentially decreasing their efficiency and the likelihood that practitioners will implement them.

Deficiencies in the Evidence

Several studies (Benavides & Poulson, 2009; Karsten & Carr, 2009) documented the use of more effective instructional strategies through reinforcement schedules as well

as various prompting or attending techniques (Carp et al., 2012; Dube & McIlvane, 1999; Fisher et al., 2007; Gutowski & Stromer, 2003). However, there are only a few studies (Kodak et al., 2011; Kodak et al., 2013; Lerman et al., 2007) that have evaluated the use of assessments of instructional strategies for children diagnosed with ASD or intellectual disabilities. Each of these studies only used a few participants. Replication of the effectiveness of an assessment methodology is still needed. Furthermore, in a study by Kodak et al. (2011), it took a range of 108-176 minutes to identify an effective strategy using an instructional assessment. A more efficient assessment methodology would mean less wasted time before teaching can begin and also may increase the likelihood that it would be used. Furthermore, an assessment that evaluates a larger variety of prompts may also be helpful in overcoming the issue many individuals diagnosed with ASD have, prompt dependence (Kodak et al., 2011).

Setting

This study took place at an agency that provided applied behavioral analyses (ABA) services, including instruction, behavioral support, and family training and training to children diagnosed with ASD and related skill deficiencies in southwest Michigan. Participants were selected from those who were receiving discrete-trial instruction services from the agency. These services were provided in the participants' homes and were supervised by Board Certified Behavior Analysts. The study took place during regularly scheduled ABA therapy sessions that occurred in the individuals' homes. The researcher went in as a consulting Board Certified Behavior Analysts to conduct this study. The agency director provided approval to the researcher to conduct the study after confirming that some of the participants may benefit from participation in the study.

Audience

This research topic has implications for clinicians who work with individuals diagnosed with ASD. It may be relevant to researchers in the field of instructional strategies for individuals with ASD as well as teachers and parents of those diagnosed with the disorder.

Definition of Terms

Below are terms that are frequently referred to throughout this applied dissertation. They are included to orient potential readers to operational definitions.

ABA. This is the application of the science of behavior analysis in an attempt to modify behavior of others (Cooper et al., 2007; Malott, Malott, & Trojan, 1999)

Auditory-visual (AV). This discrimination is the presentation of an auditory instruction intended to evoke a response that requires the learner to discriminate between visual stimuli. For example, an instructor may place photos of a cat and dog in front of the student. Then the student may be given the vocal direction, "touch dog." In an AV discrimination, it would be expected that the individual would touch the picture of the dog after this vocal instruction to do so (Carp et al., 2012).

Brief experimental analysis (BEA). This is a brief assessment tool of different types of instructional or teaching methods that is used to assess the effectiveness of certain interventions on acquisition of certain skills (McComas et al., 2009).

Discrete-trial teaching. This is, according to Cooper et al. (2007), any "operant whose response rate is controlled by a given opportunity to emit the response" (p. 694). Discrete-trial teaching occurs when an opportunity to emit a response is provided and attempted to be brought under control of certain stimuli (Cooper et al., 2007). An example of a discrete trial with a human may be when a teacher presents two color cards

to a student and provides the verbal direction, “touch red.” The learner may then either engage in a correct response (i.e., touching red) that would be reinforced or an incorrect response (i.e., touching a different color or not responding) that may be immediately followed with a correction trial.

Errorless teaching. This is a procedure used in teaching that seeks to prevent errors from occurring during teaching typically by providing prompts along with the instruction (Niemeier, 2014).

Error-correction procedure. This is an instructional procedure that provides feedback to the learner regarding errors made during the teaching process (Barbetta, Heward, & Bradley, 1993).

Overselectivity. This occurs when an individual’s failure to attend to the relevant characteristics of stimuli that would allow for desired discriminations to occur (Lovaas et al., 1979; Lovaas, Koegel, & Schriebman, 1971; Lovaas & Schriebman, 1971).

Prompts. These are cues used during teaching to assist the learner in making the correct response (Cooper et al., 2007). For example, one may physically guide a learner’s hand towards the door knob to assist in opening a door.

Prompt dependence. This occurs when, after repetitive instructional trials, a more intrusive prompt is needed to evoke independent correct responding (Fisher et al., 2007).

Identity-matching task. This is a presentation of a picture of the targeted stimulus in a teaching procedure with a vocal instruction to match. For example, an instructor may ask a learner to match a picture of two identical dogs (Carp et al., 2012).

Purpose of the Study

The purpose of the study was to evaluate the impact of current instructional

strategies upon prompt dependence among children diagnosed with ASD in an attempt to increase the rate of independent skills acquisition. A quick and easily administered assessment to determine the most effective prompting strategy for a learner may help instructors reduce instruction time and improve the effectiveness of prompt-fading strategies. The assessment included instructional strategies related to prompting strategies and observation (i.e., an additional response requirement to focus on the targeted stimuli in a teaching trial).

Chapter 2: Literature Review

The following represents a comprehensive review of literature pursuant to a review looking at the utility of an assessment procedure on decreasing one's reliance on prompts. This chapter begins with the conceptual framework upon which this assessment was developed. It then also includes information related to teaching strategies in ABA, stimulus overselectivity, and prompt dependence. The researcher then describes research conducted with BEAs and finishes with a review of the research in which those BEAs were evaluated in conjunction with ABA teaching strategies.

The science of behavior analysis originally was derived from theories and research in experimental behavior analysis. These theories were heavily influenced by Skinner's research and writings in the 1930s. Research in behavior analysis focuses on investigating the interaction of environmental contingencies with individuals' behavior. In behavior analysis, it is believed that, if one can explain the environmental contingencies surrounding behavior, then one can predict and therefore control behavior (Skinner, 1938). An emphasis is placed on removing hypothetical constructs to explain behavior in order to keep focus on what can be observed and, therefore, also be manipulated (Cooper et al., 2007).

Skinner (1938) built and further developed the science of behavior from Watsonian and Pavlovian theories of stimulus-response psychology through his theories of operant conditioning. Skinner explained that operant behaviors are behaviors maintained by their previous exposure to environmental contingencies and the consequences that followed. Operant conditioning explains the conditions under which operant behavior occurs. It is upon this theory of operant conditioning that the basic principles of the field of ABA were developed: reinforcement and punishment.

Reinforcement is the process by which a consequence follows a behavior and increases the likelihood of the behavior occurring again. The process of reinforcement is the main principle on which ABA teaching strategies are developed (Bear, Wolf, & Risley, 1968; Cooper et al., 2007).

The Research Problem

Children diagnosed with ASD tend to exhibit issues related to prompt dependence, possibly due to stimulus overselectivity (Lovaas et al., 1971). ABA teaching methods have been demonstrated to be effective in teaching children diagnosed with ASD. These teaching methods, however, rely on the use of prompts to teach skills, and some individuals come to depend on these prompts (Cooper et al., 2007). Some research (e.g., Kodak et al., 2011; Lerman et al., 2007) has suggested that the use of certain assessments of instructional strategies prior to teaching may decrease one's reliance on those prompts by identifying differentially effective instructional strategies. So far, only a few studies (Kodak et al., 2011; Kodak et al., 2013; Lerman et al., 2007) have evaluated the effects of these assessments on skills acquisition. The assessment protocols that the studies evaluated were somewhat time-consuming to conduct, potentially decreasing the likelihood ABA practitioners would use these assessments. There is an evident need for an assessment protocol that can be implemented quickly and identify an efficient instructional strategy.

ABA Teaching Strategies

Below are three instructional methods in ABA used to teach skills. These are discussed because it is during these teaching methods that issues related to prompt dependence may occur. The use of ABA to assist with teaching appropriate behaviors to individuals with ASD is increasingly becoming recognized as one of the most widely

researched and effective treatment options (Granpeesheh, Tarbox, & Dixon, 2009; Peters-Scheffer, Didden, Korzilius, & Sturmey, 2010). Many technologies have evolved from these basic ABA principles. These technologies have a strong research base, indicating effectiveness for those diagnosed with ASD. For example, discrete trial teaching, pivotal response training (PRT), and applied verbal behavior (AVB) are some of the technologies that have been developed from ABA to teach individuals diagnosed with various disabilities (Granpeesheh et al., 2009; Love, Carr, & Almason, 2008).

Discrete-trial teaching. Discrete-trial teaching is one of the teaching formats used in instructional programs for children diagnosed with ASD and intellectual disabilities. These trials are discrete in that they provide a specific opportunity for an appropriate response. Also, discrete-trial teaching programs typically share certain components: an instruction, a response, and reinforcement for appropriate responses (Delprato, 2001; Granpeesheh et al., 2009; Lovaas, 2003; Ploog, 2010). For example, a discrete trial may consist of an instructor placing three photos of animals in front of a learner. The instructor would then provide an opportunity for a response to the learner such as the auditory instruction to "touch dog." This sets the occasions for a response of touching the picture of the dog to be reinforced.

Another feature of discrete-trial teaching is the frequent presentation of brief instructional trials in contrived environments. This component was criticized by others due to issues with generalization (Delprato, 2010). By removing distractions from a child's natural environment, the child may be more likely to attend to the appropriate features of stimuli (Ploog, 2010). The strategy may lead to problems with generalization. If an individual is taught a skill in a contrived environment and without distractions, the individual is not being required to discriminate from the other distracting stimuli. As a

result of generalization concerns with discrete-trial teaching, more natural environment training methods have been incorporated into ABA instructional procedures (Granpeesheh et al., 2009).

Pivotal Response Training. One ABA technology focusing more on naturalistic teaching is pivotal response training (PRT). PRT focuses on what are known as pivotal behaviors, behaviors that are learned and then, ideally as a result of being learned, produce corresponding learning on other related but unlearned behaviors (Koegel, Bradshaw, Ashbaugh, & Koegel, 2014; Koegel & Schreibman; 1977; Koegel & Wilhelm, 1973). For example, one study using PRT techniques demonstrated that teaching children to engage in asking social question also produced increases in other forms of communication and other adaptive behaviors. This type of training can be advantageous, especially when dealing with issues with generalization. Additionally, these methods may potentially decrease the amount of time needed to teach necessary skills (Koegel et al., 2014).

Analysis of Verbal Behavior. The analysis of verbal behavior (AVB) through a seminal work by Skinner (1957) heavily influenced another technology for teaching skills in the application of behavior analysis, frequently referred to as AVB. This type of therapy focuses on Skinner's analysis of verbal behavior that breaks down verbal behaviors into categories based on their function (Leblanc, Esch, Sidener, & Firth, 2006). The term *mand* is used to describe a verbal operant that would function to access something that an individual needs. For example, a child who has not had something to eat in a while and approaches another individual saying, "Can I have a cookie please?" has just engaged in a mand. Another verbal operant that is categorized through Skinner's analysis of verbal behavior is a tact. A tact is a verbal operant that is exhibited as a result

of the speaker labeling an item in the environment. For example, a child who looks at a car and states "car" would be engaging in a tact (Cooper et al., 2007). The categorization of these verbal operants is then used for an application to assess and further treat individuals who may be struggling with communication problems, a frequently encountered deficit for children diagnosed with ASD (Cooper et al., 2007). The methods generally used in AVB-focused programs combine more naturalistic strategies with discrete-trial teaching to avoid the issues with generalization (Leblanc et al., 2006).

Each of the above techniques, discrete-trial teaching, PVT, and AVB, use prompting to teach these skills. The types of prompts used may vary according to program and individual, but generally there are different types of prompts that may be used in each of these teaching programs. Prompts are divided into two categories: response prompts and stimulus prompts. Response prompts operate on the response itself in an attempt to increase correct responding. Stimulus prompts focus on modifications to the antecedent stimuli. Response prompts include verbal instructions, modeling, gestures, and physical guidance. Verbal instructions may include vocalizations on what to do (e.g., "sweep over here") or written instructions on what to do next. Modeling includes showing the child what to do. For example, the teacher or another individual correctly clapping to show what is expected when asking a child to clap (Cooper et al., 2007). A gestural prompt may include pointing to the correct response, such as asking a child to touch red while pointing to a red object (Anson, Todd, & Cassaretto, 2008). A physical prompt includes guiding the learner's hands to complete the correct response. Stimulus prompts may include things such as positional cues. These may include instances in which stimuli are arranged in a particular manner to encourage correct responding or altering the stimuli in such a way that they stand out from the others (Cooper et al.,

2007). Placing different photos of people in front of a learner and coloring the correct smiling face red with the others being black and white is an example of altering the stimuli.

Stimulus Overselectivity

From a behavior analytic perspective, stimulus overselectivity may be conceptualized as an inability to attend to the entire stimulus, attending instead to limited aspects of the stimulus (Lovaas et al., 1971; Lovaas et al, 1979; Ploog, 2010). If a child is being taught to discriminate pictures of a chair and a couch, he or she may initially be taught using a picture of a red chair and picture of a blue couch. At first, the child may learn this discrimination by attending to the color of the different pieces of furniture, rather than attending to the feature of a longer seat cushion. If the child does not learn to attend to the size of the seat cushions on the couch, the appropriate discrimination will not be effectively generalized.

In one of the first studies on the topic, Lovaas et al. (1971) included typically functioning children, those diagnosed with ASD, and those with intellectual disabilities. Participants were exposed to a discrimination task that required them to respond appropriately to different aspects of stimuli that included visual (red floodlight), auditory (white noise at 65dB), and tactile (pressure cuff) components. Results of the study suggested that typical children responded to each aspect of the stimuli equally. Each of the participants diagnosed with only ASD responded to one detail of the stimuli: Two of the participants responded to the visual stimulus, and two responded to the auditory stimulus. None of the participants diagnosed with ASD responded to the tactile stimulus. The children diagnosed with intellectual disabilities responded to two components of the stimuli. Therefore, results of this study suggested that children with ASD are more likely

to demonstrate overselectivity than typical developing peers or those diagnosed with an intellectual disability.

In a follow-up study by Lovaas and Schreibman (1971), two of the original participants were exposed to the component that they failed to respond to in the previous study. When each stimulus was presented alone, both children were able to respond to each of the stimuli. However, when the stimuli were presented together (placed in front of the child at the same time), they were not able to respond to one stimulus in the presence of the other stimuli. Lovaas and Schreibman believed this responding to stimuli was not a result of the auditory component of the stimulus itself but instead a result of difficulties in responding by the participants to the stimulus in the context of other stimuli.

Koegel and Schreibman (1977) demonstrated that children diagnosed with ASD could eventually respond to multiple cues after repeated exposure to trials in which the appropriate responses to reinforcers were demonstrated. In this study, similar to Lovaas et al. (1971), children's behavior of pressing the bar was initially reinforced when each component was presented. Then bar pressing was only reinforced in the presence of one component of the presented stimuli (e.g., light). After successive and repeated exposure to the conditional discriminations, the children learned to discriminate between the stimuli.

Those who struggle with stimulus overselectivity may become less prompt dependent by increasing attending behavior (Dube & McIlvane, 1999; Fisher et al., 2007; Gutowski & Stromer, 2003; Reed, Altweck, Broomfield, Simpson, & McHugh, 2012). Attending behavior refers to the behavior of the learner right at the onset of a trial. If a learner is attending, then the learner is looking at the person delivering the instruction or

the instructional materials. Attending behaviors are also referred to as differential observing responses (DOR). If children do not attend to the instructional stimuli, they are more likely to struggle with discriminating the stimuli (and therefore demonstrate stimulus overselectivity). Therefore, increasing attending behavior may increase the acquisition of certain receptive teaching instructions.

Prompt Dependence

Prompt dependence is defined by instances in which a prompt is needed to evoke correct responding for a lengthy period of time. It may also include failure to acquire the discrimination without the higher order prompting completely (Fisher et al., 2007). Some learners struggle with prompt dependency when they do not learn to discriminate or attend to the different aspects of the stimuli. Instead they only attend to the prompt itself (Lovaas, 1979). If a learner is reinforced for touching or grabbing a stimulus to which the instructor is pointing, eventually the learner may simply attend to the pointing finger and not necessarily to aspects of the stimuli. This type of learning can be a barrier to teaching the appropriate discrimination. It will also hinder the ability of a learner to emit the appropriate response in the absence of the prompt.

Effects of instructional variations on prompt dependency. There is research (Anson et al., 2008; Benavides & Poulson, 2009; Constantine & Sidman, 1975; Guiterrez, Hale, O'Brien, Fischer, & Alexandria, 2008; Karsten & Carr, 2009; Neef, Iwata, & Page, 1980; Olenick & Pear, 1980; Weeks & Gaylord-Ross, 1981) that demonstrated that instructional variations will have an effect on prompt dependency or independent correct responding during acquisition programming. This research focused on different instructional variables such as reinforcement variations (Karsten & Carr, 2009), task interspersal, (Benavides & Poulson, 2009), order of instructional stimuli

(Guiterrez et al., 2008), prompt type (Anson et al., 2008), error-correction procedures (Weeks & Gaylord-Ross, 1981), and observing response requirements (Constatine & Sidman, 1975).

Olenick and Pear (1980) evaluated the effects of differential reinforcement in the form of the reinforcement schedule on unprompted correct responding. In this study, participants were exposed to different schedules of reinforcement in an attempt to evaluate their effects on participants' independent correct tacting. In one condition, independent correct responding was reinforced on a continuous schedule of reinforcement, a fixed ratio (FR) of 1. Prompted responses were reinforced on a FR schedule of 6 or 8. In the other condition, the requirements were mixed and independent correct responses were reinforced on a FR of 6 or 8 and correct prompted responses were reinforced on a FR of 1. Participants exhibited higher independent correct responding during the condition under which their independent correct responses were reinforced under a FR of 1. These results suggest that independent correct responding is more likely to occur with a higher reinforcement schedule for independent responses.

Karsten and Carr (2009) evaluated the use of differential reinforcement with respect to quality of reinforcement on prompt dependency or correct unprompted responding. In this study, two participants were exposed to two conditions. In one condition, unprompted responses were reinforced equally to prompted responses. In the other condition, unprompted responses were reinforced with higher quality reinforcers. Results suggested that differential reinforcement was a more effective procedure for teaching the targeted motor and vocal responses and decreased the need for prompts to emit these correct responses.

Task interspersal is the manner in which instructional trials are presented. It

generally consists of the presentation of instructional tasks along with other mastered tasks (e.g., conduct a few motor imitation requests and then include body-part-identification instructional requests). A study by Neef et al. (1980) compared the effects of task interspersal and high-density reinforcement on independent correct responses. In this study, participants were exposed to three conditions assessing their ability to spell words correctly in an alternating treatment design. The conditions consisted of one in which the delivery of spelling words that were not interspersed, a condition in which high-density reinforcement was delivered, and third in which the spelling words were interspersed. In the interspersed condition, spelling words that were previously mastered by the participant were randomly presented in between the spelling words targeted for acquisition. Results of this study suggested that the interspersal condition produced higher rates of spelling words mastered than the high-density reinforcement condition.

The use of task interspersal alone to reduce prompt dependency was evaluated in a study conducted by Benavides and Poulson (2008). Benavides and Poulson evaluated the acquisition rate of unprompted correct responding with three children during a match-to-task instructional program. Participants were first taught the match-to-sample tasks without interspersing tasks. Second, the task interspersal was introduced. This consisted of the intermittent presentation of 12 mastered stimuli and 12 nonmastered stimuli. Correct responding increased dramatically with the introduction of the task interspersal condition. These results provide support that task interspersal can facilitate unprompted correct responding and, therefore, decrease prompt dependence.

Researchers (Grow, Carr, Kodak, Jostad, & Kisamore, 2011; Guitterez et al., 2008) have attempted to evaluate the order in which to introduce stimuli in an attempt to increase independent correct responding. According to Love et al. (2008), 37% of early

intensive behavior intervention programs used the introduction of one stimulus at first and then mixed with other stimuli as opposed to multiple stimuli (distracter stimuli) being introduced at first. Guiterrez et al. (2008) compared the effects of teaching conditional discriminations (i.e., presenting multiple stimuli or distracters along with the target) from the onset or starting with more simple discriminations (i.e., presenting one stimulus with no distracters) on correct responding. Results suggested that starting with the conditional discrimination method is more effective in teaching these discriminations than starting with the simple-then-conditional method. Participants required more sessions for mastery during the simple-conditional than the conditional-discrimination-alone condition.

Grow et al. (2011) also evaluated the effects of simple-then-conditional and conditional-only training methods on auditory-visual conditional discriminations. Unlike Guiterrez et al. (2008), an observing response was added in to help with instructional strategies. This included using a dark sheet of paper over the stimuli. Placing the dark sheet of paper over the stimuli required the participant to engage in a response (pulling dark sheet off). The researchers believed that engaging in this observing response requirement might result in a higher likelihood that the individual would attend more carefully to the stimuli. In this study, three children diagnosed with ASD were exposed to at least three different conditions (i.e., general teaching procedure, simple-conditional method, and conditional-only method). This was used to determine under which condition the participant first met the mastery criterion. In the general teaching procedure condition following the observing response requirement, the instructor presented an auditory stimulus along with the receptive stimuli. If a participant did not respond within 5 seconds of the auditory stimulus, then a least-to-most prompting hierarchy was delivered. This hierarchy consisted of pointing within 3 inches of the correct stimulus,

then within 1 inch of the correct stimulus followed by a physical prompt. In the simple-conditional method condition, the same general teaching procedure was followed as previously described. However, the instructor only presented one comparison stimulus repeatedly while delivering the auditory stimulus. During subsequent steps in this condition, the instructor would then present two stimuli from which to choose while delivering the auditory stimulus. The conditional-only method varied from the simple-conditional method in that three visual stimuli were presented along with the auditory stimulus during each teaching trial. Results suggested that the conditional-only method was more effective in producing unprompted correct responses during an auditory-visual discrimination task.

Some studies (Anson et al., 2008; Shabani et al., 2002) have been conducted in an attempt to evaluate the effectiveness of different prompting strategies. This research has been aimed towards evaluating the use of more covert prompting in an attempt to decrease the obtrusiveness of prompts. Decreasing the obtrusiveness of prompts may also decrease prompt dependency or at least decrease stigmatization potentially produced by one being prompted. A study by Shabani et al. (2002) demonstrated the effectiveness of covert tactile prompts on the exhibition of on-topic verbalization and conversation with peers. In this study, three children diagnosed with ASD were exposed to covert tactile prompts in the form of a vibrating object that was placed in the pocket of the child in order to prompt the child to engage in on-topic verbalizations. The effects of this prompt on the behavior of engaging in on-topic responses was evaluated through an ABAB design. It should be noted, however, that typical prompting methods (i.e., verbal prompts) were needed in the first portion of the study to actually teach the children how to engage in on-topic responses. The covert tactile prompting techniques were then used as

reminders to engage in the on-topic verbalizations. Results suggested that the covert prompting was effective in increasing the on-topic verbalizations. After fading the vibrating object prompt, the on-topic vocalizations continued to occur (however at lower levels than during the prompting condition).

Also evaluating the use of different types of prompts, Anson et al. (2008) evaluated the effects of covert prompts on attending behavior of school-aged children diagnosed with ASD in a classroom setting. In this study, five participants were exposed to common prompts (i.e., gestural, model, and physical) as well as a covert tactile prompt that consisted of a vibrating pager clipped to the participants' clothing. Participants were exposed to different prompting conditions in an alternating treatment design. During the gestural prompting condition, participants were provided physical movements such as tapping or pointing to evoke correct attending behavior. In the verbal prompt condition, participants were given a vocal prompt to evoke the appropriate behavior. In the covert prompt condition, participants were exposed to a vibration from the pager (as controlled by the experimenter) after 5 seconds of off-task behavior. Results of the study suggested that the covert prompt was as effective as the more traditional prompting methods (i.e., gestural, model, and physical). However, it also should be noted that each child demonstrated differential effectiveness with each of these prompts. These results suggested the potential utility of conducting an assessment of effective instructional strategies because the effectiveness of the type of instruction varied across individuals.

Progressive-prompt-delay procedures are those procedures in which the time between the instruction and when the prompt is presented changes. These are generally associated with errorless teaching procedures. For example, initially a child may be prompted after 1 second and then this criterion will slowly increase in 1-second

increments. This is different from a constant prompt delay in which the time stays the same. In a constant-prompt delay, a child may be given 5 seconds before a prompt is provided to aid in correct responding. These are generally associated with error-correction procedures as they provide an opportunity for the individual to respond incorrectly (Cooper et al., 2007).

Errorless teaching methods are generally implemented by using a progressive prompt delay and, therefore, minimizing incorrect responding that may be exhibited. One study conducted by Weeks and Gaylord-Ross (1981) found that the use of errorless teaching methods may decrease challenging behavior exhibited during teaching sessions. Two children with challenging behaviors participated in this study. To evaluate the effectiveness of each condition, the children were exposed to an easy condition, a difficult condition, and an errorless condition in a reversal design. In the easy condition, participants were asked to discriminate between simple figures. In the difficult condition, participants were asked to discriminate between more complex figures. In the errorless condition, participants were asked to discriminate between the same figures used in both the easy and difficult conditions. The difference in the errorless teaching procedure was the use of stimulus prompts that were initially introduced and then faded. It was hypothesized that the more frequent access to reinforcement when using errorless teaching methods may have influenced the decrease in challenging behavior. Errorless teaching may function as somewhat of an abolishing operation for challenging behavior (Weeks & Gaylord-Ross, 1981).

Some studies have compared the effects of most-to-least prompting hierarchies (errorless prompting) to constant prompt-delay procedures (error-correction prompting). A most-to-least prompting hierarchy is implemented by decreasing the intrusiveness of a

prompt (prompt fading). For example, one may start by using a full physical prompt, fading to a partial physical model, and finally a verbal prompt. In McDonnell and Ferguson's (1989) study, most-to-least and constant prompt-delay procedures were compared using an alternating treatment design while teaching four participants how to cash checks. In the most-to-least condition, prompts were systematically faded as training sessions continued. In the constant prompt-delay condition, students were provided a prompt after no responding or incorrect responding of 3 seconds. Results found that both strategies were effective in teaching the individuals how to cash checks. However, the most-to-least prompt strategy was a more effective procedure as the participants acquired the skills more quickly during that condition.

Shook (1999) evaluated varying time delays during instructional trials on prompt dependency. In this study, varying time delays were evaluated on participants' ability to ask questions about their environment. An alternating treatment design was used to assess the effectiveness of a progressive 1-second time delay to a standard 4-second time-delay procedure on correct responding. In one condition, participants were only given 1 second to respond before a prompt was delivered. The time delay increased as certain mastery criteria were met. In the other condition, there was a constant 4-second delay before the prompt was delivered. The results suggested that the children reached mastery more effectively and quickly when exposed to the constant 4-second time delay. This study also supported the use of progressive time delays or errorless correction procedures to assist with faster acquisition of independent correct responding.

Niemeier (2014) also evaluated the effects of errorless versus error-correction procedures on skill acquisition for four children diagnosed with ASD. Participants were exposed to two conditions, errorless and error correction, in an alternating treatment and

multiple baseline research design. The effects of these two conditions on AV discriminations were evaluated. In the error-correction condition, a 5-second prompt delay was used, and a model prompt was delivered following any incorrect responses or no response. In the errorless condition, prompts were delivered along with the auditory instruction. After every three consecutive prompts, a prompt delay was used in increasing 1-second increments. Unlike the results of Shook (1999) and McDonnell and Ferguson (1989), results of the study suggested that each child responded differently to the procedures as suggested by different acquisition rates depending on the participant and type of error-correction procedure. These results also may support the usefulness of an assessment of instructional strategies.

Observing responses or differential observing responses (DOR) are any type of response that may be used during instructional trials that place a requirement on the learner to attend to the target stimuli. One of the first studies to evaluate the effects of naming in a delayed matching-to-sample task was conducted by Constantine and Sidman (1975). The study included four participants with intellectual disabilities. The study evaluated the effects of immediate picture-to-picture matching, delayed picture-to-picture matching, auditory-visual matching, and naming the pictures on participants' ability to match to sample correctly. The naming condition consisted of asking the participant to label the targeted picture stimulus vocally. In the second experiment, the researchers compared the effects of naming prior to matching pictures with not naming the pictures prior to being asked to match pictures. Results suggested that participants were more likely to match to sample correctly under the condition in which they were asked to first name the targeted stimulus.

Dube and McIlvane (1999) studied the effects of DOR on stimulus overselectivity

in matching-to-sample tasks by individuals diagnosed with intellectual disabilities. In this study, participants were exposed to DOR procedures that entailed the presentation of comparison stimuli. These stimuli were matched to the targeted stimuli as well as the distractor stimuli. The conditions of the experiment consisted of a baseline, compound DOR, and compound simultaneous matching. In the baseline phase participants were asked to match two stimuli. In the compound DOR condition, participants were first expected to engage in matching-to-sample of the targeted stimuli before being asked to match-to-sample. During the compound simultaneous-matching procedure, participants were also expected to engage in matching to a sample of the targeted stimuli, and correct responding was differentially reinforced. Results demonstrated that stimulus overselectivity was reduced when the DOR procedure was in place. However, correct identification of stimuli was not maintained once the DOR procedure was removed.

Doughty and Hopkins (2011) extended the research of Dube and McIlvane (1999) and found that correct responding occurred at higher levels when a requirement was put in place to engage in a higher number of observing responses. One individual diagnosed with a mild intellectual disability participated in this study and was exposed to an observing-response requirement that entailed identifying the correct sample stimuli by selecting the stimulus on a computer screen. In one condition, the individual was exposed to the observing-response requirement by being required to select the correct comparison stimulus on one occasion. In the other condition, the participant had to choose the correct sample stimulus 10 times. Results of the study suggested that, when the observing-response requirement was increased to 10 times, the participant was more likely to respond correctly (therefore decreasing stimulus overselectivity).

Fisher et al. (2007) evaluated the inclusion of an identity-matching task in

teaching trials in order to increase learners' attending behavior. Initially, two participants were exposed to vocal instructions and asked to identify a stimulus among the array. Participants were exposed to conditions that varied in terms of the prompts used. One condition consisted of moving to a gestural prompt following incorrect responding. The other condition consisted of an identity-matching task as a correction procedure following an incorrect response. The identity-matching task was conducted by presenting an exact replica picture of the targeted stimuli, and the participant was asked to match it. Results suggested that the identity-matching task was the only condition in which participants achieved mastery. This strongly supports the use of this procedure for children who may demonstrate signs of prompt dependency.

Carp et al. (2012) conducted a study of four children's acquisition of AV discrimination using identity matching. An AV discrimination is a discrimination of an auditory stimulus by responding to a visual stimulus. An example of this would be presenting three pictures of animals to a learner, delivering an auditory stimulus such as "touch dog," and expecting the participant to respond to the visual stimulus (e.g., picture of dog). In this study, participants were exposed to four different conditions: picture prompt, pointing prompt, trial and error, and no reinforcement. During the picture-prompt condition, correct responses were reinforced in the form of praise and delivery of an edible. Incorrect responses were followed by an identity-matching trial. This consisted of the presentation of a picture of the item, which was previously not identified, and a request for the participant to point to the corresponding object. The instruction was presented, and correct responses were reinforced in the pointing-prompt condition just as they were in the picture-prompt condition. The difference in this condition was that incorrect responses were followed by gesture prompts (pointing to the picture).

Participants were also exposed to a trial-and-error condition in which no prompts were delivered contingent on incorrect responding; however, reinforcement was delivered for correct responses. The no-reinforcement condition was conducted just like the trial-and-error condition. The reinforcement for correct responses was removed. Acquisition of responses was higher during both the pointing-prompt condition and picture-prompt condition. However, most acquisition occurred during the picture-prompt condition. Results supported previous studies (Constantine & Sidman, 1975; Doughty & Hopkins, 2011; Dube & McIlvane, 1999; Fisher et al., 2007) suggesting that inserting an identity-matching task in an AV discrimination task may enhance acquisition of discriminations.

A study by Reed et al. (2012) evaluated the effects of an observing response on stimulus overselectivity, particularly with respect to when the observing response requirement was removed. In this study, an observing response was used that entailed pointing, touching, or naming a stimulus prior to selecting the response. In this study, 55 individuals participated in a between-group design study to evaluate the effects of an observing response. The experimental group was exposed to the observing-response requirement. The control group was not required to engage in an observing-response requirement. Results of this study indicated that the observing-response requirement did not seem to have any effect on stimulus overselectivity. This is in contrast to other studies conducted indicating that the observing-response requirement did decrease stimulus overselectivity (Carp et al., 2012; Doughty & Hopkins, 2011; Dube & McIlvane, 1999; Fisher et al., 2007). The results of this study may need to be considered with caution. The between-subjects group design used may not yield an appropriate social significance of the effect of observing response procedure on stimulus overselectivity for every individual with ASD. In other words, there may be some individuals diagnosed with ASD

for whom a DOR procedure does assist in reducing overselectivity and others for who it does not.

Labeling items prior to instructional tasks is another type of DOR for individuals who can verbally label items. It has also proven to be a successful way of decreasing the needs for prompts (Gutowski & Stromer, 2003). In the first experiment in this study, two participants were exposed to two conditions in a reversal design to evaluate the effects of labeling stimuli in matching-to-sample tasks. In one condition, participants were asked to match without being asked to name the stimuli. In the other condition, participants were asked to name the stimuli. In a second experiment, three participants were asked to match stimuli in conditions that varied according to the delay. One condition had a 0-second delay, 5-second delay, and 10-second delay. When the participants were asked to label the stimuli prior to the matching-to-sample trial, there was an increase in correct responding. However, for one participant, the longer the delay (the 10-second delay condition), the less of an effect the labeling procedure had on correct responding.

Walpole, Roscoe, and Dube (2007) also studied the effects of a DOR on word matching-to-sample accuracy for a participant diagnosed with ASD. In this study, the DOR procedure consisted of the individual matching the individual letters in the sets that differentiated the words. In this study, there were no contrived consequences for correct differential responding. Regardless of whether the correct DOR was emitted, a trial followed. Results suggested that the DOR did increase accurate responding. Unlike the results in Dube and McIlvane (1999), correct responding was maintained after the removal of the DOR requirement.

Assessments of Instructional Strategies

Research (Anson et al., 2008; Coon & Miguel, 20120; Niemeier, 2014) suggested

instructional strategies are idiosyncratic; each child may respond differently to certain instructional strategies. Therefore, it seems important that research focus on developing an assessment that can quickly identify an effective strategy for an individual student. Many studies (Daly, Martens, Hamler, Dool, & Eckert, 1999; Duhon, 2004; Jones & Wickstrom, 2002; McComas et al., 2009; Mong & Mong 2011; Schmidt, Shanholtzer, Mezhoudi, Scherbak, & Kahng, 2014) exist regarding the effectiveness of these procedures in general education. These procedures are typically called BEAs. However, more research is needed regarding the use of BEAs for instructional strategies teaching children diagnosed with ASD or intellectual disabilities in order to assist with a practical technology.

BEAs within general education. BEAs are similar to functional analysis (FA) methodology for identifying the function of challenging behavior (Schmidt et al., 2014). A FA is an experimental methodology first developed by Iwata, Dorsey, Slifer, Bauman, and Richman (1994) to help identify the function of a challenging or problem behavior. FAs are conducted by looking at the potential antecedents and consequences responsible for evoking challenging behavior. During FAs, antecedents and consequences are manipulated to test a certain hypothesis regarding the potential function of the behavior. After presenting these manipulated conditions in a systematic manner, a comparison of the effects of the each contrived situation (the contrived antecedents or consequences) and their effects on the exhibition of the problem behaviors is conducted. During a BEA, manipulation of antecedents or consequences is conducted to determine their effect on the acquisition of behavior (Schmidt et al., 2014).

A study by McComas et al. (1996) evaluated the effects of BEAs on accurate responding during academic tasks. In this study, participants included four individuals

diagnosed with learning disabilities. Participants were exposed to several different instructional strategies. These included sounding out, following along, and note taking for skill of reading comprehension. Spelling skills required exposure to verbal rehearsal, verbal outlines, rhyming words, and sample spelling. Following the assessment, the type of instructional strategy that was most effective varied by participant.

Daly et al. (1999) conducted a study utilizing BEAs to improve oral reading fluency. This study used BEAs to find an effective intervention to work on oral-reading fluency for four children who were struggling. Unlike other BEAs, in this assessment, interventions were introduced one at a time until a treatment package that worked for the individual was found. The order of interventions was determined by the least adult effort needed to run the intervention. The strategies used in the BEA included rewards for rapid reading, repeated readings, listening passage preview, and lowering difficulty level. The most improvement for two of the participants was observed during the rewards for rapid-reading and self-management strategies. The results of this study found that combining instructional components proved to be a way to identify effective instructional components for improving oral reading fluency. A potential limitation of this study was that it did not tease out the effective components. Progress may have been observed with just the implementation of one of the treatment components.

Eckert, Ardoin, Daly, and Martens (2002) evaluated the effects of a BEA on oral reading fluency but did not find that BEAs always identified a differentially effective strategy. In this study, an assessment of both antecedent and consequence interventions on oral reading fluency was evaluated. The consequential procedures included in the assessment consisted of contingent reinforcement and performance feedback. The antecedent procedures consisted of listening to passage previews and repeated readings.

Six individuals who struggled with fluency in oral reading participated. Results of this study supported the use of BEAs to identify effective interventions for only four of the six participants.

In another study using BEA on oral-reading fluency, the effectiveness of four instructional strategies for each of the participants was compared using an alternating-treatment design. The instructional strategies compared included incentive conditions, repeated reading, phrase drills, and easier material. The assessment identified which instructional strategy was the most effective for each of the participants (Jones & Wickstrom, 2002).

Duhon (1994) conducted classroom-wide assessment to determine whether work completion in class was related to a skill deficit or motivational deficit. Participants were exposed to instructional conditions that included instructions on how to do the work and a reward condition in which participants were given rewards for work completion. This study used teachers to conduct the brief assessment procedures. Effective interventions were found for each of the participants, and an extended analysis confirmed the findings of the assessments. The strategy found to be most effective for each of the participants during the assessment was also effective in improving work completion during the extended analysis. This study supported the use of BEAs to identify more effective instructional methods for whole classrooms (Duhon, 2004).

One study found BEAs to not be effective. Mong (2008) evaluated the effectiveness of interventions identified through BEAs by conducting an extended analysis of all of the BEA-included interventions in follow-up conditions. Eight second- and third-grade students who were below average in reading skills participated. Various reading interventions were compared in a BEA analysis through an alternating-treatment

design. These interventions included contingent reinforcement, repeated reading, listening-passage preview, and phase drill. The effects of these interventions on the words read correctly per minute were evaluated. This study actually determined that, for five of the eight students, the BEA-identified intervention was the most effective. Additionally, the repeated-reading intervention was found to be the most effective for seven of the participants. However, results of the extended analyses suggested that the BEAs may not be needed to determine a necessary approach for teaching reading skills. Even though one intervention was identified as more effective during the assessment for each of the participants, the extended analysis suggested that this difference was not significant in the long term. That is, each of the interventions eventually ended up being an effective tool to teach the reading skills.

McComas et al. (2009) evaluated the effects of BEA on reading-fluency skills. Three school-aged children who exhibited below-average performance in reading fluency participated in this study. Two incentive systems were evaluated for two of the participants in rapidly alternating conditions to determine which was more effective in increasing the correct words read per minute. The third participant was exposed to different modeling systems to work on reading fluency. After identifying differentially effective interventions for each of the participants, the interventions were implemented, and reading fluency improved for each of the participants, resulting in them meeting grade-level fluency levels.

Writing skills have also been assessed with BEAs. Three conditions were compared in one study on BEAs, including an incentive condition (adding a contingency reward for correctly formed letters), a box condition (a way to assist with prompts on paper), and a modeling condition. Each of these conditions was presented in a reversal

design while data were collected on the accuracy of letter formation in each condition. Results of the BEA did identify a differentially effective intervention for teaching the writing skills for the one participant included in this study. However, during the follow-up phase of the study, the results indicated that only moderate effects were observed when they used the intervention identified to be most effective. Results of this study should be read with caution, however, given that only one participant participated (Burns, Ganuza, & London, 2009).

Mong and Mong (2011) demonstrated the effectiveness of BEAs on math fluency skills for 3 second-grade students. This study looked at different interventions to teach mathematics, including cover, copy, and compare, taped problems, and math to mastery. The cover, copy, and compare intervention consists of short learning trials and self-management strategies to become more accurate and fluent with math skills. The taped-problems intervention included a process in which students read math lists along with an audiotape to improve fluency. Math to mastery is an intervention package that includes previews of math problems, repetitive practice, corrective feedback, and self-monitoring. The BEA correctly identified the math interventions that were most effective for each for the three participants. For two of the participants, this was math to mastery, and for one it was cover, copy, and compare. However, some of the assessments took quite long to implement, potentially decreasing the social validity of the BEA.

One study compared the effects of BEAs on escape-maintained behavior during instructional demands. In this study, different interventions were presented in an alternating treatment design for two participants diagnosed with an intellectual disability and ASD. The BEA identified intervention strategies that either evoked the most or least amount of challenging behavior during academic instruction. Therefore, after identifying

the components of the instructional features that were evoking the escape-maintained problem behavior, effective interventions were developed based on the results of the BEAs (Schmidt et al., 2014).

Parker, Dickey, Burns, and McMaster (2012) conducted a study comparing the effects of brief experimental analyses on writing. Three first-grade students who were struggling with writing participated in this study. The instructional strategies compared dealt with motivational issues, task difficulty, insufficient instruction, and insufficient practicing opportunities. These conditions were rapidly alternated in the design. The BEAs effectively identified interventions that helped the participants with writing skills. Furthermore, the interventions that were identified as most effective proved to improve the writing skills of each of the participants.

Bourret, Vollmer, and Rapp (2004) evaluated the effects of a vocal mand (i.e., request) assessment for identifying effective teaching strategies. Each participant was assessed in order to identify an effective teaching strategy for mand acquisition. Participants included three individuals who exhibited deficits in vocal-verbal repertoires. During the assessment phase, participants were exposed to the available preferred item. If participants did not vocally request the item, they were then provided a nonspecific prompt. If they still did not vocally request the item, then a model prompt was delivered followed by a phoneme prompt. After the verbalization was made, a reinforcer was delivered to the individual regardless of the type of prompt provided. Each of the participants responded differently to the prompting strategies. For some participants, one type of prompt was more effective in teaching mands than other types of prompts. These results supported the use of conducting an assessment of intervention tools prior to teaching instructional skills.

The alternating-treatment design is a single-subject research method that is used to compare the effects of separate treatment variables on a dependent variable. This design allows for a quick comparison between treatment conditions, making it a useful tool for conducting assessments (Cooper et al., 2007). As previously mentioned, the assessment of instructional strategies in ABA is similar to the assessment of challenging behaviors in ABA in that a manipulation of antecedents and consequences is being conducted to evaluate the effects on behavior (Schmidt et al., 2014). Similarly, the experimental method used to conduct FAs (alternating-treatment design) serves as a useful method for comparing the effects of instructional strategies. This single-subject alternating-treatment-design methodology was used in the following described studies (Kodak et al., 2011; Kodak et al., 2013; Lerman et al., 2004) to determine the most effective teaching strategy. The use of this type of design is helpful as it allows for quick comparisons between manipulated variables and their effects on dependent variables to be made (Gast, 2010). It also provides a model for practitioners to use in comparing the effectiveness of intervention and instructional strategies in clinical settings (Cooper et al., 2007). Of particular advantage of the use of an alternating-treatment design is that the study methodology can be quickly implemented within the clinical settings of practitioners providing ABA instruction. This allows one to make decisions about the most effective approach for their individual learners.

Lerman et al. (2004) evaluated an assessment procedure to determine the instructional strategies that may be more effective for teaching child listener-responder skills. Listener-responder skills are discrimination skills in which a learner is given a discriminative auditory stimulus (e.g., “sit down please”) and responds accordingly (the child sits down). Six children participated and were exposed to four conditions in an

alternating-treatment design to assess which instructional strategy produced the quickest acquisition for each individual child. The conditions assessed included one in which reinforcement was provided for correct responses, one in which prompts were provided to assist in correct responding, a condition in which both prompts and reinforcement were used, and a condition in which trials were simply presented and responses were recorded. Assessment results suggested that, for most of the children, the reinforcement condition was enough to produce mastery of the targeted responses. One child's target response only met mastery during the prompt condition (Lerman et al., 2004).

A study conducted by Kodak et al. (2011) helped demonstrate the validity in conducting an assessment of effective instructional strategies as outlined by Lerman et al. (2004). In addition, Kodak et al. evaluated more instructional stimuli and differentiated among correct prompted responses, correct independent responses, and attending behavior using an alternating-treatment design. Kodak et al. included an identity-matching procedure, positional prompt, and baseline that included praise delivered for correct responding. After determining the best instructional strategies from the assessment for each child, those strategies were then evaluated in comparison to other treatments for each child. Results suggested that, after identifying an effective instructional strategy, correct responding rapidly increased.

Another extension of Lerman et al. (2004) was conducted by Kodak et al. (2013). This study evaluated the use of BEAs to assess which instructional strategies would be most effective with children. The conditions included in the assessment were contingent praise, reinforcement, and positional prompt and reinforcement. During the contingent-praise condition, unprompted correct responses were reinforced with praise. Also during this condition, a therapist presented instructions, and if a correct response did not occur in

5 seconds, the next trial was introduced. If a correct response did occur, praise was delivered. In the reinforcement condition, preferred edibles and praise were delivered contingent on correct responding. As in the praise condition, if no responding occurred in 5 seconds, the next trial was introduced. In the positional prompt and reinforcement condition, incorrect responses were followed by the closer presentation of the target stimulus (placed the correct stimulus closer to participant). Additionally, unprompted correct responses were reinforced with praise and an edible or small tangible. In this condition, praise was delivered for prompted correct responses. This was run during an AV conditional-discrimination procedure. Acquisition of responses was quickest for all participants during the positional prompt phase. Assessment times varied from 108 to 176 minutes. These results demonstrated that the assessment identified an effective instructional strategy for each of the participants.

There have been several studies that evaluated ways to address problems with prompt dependence. Some of the ways prompt dependence has been evaluated have included manipulation of variables such as the effects of positional, gestural, or physical prompts on unprompted correct responses (Carp et al., 2012; Fisher et al., 2007; Grow et al., 2011; Guiterrez et al., 2009). Benavides and Poulson (2008) attempted to manipulate the number of mastered and new skills being taught at once. Differential reinforcement of prompted and unprompted responses has also been studied. The study by Karsten and Carr (2009) indicated differential reinforcement has an increasing effect on unprompted correct responses. The use of brief assessments to determine the instructional effectiveness of different types of procedures has been evaluated and validated to be an effective method for increasing acquisition of responses in children diagnosed with ASD (Kodak et al., 2011).

The present study proposed to evaluate further the use of rapid assessments of instructional strategies on the acquisition of skills (Kodak et al., 2011; Kodak et al., 2013; Lerman et al., 2004). The rapid assessment conducted by Kodak et al. (2013) took almost 3 hours to complete. An assessment that takes less time and includes an evaluation of more potential instructional strategies may be an effective strategy for improving the rate of acquisition of skills or decrease one's reliance on prompts for children diagnosed with ASD. A focus was placed on evaluating those strategies that increased the likelihood of attending behaviors to offset the many documented difficulties with stimulus overselectivity. In order to compare the effectiveness of this protocol as an assessment tool to determine the individual differences in learner's responses to instructional strategies, a single-subject research design was used. Single-subject research allows the subjects to serve as their own control, therefore allowing for the individual comparisons to be made.

Research Questions

An alternating-treatment design was used to evaluate a rapid-assessment protocol on the acquisition of AV conditional discriminations with children diagnosed with ASD in an attempt to answer the following research questions:

1. Does an assessment protocol of instructional variables (e.g., prompts and observing responses) identify a more effective (i.e., one strategy requires less prompted trials to evoke correct responding) instructional strategy for teaching AV conditional discriminations to children diagnosed with ASD or other intellectual disabilities?

2. Does the assessment protocol show individual differences in patterns of learning among a small selection of participants?

Chapter 3: Methodology

This chapter is a description of the methodology used to evaluate the research questions posed. This chapter includes who was involved in the research and where and how this study was conducted.

Participants

The participants in this study included three children who had received a clinical diagnosis of ASD from a licensed practitioner. Participant 1 was 2 years old and had been receiving ABA services for about 4 months prior to the study. Participant 2 was 4 years old and had been receiving ABA services for about 9 months. Participant 3 was 3 years old and had been receiving ABA services for 1 year. Participants were selected from a population of individuals already participating in ABA services through an agency in southwest Michigan. Participants were chosen based on verbal reports from the current case manager or Board Certified Behavior Analyst overseeing their cases, indicating that the participants struggled with prompt dependence. This was defined as requiring the same level of prompting for 40 consecutive trials for a majority (more than 75%) of current AV conditional-discrimination targets or other programming if they were not currently working on any AV conditional-discrimination programs. This was confirmed through record review by the primary investigator. Initially, four individuals were identified as potential participants by the agency. One of the four dropped out of ABA services shortly after being asked to participate.

Research Setting

The study was conducted in collaboration with an organization providing ABA services to children diagnosed with ASD and related disabilities in the southwest Michigan area. The children's therapy sessions typically consisted of one-on-one

instruction in a wide variety of skills such as communication, receptive skills, and skills of daily living. These sessions generally lasted 2 to 3 hours, occurred during the day, and were conducted in the children's homes. Removing the individuals from their current therapy environments may have introduced confounding variables. Therefore, the study took place within the settings and times of the participant's regularly scheduled ABA therapy sessions. The same therapists who conducted the regularly scheduled therapy sessions ran all the sessions during the best strategy phase. However, the primary investigator conducted the assessment.

Instruments

This section includes information regarding any tools that were used during the study. The data-collection tools were used throughout the study. Instruments used in the study included two specific preference assessments and commonly used data-collection sheets. The preference assessment was administered prior to the beginning of data-collection sessions.

Preference assessments. A multiple stimulus without replacement (MSWO) preference assessment as described by Deleon and Iwata (1996) was conducted with two of the three participants to determine participants' potential reinforcers. One of the participants lacked the prerequisite skills to participate in a MSWO assessment; therefore, a free-operant preference assessment was conducted for the other participant (Roane, Vollmer, Ringdahl, & Marcus, 1998). A reinforcer is a stimulus (i.e., item or event) that follows a behavior and increases the future frequency of the behavior. A reinforcer is defined by its function. This means that an item is only a reinforcer if the behavior it follows increases over time. MSWO and free-operant preference assessments are frequently used in practice to determine the items or activities that may be used as

reinforcers (Cooper et al., 2007). Identifying potential reinforcers through this assessment increased the effectiveness of the teaching procedures and allowed the instructional conditions being compared to have similar levels of power in the reinforcers used.

Data sheets. Data sheets that allowed one to gather data on whether a response was correct, prompted, or incorrect were used. These datasheets also included information as to which condition was being implemented as well as the corresponding target discrimination. This form was similar to many others used in the field and was used simply as a means to gather data on the dependent variable. A datasheet was created specifically for this study (see Appendix A).

Procedures

The following describes the experimental methods that were used in the study. The experimental design, the manner in which the conditions of the experiment were conducted, the measurement system, and treatment fidelity are described.

Design. A single-subject research alternating-treatment design was used to compare the effectiveness and efficiency of four different types of instructional strategies on independent responding. An alternating treatment design is a comparative design allowing for a quick and rapid comparison between various intervention or assessment protocols (Gast, 2010). The pilot nature of the project as well as the comparison of differential effects on individual's behaviors made this the most appropriate research design for this study (Coon & Miguel, 2012).

The instructional strategies in the assessment that were compared included positional prompts (e.g., placing a stimulus closer to the individual), gestural prompts (e.g., pointing to an object), physical prompts (e.g., guiding the individual's hand to perform the correct response), and an observing response (e.g., asking to match-to-

sample). Each instructional strategy was associated with a different target so that each condition's results could be differentiated from the other conditions.

Experiment. Two of the participants were exposed to a three-phase alternating-treatment design that included a baseline, the assessment-protocol phase, and a best treatment phase. One participant was exposed to a two-phase alternating-treatment design including just the baseline phase and assessment-protocol phase.

Prior to gathering baseline data, a preference assessment was conducted to identify potential reinforcers. Then, baseline data were gathered regarding the individual's ability to respond to AV tasks. Next, the four instructional conditions (i.e., gestural prompt, positional prompt, physical prompt, and identity-matching prompt) were randomly alternated. Alternating the conditions continued until 40 trials had passed without any strong differentiation between the independent correct responding for any of the four treatment conditions. Each condition was conducted during regularly scheduled ABA therapy-session times. Each instructional condition consisted of 10 discrete-trial-teaching-based trials. A flow chart in Appendix B displays the order of the experiment.

A MSWO preference assessment was conducted with two of the participants as outlined by Deleon and Iwata (1996) prior to exposing them to experimental conditions. The assessment was conducted by first identifying five to seven preferred items that may function as reinforcers through interviews with caregivers or family members as well as behavioral technicians. The participant was then exposed to the items by placing each in front of the participant and encouraging the participant to sample each item. Next, the items were reintroduced, and the participants were asked to "choose." As soon as the participant chose an item, the other items were removed, and the participant was given access to the item for a brief period of time. The experimenter recorded which item was

chosen and re-presented the array of items. This process was repeated until a hierarchy of items chosen had been recorded or until 30 seconds passed when the participant was told to "choose" and did not make a selection. For Participant 2, the items that were ranked from most to least preferred were as follows: chips, M&Ms, chewy granola bars, and Reese's Pieces. For Participant 3, the items were ranked as follows: chocolate-covered raisins, peanut butter cheese crackers, sour gummy worms, pretzels, chips, and then Reese's Pieces.

Participant 1 lacked the prerequisite skills (i.e., point to an item that is desired) to make a choice, and therefore, a free-operant preference assessment (Roane et al., 1998) was used to assess preferences for this participant. This was done by first allowing the individual to sample the items. After the individual sampled a group of items that were identified by verbal reports from his caregiver and behavior technician as potentially preferred, the items were placed equally spaced in front of the participant. The participant then selected an item by simply engaging with it or picking it up. The amount of time the individual spent engaged with each item was recorded, and the preference hierarchy was determined based on the time spent with each item. Therefore, the more time a participant spent with an item, the more preferred that item was determined to be. Based on the results of this assessment, Participant 1's preferred items were ranked from most to least preferred as follows: Sponge Bob Square Pants video, pop-up book, puzzle, and shape-sorter box.

During baseline, participants were exposed to each AV instruction in a commonly used ABA teaching protocol similar to discrete-trial teaching. Participants sat at a table or on the ground with their instructor either across or next to them. Once participants were looking at either the instructor or stimuli, the instructor presented three equally spaced

stimuli (for each of these participants it was different color cards) about 1 foot in front of the participant and delivered the auditory instruction (e.g., “Touch red”). As soon as a correct response or incorrect response was emitted or if 5 seconds elapsed with the absence of a correct response, materials were removed, and the therapist looked away while recording data on the datasheet. After an intertrial interval of about 5-10 seconds, the next trial was introduced. In order to ensure the assessment protocol emulated the typical teaching environment, mastered targets were interspersed every few trials.

Following the baseline sessions, four conditions were presented in a counterbalanced, random order to each participant. All the conditions were completed within one of the participant’s instructional sessions.

The first condition was conducted similarly to the baseline condition with two small variations. For one, correct responses were reinforced with praise in addition to the delivery of a highly preferred item (the item identified as most preferred during the preference assessment). Also, incorrect responding was followed by a correction trial. Incorrect responding, defined by lack of responding or touching the wrong stimulus within 5 seconds of the instruction, resulted in the removal of attention by the instructor (i.e., turn head away) while recording data on the datasheet immediately after a correction trial was delivered. During the correction trial, a gestural prompt was paired with the auditory stimulus and consisted of pointing to the correct stimulus. Reinforcement was delivered contingent upon correct responding, but reinforcement of a lower magnitude was delivered (e.g., just praise) following prompted responding in correction trials. Responding during correction trials was not counted as one of the 10 trials in the condition.

The second condition was conducted just like the gestural prompt condition.

However, instead of delivering a gestural prompt along with the auditory stimulus, a positional prompt was delivered. The instructor placed the correct stimulus 2 inches closer to the participant than the two distractor stimuli.

The third condition was conducted just like the above conditions. However, hand-over-hand guidance was delivered to ensure correct responding along with the vocal instruction (Cooper et al., 2007).

The fourth condition was conducted just as described in the above-listed conditions. However, correction trials were implemented following incorrect responses. They consisted of the presentation of the targeted stimulus alone placed in front of the participant. Then participants were asked to "Match _____" while being presented with a picture identical to the stimulus. Praise was delivered contingent upon correct matching of the stimuli consisting of taking the identical picture and placing it in front of, on top of, or to the side of the targeted stimulus. Identity-matching trials were only conducted once following each incorrect response.

Following the completion of the alternating conditions, participants were exposed to the instructional strategy that was associated with the lowest number of trials to mastery criterion during the previous phase while exposing the participant to a new AV target. The instructional strategy was implemented just as described in the assessment protocol condition.

Measurement. Trained research assistants recorded data on the number of correct and incorrect responses emitted by the participant. A correct response (recorded by a +) was defined by touching, grabbing, or pointing to the corresponding visual stimulus within 3 to 5 seconds of the corresponding auditory discriminative stimulus. Data were also recorded on the incorrect responses. Incorrect responses were recorded with a dash

(–) when the learner did not touch, grab, or point to the corresponding visual stimulus within 3 to 5 seconds of the corresponding auditory discriminative stimulus. These codes were recorded on the datasheet included in Appendix A.

Fidelity of intervention. Trained research assistants gathered fidelity data during 96% of the assessment condition to ensure implementation was being carried out as intended. The assessment fidelity data indicated that the strategies were implemented with 93% agreement (Participant 1's data were 89%; Participants' 2 and 3 interobserver agreement (IOA) data were 100%). During the best strategy phase, fidelity data were gathered during an average of 16% of the time (20% of the time for Participant 1 and 11% for Participant 2). Fidelity data during follow-up indicated that the strategies were being carried out with accuracy 100% of the time.

IOA. This is a procedure used to ensure reliability of data by having two independent observers gather data on the same event to ensure reliability of data (Gast, 2010). Data for calculating IOA were gathered during 100% of the assessment phase for each participant to ensure the participants' response data were being recorded with reliability. IOA data were gathered during the best treatment phase an average of 16% of the time for the two participants exposed to that phase. The second observers were trained research assistants and the primary investigator. They were not blind to the experiment conditions. The IOA were calculated by dividing the number of agreements by the number of total opportunities for agreements and multiplying that total by 100 (Gast, 2010). IOA data averaged 87% correct for all three participants during the assessment phase. For Participant 1, during the assessment phase, there was 60% agreement. Participant 2 had 98% agreement, and Participant 3 had 100% agreement. During the final best treatment phase, the IOA data were 100%. The datasheet included in

Appendix A was used by both observers.

Chapter 4: Results

The purpose of this study was to evaluate the effectiveness of an assessment protocol for individuals diagnosed with ASD who struggle with dependence on prompts. The following questions were asked and researched in this study:

1. Does an assessment protocol of instructional variables (e.g., prompts and observing responses) identify a more effective (i.e., one strategy requires less prompted trials to evoke correct responding) instructional strategy for teaching AV conditional discriminations to children diagnosed with ASD or other intellectual disabilities?

2. Does the assessment protocol show individual differences in patterns of learning among a small selection of participants?

Assessment of Instructional Strategies Effectiveness

For Participant 1, results of the assessment demonstrated a slight difference in acquisition of instructional strategies (see Figure 1). As one can see from Table 1, a higher percentage of independent responding was associated with the positional prompt condition. The percentage of nonoverlapping data (PND) for positional prompting using the alternating treatment design was 50%, indicating that the difference between that strategy and the other was not significant. The final phase, best treatment phase, had a PND of 100% when compared to the baseline data for that target at 0%.

For Participant 2, results of the assessment did not demonstrate a significant difference in acquisition of instructional strategies (see Figure 2). There was slightly more independent correct responding associated with the positional prompt condition. The PND for positional prompting was 52%, indicating that the difference between that strategy and the other, matching-to-sample, was not significant. To decide on which strategy to use during the final best treatment phase, the researcher identified the

strategies that were associated with the highest percentage of independent responding, which were match-to-sample and the positional-prompt strategies.

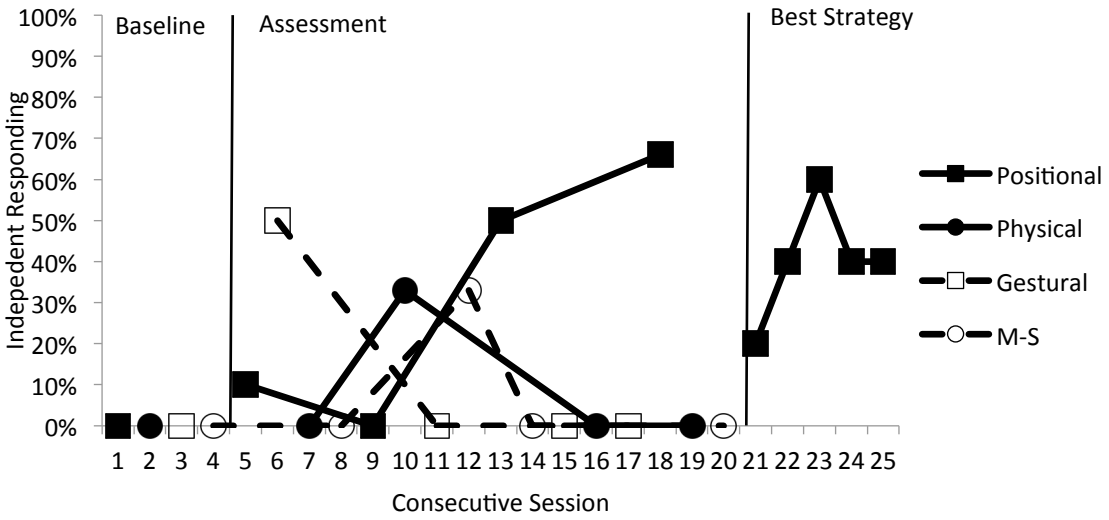


Figure 1. Results for Participant 1. Baseline data here indicate Participant 1 responded correctly 0% of the time. Then during the assessment phase, Participant 1 responded slightly better with the positional prompt as the data series is slightly higher than the others. During the best treatment phase, Participant 1 ranged from 20% to 60% correct responding.

Table 1

Percentage Correct Responding for Participant 1 During Each Instructional Strategy

Instructional Strategy	Positional	Physical	Gestural	M-S
Baseline	0	0	0	0
Assessment	32	8	13	8
Best treatment phase (positional)	40	NA	NA	NA

Note. M-S = matching-to-sample; NA = not applicable.

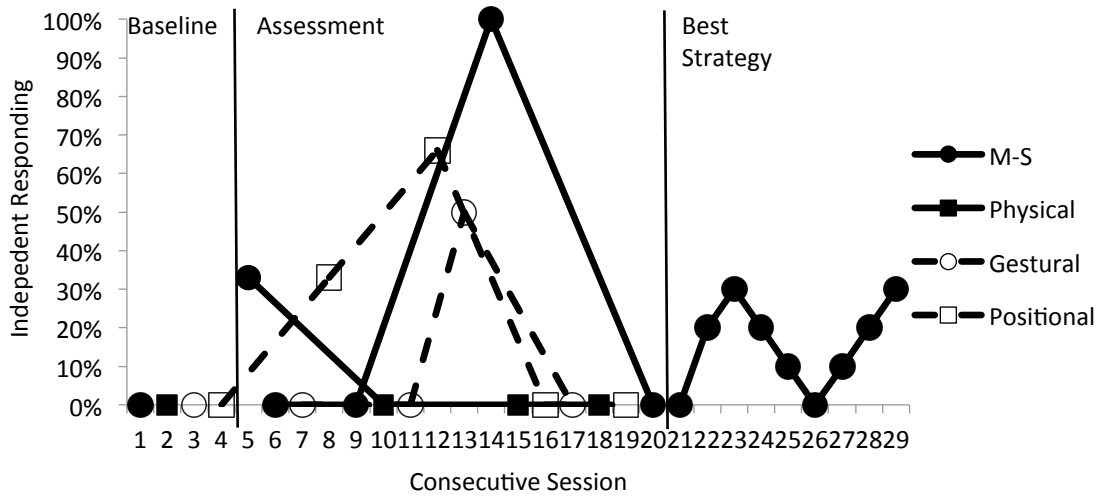


Figure 2. Results for Participant 2. Baseline data here indicate Participant 2 responded correctly 0% of the time. During the assessment phase, Participant 2 responded slightly better with the matching-to-sample strategy as that data series is slightly higher than the others. Participant 2 ranged from 0% to 30% correct responding during the best treatment phase.

Table 2

Percentage Correct Responding for Participant 2 During Each Instructional Strategy

Instructional strategy	Positional	Physical	Gestural	M-S
Baseline	0	0	0	0
Assessment	20	7	10	20
Best treatment phase (M-S)	NA	NA	NA	NA

Note. M-S = matching-to-sample; NA = not applicable.

Then the strategy associated with the largest percentage of correct responding during correction trials was chosen. For Participant 2, this was match-to-sample at 100%

correct during prompting. The best treatment phase did suggest that match-to-sample as an instructional strategy was effective with a PND of 70% when compared to the baseline data for that target.

For Participant 3, results of the assessment did not demonstrate a significant difference in acquisition of instructional strategies (see Figure 3). There was slightly more independent correct responding associated with the positional prompt condition (see Table 3). However, as one can see in Figure 3, the difference between that condition and the others was not significant. The PND for positional prompting was 25% supporting the researcher's visual analysis that the difference between that strategy and the next best was not significant.

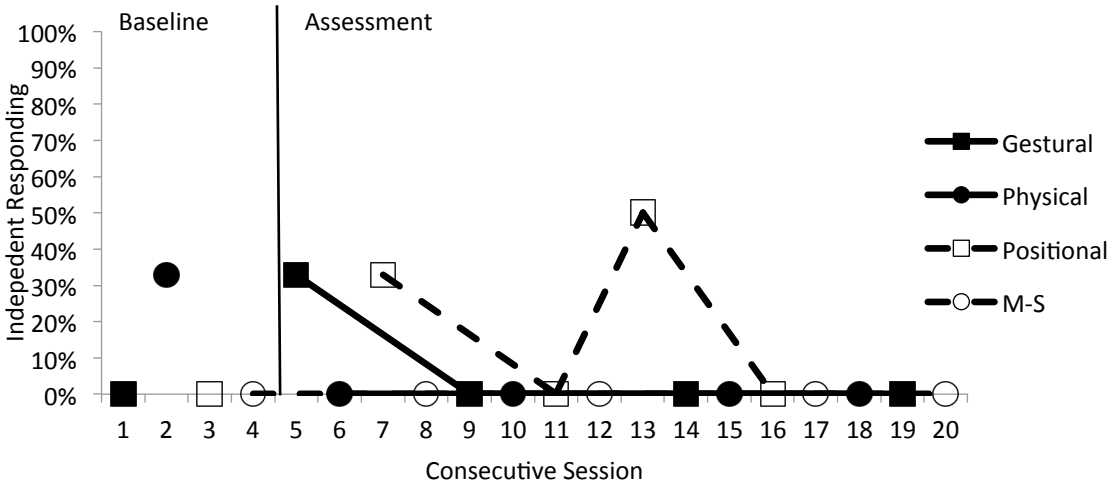


Figure 3. Results for Participant 3. Baseline data here indicate Participant 3 responded correctly 33% of the time for the target associated with the physical prompt. Participant 3 responded 0% correct for the other targets. During the assessment phase, Participant 3 responded slightly better with the positional prompt as the data series is slightly higher than the others.

Patterns of Learning Differences

As one can see from Figure 4, the assessment protocol demonstrated there were individual differences in responding between each of the three participants. For example,

Participant 1 scored an average of 32% correct during the positional instructional strategies. Participant 2 scored 32% correct during the matching-to-sample condition, and Participant 3 scored 21% correct during the positional strategy. Data from all three participants supported that individual learning differences may occur.

Table 3

Percentage Correct Responding For Participant 3 During Each Instructional Strategy

Instructional strategy	Positional	Physical	Gestural	M-S
Baseline	0	0	0	0
Assessment	21	0	0	8

Note. M-S = matching-to-sample; NA = not applicable.

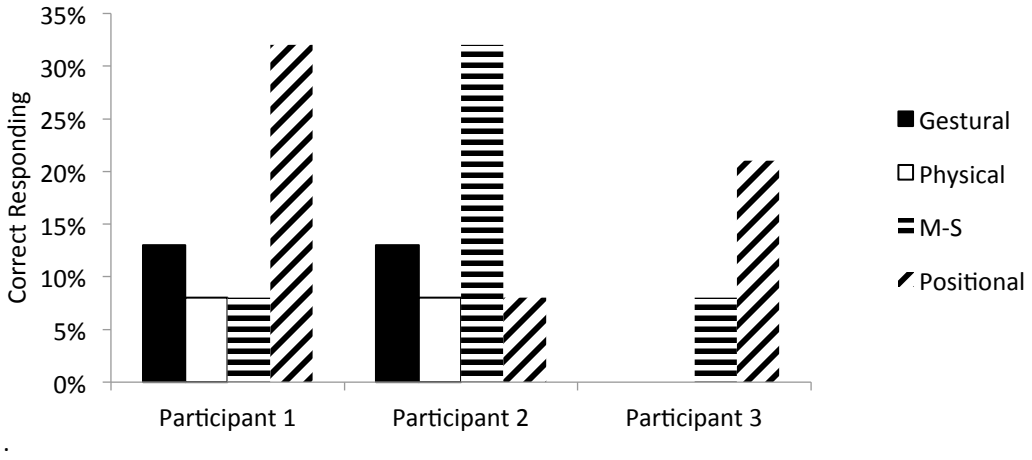


Figure 4. Responding according to instructional strategy for each participant.

Figure 5 represents the percentage of correct responding during each of the instructional strategies. As one may expect based on the strategy, physical prompting

resulted in 100% correct responding for each of the three participants. Matching-to-sample was associated with the next most correct responding when looking at the data for all three participants with an average of 68% correct prompted responding. Next, positional prompting was associated with an average of 35% of correct prompted responding. Finally, gestural prompts were associated with an average of 12% correct responding as an average of all three participants.

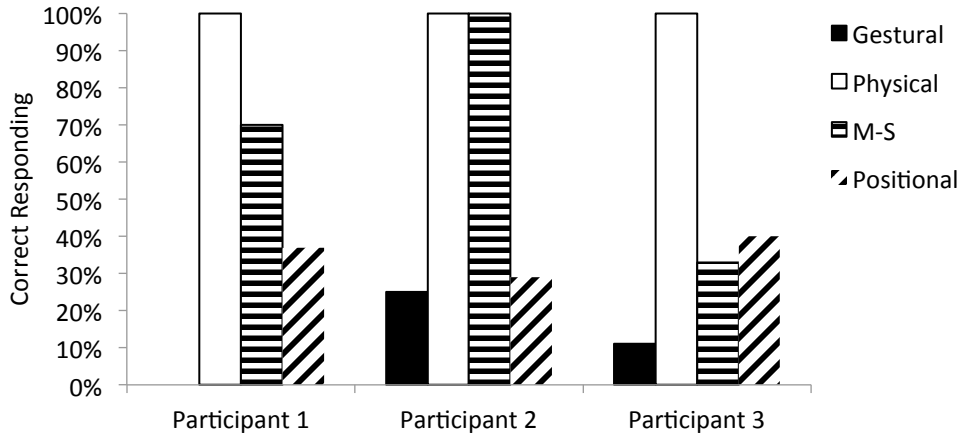


Figure 5. Responding during correction trial for each participant and instructional strategy.

Summary

In conclusion, this study did not strongly support an assessment of instructional strategies for identifying a clearly differential pattern of responding according to instructional strategies as asked in the first research question. All three participants did show differential responding according to the instructional strategy; however, the difference in responding was not significantly different. The study did identify differences in patterns of learning between the three participants as asked in the second research question. The study also demonstrated that the most correct responding to the prompts occurred when using a physical prompt or match-to-sample strategy.

Chapter 5: Discussion

The purpose of this study was to determine whether a brief assessment protocol could identify a more efficient instructional strategy to overcome prompt dependence with individuals diagnosed with ASD. According to the data gathered here, the assessments did not provide strong support for one strategy over the other. However, based on the data collected for two of the participants, the instructional strategies that were associated with slightly better performance did appear to assist in helping the participants make gains in independent response acquisition during the best treatment phases. Therefore, this study did not necessarily support or refute the results of Bourret et al. (2004), Kodak et al. (2011), Kodak et al. (2013), and Lerman et al. (2004) who found that rapid assessments of instructional strategies were effective in improving the acquisition of skills in ABA instructional settings. This study also did not support or refute the results of studies conducted in typical educational settings that effectively used brief experimental analyses to identify more efficient instructional strategies (Daly et al., 1999; Duhon et al., 2004; Jones & Wickstrom, 2002; McComas et al., 2009; Mong & Mong 2011; Schmidt, et al., 2014). If anything, the data from the best treatment phase for two of the participants' supported the utility of this type of an assessment before teaching skills.

This study also looked to answer whether or not individual differences would be observed among the participants regarding patterns of learning with different instructional strategies. This study did identify different learning patterns for each of the participants, supporting results of the Coon and Miguel (2012) study suggesting that individuals' learning patterns may be related to their history of reinforcement with certain instructional strategies. Two of the participants exhibited slightly better responding when

exposed to positional prompts, and the other responded slightly better to a differential observing response as a corrective strategy during learning.

There are different possible explanations for the difference in responding seen between individuals. As already mentioned, each individual's history of reinforcement with specific instructional strategies may impact how they responded to the different strategies. Additionally, instructional strategies may be differentially effective as a result of the individual's attending skills. For example, if an individual does not attend to a finger point, then a gestural prompt will not be very helpful in increasing independent acquisition. Likewise, if an individual does not look at the materials in an instructional trial, then a matching-to-sample task may be a helpful way to increase attending to the materials themselves.

One reason why this study may have not been as effective in identifying more efficient instructional strategies as several other studies demonstrated (Bourret et al., 2004; Kodak et al., 2011; Kodak et al. 2013; Lerman et al., 2004) may be because the participants included in this study were identified as prompt dependent. Therefore, it may be that a longer assessment is needed for individuals who may have more difficulty with transferring stimulus control. A main purpose of this assessment was to develop a brief assessment strategy with the thought that, the more brief the protocol, the more likely it would be used in the field. Unfortunately, this study did not support the use of a brief strategy in order to identify a more efficient instructional strategy. In fact, it is possible that, if the assessment was not limited to a certain number of trials, it may have been able to identify more clearly a more effective instructional strategy for the participants. Participant 1 took the longest time, 41 minutes, for the assessment to be completed. The duration of the assessment was measured from the time the first trial was delivered until

the last trial. This means that, even when small breaks were provided, the timer was still running. Participant 1 required several small breaks in addition to interspersed mastery trials in order to gain compliance to conduct the instructional assessment. The participant would frequently get up in the middle of the assessment and run across the room or jump on a mattress during the assessment.

Participant 2 took 26 minutes to complete the assessment. This participant was also given brief breaks in between several trials. The assessment for Participant 3 took 32 minutes to complete. This made it a more brief assessment compared to the Kodak et al. (2013) assessment, which took 3 hours to complete. The instructional assessment conducted in the Mong and Mong (2011) study was also found to be effective but took so long to complete that the social validity of even conducting such an assessment is questioned. Again, it may be that the brief nature of the assessment in this study was too extreme in order to actually determine a more effective strategy. In other words, if more trials had been conducted, it is possible that one strategy may have demonstrated a more effective pattern. However, increasing the duration of the assessment may have also decreased the social validity of the protocol.

Participants were identified as prompt dependent and may, therefore, not be entirely representative of how others may respond. This may suggest that a brief assessment protocol is not helpful for identifying differentially effective prompts for individuals who struggle with prompt dependence. However, it may still be effective for those who do not have a tendency to become dependent on prompts.

Even though the results of the assessment did not demonstrate significant differences between the different strategies, the best treatment phase did support the instructional strategies that were identified as more effective when simply comparing

percentage correct responding. During the best treatment phase, acquisition of the targeted skill was observed for both participants above baseline data. Therefore, even though the data from the assessment alone did not support this brief assessment protocol, the best strategy phase did support its use.

Overall, these findings suggest that there are individual differences in learning patterns between individuals. For those who exhibit issues related to prompt dependence, it may therefore be useful to conduct an assessment of instructional strategies to identify which type of instructional strategy works more efficiently for the individual. The type of strategy used in this study may have been a bit too brief, however. Therefore, a more lengthy assessment like the one conducted in the Kodak et al. (2013) study may be a more effective protocol for identifying a more efficient strategy.

Implications

The results of this study have implications for Board Certified Behavior Analysts, educators, families, and children diagnosed with ASD. The fact that individuals diagnosed with ASD who exhibit issues with prompt dependence do demonstrate differences in individual patterns of learning should be strongly considered for those who work on skill acquisition with these individuals. Acquisition of skills may be slower for individuals whose teachers simply use a standard instructional strategy method instead of an individualized system of instruction. This should be taken into consideration when designing treatment programs to work on skill acquisition.

Limitations

There are several limitations to this study. Some were inherent in the single-subject research methodology used, and some were related to the actual execution of the study. The small number of participants involved may not be an adequate representation

of the effectiveness of the procedure and may limit attempts to make generalizations. Limitations associated with the alternating-treatment design, including multiple-treatment interference and the unnatural nature of rapidly altering conditions, are worth noting (Gast, 2010). One may question if the results would be the same if the targeted skill was introduced with just one intervention. Similarly, the rapid changing of treatment conditions may also not be representative of how the instructional strategy would be implemented in a natural setting.

Alternating-treatment designs are good for demonstrating significant differences between variables, not small differences (Gast, 2010). This is another possible explanation for the assessment results not clearly identifying through visual inspection or PND a significant difference in strategies. Either a longer assessment with more sessions should have been conducted or perhaps a multiple-baseline design across skills could have been used to identify the more efficient strategy. Again, the alternating-treatment design was chosen due to the practical nature of the design in allowing for rapid comparison between treatment types.

The AV discrimination materials that were used were color identification. This was used due to the young age of the participants (all under the age of 4). Despite baseline data that were collected indicating that the participants did not exhibit receptive identification of colors in their repertoire, it is still possible that the history with certain colors may have skewed the results of the instructional strategy assessment. That is, if yellow was paired with a positional prompt for Participant 1 and if Participant 1 just had more of a tendency to select the color yellow during trials, it may have provided a unfair representation of how the instructional strategy itself encouraged responding or if it was just a factor of the visual stimulus itself. Colors were associated with a different

instructional strategy for each participant in order to overcome any likelihood of certain colors standing out from the others; however, this did not account for any personal individual histories with the colors.

IOA data, particularly for Participant 1, were low during the assessment phase. This means that one should question the reliability of the results for that participant. Similarly the treatment fidelity data for Participant 1 were also low during the assessment phase. Participant 1 exhibited a fair amount of refusal to comply and challenging behaviors throughout the assessment. In between trials, the participant would get up from the chair or ground where the assessment was being conducted and would run around the room or attempt to jump on furniture. Despite a preference assessment being conducted and using only the most highly valued reinforcers, it is possible that the proper establishing operations were not in place to motivate the child to sit and comply with the assessment procedures. As a result of the frequent challenging behaviors and constant moving around, the second observer was assisting the researcher conducting the assessment in managing the child's behavior for their safety. The amount of response effort in managing these disruptive behaviors may be a contributing factor to the IOA data and assessment implementation inconsistencies. When looking at the data for Participants 2 and 3, the IOA and fidelity data were much higher. This was despite the research assistants being trained in the same way for each of the three participants. The largest difference between the assessments was the number of disruptive behaviors exhibited by the participants.

A stronger case may have been made for the assessment protocol if a comparison instructional strategy was used during the best strategy phase. If there had been a second target that was addressed during the final best treatment phase using the instructional

strategy that was identified as least effective to compare it may have provided support of the utility of the assessment protocol. Additionally, if the third participant had not had to drop out of ABA services and move out of state unexpectedly, then additional follow-up data gathered in the best treatment phase may have provided more information about the usefulness of the assessment.

The primary investigator conducted the assessment protocol whereas the behavior technician familiar with the participant conducted the best treatment phase. The difference in the person conducting the two phases may have confounded the results as it is possible that the participants responded differentially to these two people. It is possible that the progress observed in the best treatment phase for Participants 1 and 2 may really be because the implementation in this phase was with people with whom the participants were more familiar.

Another possible limitation to this study was that, even if there was an instructional strategy that was identified as a more effective instructional technology for AV discriminations, it may have not generalized to other needed skill acquisitions. For example, knowing a child can acquire skills more efficiently when using stimulus size prompts may not be beneficial when attempting to teach an individual language skills.

Additionally, study participants were already enrolled in ABA treatment settings. Previous experience within ABA may skew data as student participants may respond differently than students not having previous exposure to ABA programs. Also, the evaluation of only four strategies to compare instructional effectiveness may be limiting. There may be other variables that contribute to a child's success being ignored with an assessment methodology only comparing these four instructional strategy techniques.

The extent to which the most effective identified intervention for each participant

works over the long term may also be limited in this given study. As identified in the study conducted by Mong and Mong (2008), the long-term exposure to certain teaching strategies did not support the utility of an assessment of instructional strategies. After time, in Mong and Mong's study, each of the strategies in the study produced similar learning patterns.

Future Research

Future studies should continue to investigate methods to overcome issues related to prompt dependence. It is possible that this assessment was too brief for individuals who exhibit issues related to prompt dependence. It is possible that a longer assessment or an assessment that took place over a few days or sessions would have been more likely to identify a differentially effective procedure.

It may also be beneficial for researchers to replicate a similar assessment protocol with a population of children who do not exhibit issues related to prompt dependence. It may be that the brief nature of this assessment is better suited for children who do not exhibit such difficulties with relying on prompts. It would be interesting to see if the implementation of this type of assessment protocol decreased time needed for ABA services or just in general increased the rate of acquisition.

Future research may also continue to investigate best transfer-of-stimulus-control strategies by looking into different instructional strategies or the influence of past history with certain instructional strategies and any correlation to the effectiveness of future implementation. For example, if one has been exposed to a large number of physical prompts for teaching instead of positional prompts, will the physical prompts be a more effective means to teach future skills or will a new instructional strategy never used be more effective? Or is the type of reinforcement delivered or associated with the

instructional strategy having an impact on the type of future responding?

Conclusion

This study did not support the methodology used in the assessment protocol for clearly identifying differences between instructional strategies. However, this study did demonstrate that there are differences in learning patterns for the individuals included in this study. This study supports the need to develop individualized systems of instruction that take into consideration the type of prompt to use in order to develop the most efficient instructional systems.

References

Anson, H. M., Todd, J. T., & Cassaretto, K. J. (2008). Replacing overt verbal and gestural prompts with unobtrusive covert tactile prompting for students with autism. *Behavior Research Methods, 40*, 1106-1110. doi:10.3758/BRM.40.4 .1106

Barbetta, P. M., Heward, W. L., & Bradley, D. M. (1993). Relative effects of whole-word and phonetic-prompt error correction on the acquisition and maintenance of sight words by students with developmental disabilities. *Journal of Applied Behavior Analysis, 26*, 99-110.

Bear, D. M., Wolf, W. M., & Risley, T. R. (1968). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis, 1*, 91-97. doi:10 .1901/jaba.1968.1-91

Benavides, C. A., & Poulson, C. L. (2009). Task interspersal and performance of matching tasks by preschoolers with autism. *Research in Autism Spectrum Disorders, 3*, 619-629. doi:10.1016/j.rasd.2008.12.001

Blumberg, S. J., Bramlett, M. D., Kogan, M. D., Schieve, L. A., Jones, J. R., & Lu, M. C. (2013, March). Changes in prevalence of parent-reported autism spectrum disorder in school-aged U.S. children: 2007 to 2011-2012. *National Health Statistics Report.* Retrieved from http://www.cdc.gov/nchs/data/nhsr/nhsr065.pdf

Bourret, J., Vollmer, T. R., & Rapp, J. T. (2004). Evaluation of a vocal mand assessment and vocal mand training procedures. *Journal of Applied Behavior Analysis, 37*, 129-144.

Burns, M. K., Ganuza, Z. M., & London, R. M. (2009). Brief experimental analysis of written letter formation: Single-case demonstration. *Journal of Behavioral Education, 18*, 20-34. doi:10.1007/s10864-008-9076-zc

Carp, C. L., Peterson, S. P., Arkel, A. J., Petursdottir, A. I., & Ingvarsson, E. T. (2012). A further evaluation of picture prompts during auditory-visual conditional discrimination training. *Journal of Applied Behavior Analysis, 45*, 737-751. doi: 10.1901/jaba.2012.45-737

Cipani, E. (2012). Stimulus overselectivity: Empirical basis and diagnostic methods. *Behavior Analyst Today, 13*(1), 3-11.

Constantine, B., & Sidman, M. (1975). Role of naming in delayed matching-to-sample. *American Journal of Mental Deficiency, 79*, 680-689.

Coon, J. T., & Miguel, C. F. (2012). The role of increased exposure to transfer-of-stimulus-control procedures on the acquisition of intraverbal behavior *Journal of Applied Behavior Analysis, 45*, 657-666. doi:10.1016/ 0270-3092(83)90030-9

Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). *Applied behavior analysis* (2nd ed.). Upper Sadle River, NJ: Pearson Prentice Hall.

Daly, E. J., Martens, B. K., Hamler, K. R., Dool, E. J., & Eckert, T. L. (1999). A brief experimental analysis for identifying instructional components needed to improve oral reading fluency. *Journal of Applied Behavior Analysis, 32*, 83-94.

Deleon, I. G., & Iwata, B. A. (1996). Evaluation of a multiple-stimulus presentation format for assessing reinforcer preferences. *Journal of Applied Behavior Analysis, 29*, 519-533.

Delprato, D. J. (2001). Comparisons of discrete-trial and normalized behavioral language intervention for young children with autism. *Journal of Autism and Developmental Disorders, 31*, 315-325.

Dickson, C. A., Wang, S. S., Lombard, K. M., & Dube, W. V. (2006). Overselective stimulus control in residential school students with intellectual disabilities. *Research in Developmental Disabilities, 27*, 618-631. doi:10.1006/j.ridd.2005 .07.004

Doughty, A. H., & Hopkins, M. N. (2011). Reducing stimulus overselectivity through an increased observing-response requirement. *Journal of Applied Behavior Analysis, 44*, 653-657. doi:10.1901/jaba.2011.44-653

Dube, W. V., & McIlvane, W. J. (1999). Reduction of stimulus overselectivity with nonverbal differential observing responses. *Journal of Applied Behavior Analysis, 32*, 25-33.

Duhon, G. J., Noell, G. H., Witt, J. C., Freeland, J. T., Dufrene, B. A., & Gilbertson, D. N. (2004). Identifying academic skill and performance deficits: The experimental analysis of brief assessments of academic skills. *School Psychology Review, 33*, 429-443.

Eckert, T. L., Ardoin, S. P., Daly, E. J., & Martens, B. K. (2002). Improving oral reading fluency: A brief experimental analysis of combining an antecedent intervention with consequences. *Journal of Applied Behavior Analysis*, *35,* 271-281.

Fisher, W. F., Kodak, T., & Moore, J. W. (2007). Embedding an identity-matching task within a prompting hierarchy to facilitate acquisition of conditional discriminations in children with autism. *Journal of Applied Behavior Analysis, 40*, 489-499. doi:10.1091.jaba.2007.40-489

Ganz, M. L. (2007). The lifetime distribution of the incremental societal costs of autism. *Arichives of Pediatrics and Adolescent Medicine, 161*, 343-349.

Gast, D. L. (2010). *Single subject research methodology in behavioral sciences.* New York, NY: Routledge

Granpeesheh, D., Tarbox, J., & Dixon, D. R. (2009). Applied behavior analytic interventions for children with autism: A description and review of treatment research. *Annals of Clinical Psychiatry, 21*, 162-173.

Grow, L. L., Carr, J. E., Kodak, T. M., Jostad, C. M., & Kisamore, A. N. (2011). A comparison of methods for teaching receptive labeling to children with autism spectrum disorder. *Journal of Applied Behavior Analysis, 44*, 475-498.

Grzadzinski, R., Huerta, M., & Lord, C. (2013). DSM-5 and autism spectrum disorders (ASDs): An opportunity for identifying ASD subtypes. *Molecular Autism, 4*(12), 1-6.

Guiterrez, A., Hale, M., O'Brien, H., Fischer, A., & Alexandri, M. (2009). Evaluating the effectiveness of two commonly used discrete trial procedures for teaching receptive discrimination to young children with autism spectrum disorder. *Research in Autism Spectrum Disorders, 3*, 571-579. doi:10.1016/j.rasd.2008.12 .005

Gutowski, S. J., & Stromer, R. (2003). Delayed matching to two-picture samples by individuals wtih and without disabilities: An analysis of the role of naming. *Journal of Applied Behavior Analysis, 36*, 487-505.

Iwata, B. A., Dorsey, M. F., Slifer, K. J., Bauman, K. E., & Richman, G. (1994). Toward a functional analysis of self-injury. *Journal of Applied Behavior Analysis, 27*, 197-209.

Jones, K. M., & Wickstrom, K. F. (2002). Done in sixty seconds: Further analysis of the brief assessment model for academic problems. *School Psychology Review, 31*, 554-568.

Karsten, A. M., & Carr, J. E. (2009). The effects of differential reinforcement of unprompted responding on the skill acquisition of children with autism. *Journal of Applied Behavior Analysis, 42*, 327-334.

Kodak, T., Clements, A., & LeBlanc, B. (2013). A rapid assessment of instructional strategies to teach auditory-visual conditional discriminations to children with autism. *Research in Autism Spectrum Disorders, 7*, 801-807.

Kodak, T., Fisher, W. W., Clements, A., Paden, A. R., Gawley, E., & Dickes, N. (2011). Functional assessment of instructional variables: Linking assessment and treatment. *Research in Autism Spectrum Disorders, 5*, 1059-1077.

Koegel, R. L., Bradshaw, J. L., Ashbaugh, K., & Koegel, L. K. (2014). Improving question-asking initiations in young children with autism using pivotal response treatment. *Journal of Autism and Developmental Disorders, 44*, 816-827. doi:10 .1007/s10803-013-1932-6

Koegel, R. L., & Schreibman, L. (1977). Teaching autistic children to respond to simulatneous multiple cues. *Journal of Experimental Child Psychology, 24*, 299-311.

Koegel, L. K., & Wilhelm, H. (1973). Selective responding to the components of multiple visual cues by autistic children. *Journal of Experimental Child Psychology, 15*, 442-453.

Leblanc, L., Esch, J., Sidener, T. M., & Firth, A. M. (2006). Behavioral language interventions for children with autism: Comparing applied verbal behavior and naturalistic teaching approaches. *Analysis of Verbal Behavior, 22*, 49-60.

Lerman, D. C., Vorndran, C., Addison, L., & Kuhn, S. A. C. (2004). A rapid assessment of skills in young children with autism. *Journal of Applied Behavior Analysis, 37*, 11-26.

Lovaas, O. I. (2003). *Teaching individuals with developmental delays: Basic intervention techniques*. Austin, TX: Pro-Ed.

Lovaas, O. I., Koegel, R. L., & Schreibman, L. (1979). Stimulus overselectivity in autism: A review of research. *Psychological Bulletin, 86*, 1236-1254.

Lovaas, O. I., & Schreibman, L. (1971). Stimulus overselectivity of autistic children in a two stimulus situation. *Behaviour Research and Therapy, 9*, 305-310. doi:10 .1016/0005/7967(71)90042-8

Lovaas, O. I., Schriebman, L., Koegel, R. L., & Rehm, R. (1971). Selective responding by autistic children to multiple sensory input. *Journal of Abnormal Psychology, 77*, 211-222.

Love, J. R., Carr, J. E., & Almason, S. M. (2008). Early and intensive behavioral intervention for autism: A survey of clinical practices. *Research in Autism Spectrum Disorders*, *3*, 421-428. doi:10.1016/j.rasd.2008.08.008

Malott, R. M., Malott, M. E., & Trojan, E. A. (1999). *Elementary principles of behavior* (4th ed.). Upper Saddle River, NJ: Pearson.

Matthews, B., Shute, R., & Rees, R. (2001). An analysis of stimulus overselectivity in adults with autism. *Journal of Intellectual and Developmental Disability, 26*, 161-176. doi:10.1080/13668250020054477

McClannahan, L. E., & Krantz, P. J. (1997). In search of solutions to prompt dependence: Teaching children with autism to use photographic activity schedules. In E. M. Pinkston & D. M. Baer (Eds.), *Environment and behavior* (pp. 271-278). Boulder, CO: Westview Press.

McComas, J. J., Wacker, D. P., Cooper, L. J., Asmus, J. M., Richman, D., & Stoner, B.

(1996). Brief experimental analysis of stimulus prompts for accurate responding on academic tasks in an outpatient clinic. *Journal of Applied Behavior Analysis, 29*, 397-401. doi:10.1901/jaba.1996.29-397

McComas, J. J., Wagner, D., Chaffin, M. C., Holton, E., McDonnell, M., & Monn, E. (2009). Prescriptive analysis: Further individualization of hypothesis testing in brief experimental analysis of reading fluency. *Journal of Behavioral Education, 18*, 56-70. doi:10.1007/s10864-009-9080-y

McDonnell, J., & Ferguson, B. (1989). A comparison of time delay and decreasing prompt hierarchy strategies in teaching banking skills to students with moderate handicaps. *Journal of Applied Behavior Analysis, 22*, 85-91.

McHugh, L., & Reed, P. (2007). Age trends in stimulus overselectivity. *Journal of the Experimental Analysis of Behavior, 88*, 369-380. doi:10.1901.jeab.2007.88-369

Mong, K. W. (2008). *A comparison of brief experimental analysis and extended intervention analysis for identifying reading interventions for at-risk elementary students* (Doctoral dissertation), Available from ProQuest Dissertations and Theses database. (UMI No. 3315174)

Mong, M. D., & Mong, K. W. (2011). The utility of brief experimental analysis and extended intervention analysis in selecting effective mathematics interventions. *Journal of Behavioral Education, 21*, 99-118. doi:10.1007/s10864-011-9143-8

Neef, N. A., Iwata, B. A., & Page, T. J. (1980). The effects of interspersal training versus high-density reinforcement on spelling acquisition and retention. *Journal of Applied Behavior Analysis, 13*, 153-158.

Niemeier, J. (2014). *A comparison of the effects of errorless vs. error correction procedures on skill acquisition.* (Master's thesis). University of Nebraska, Lincoln. Available from ProQuest Dissertations and Theses database. (UMI No. 1554410)

Olenick, D. L., & Pear, J. J. (1980). Differential reinforcement of correct responses to probes and prompts in picture-name training with severely retarded children. *Journal of Applied Behavior Analysis, 13*, 77-89.

Parker, D. C., Dickey, B. N., Burns, M. K., & McMaster, K. L. (2012). An application of brief experimental analysis with early writing. *Journal of Behavioral Education, 21*, 329-349. doi:10.1007/s10864-012-9151-3

Peters-Scheffer, N., Didden, R., Korzilius, H., & Sturmey, P. (2010). A meta-analytic study on the effectiveness of comprehensive ABA-based early intervention programs for children with autism spectrum disorder. *Research in Autism Spectrum Disorders, 5*, 60-69. doi:10.1016.j.rasd.2010.03.011

Ploog, B. (2010). Stimulus overselectivity four decades later: A review of the literature and its implications for current research in autism spectrum disorder. *Journal of Autism and Developmental Disorders, 40*, 1332-1349. doi:10.1007/s10803-010-0990-2

Reed, P., Altweck, L., Broomfield, L., Simpson, A., & McHugh, L. (2012). Effect of observing-response procedures on overselectivity in individuals with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 27*, 237-246. doi:10.1177/1088357612457986

Reed, P., & Gibson, E. (2005). The effect of concurrent taslk load on stimulus overselectivity. *Journal of Autism and Developmental Disorders, 35*, 601-614. doi:10 .1007/s10803-005-0004-y

Roane, H. S., Vollmer, T. R., Ringdahl, J. E., & Marcus, B. A. (1998). Evaluation of a brief stimulus preference assessment. *Journal of Applied Behavior Analysis, 31*, 605-620.

Schmidt, J. D., Stanholtzer, A., Mezhoudi, N., Scherback, B. E., & Khang, S. (2014). The utility of a brief experimental analysis for problem behavior maintained by escape from demands. *Education and Treatment of Children, 37*, 229-248. doi:10.1353/etc.2014.0012

Shabani, D. B., Katz, R. C., Wilder, D. A., Beauchamp, K., Taylor, C. R., & Fischer, K. J. (2002). Increasing social initiations in children with autism: Effects of a tactile prompt. *Journal of Applied Behavior Analysis, 35*, 79-83.

Shook, S. L. (1999). *Teaching children with autism to ask questions in an integrated preschool settings: A comparison of constant and progressive time delay* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 9944178)

Skinner, B. F. (1938). *The behavior of organisms: An experimental analysis*. Oxford, England: Appleton Center.

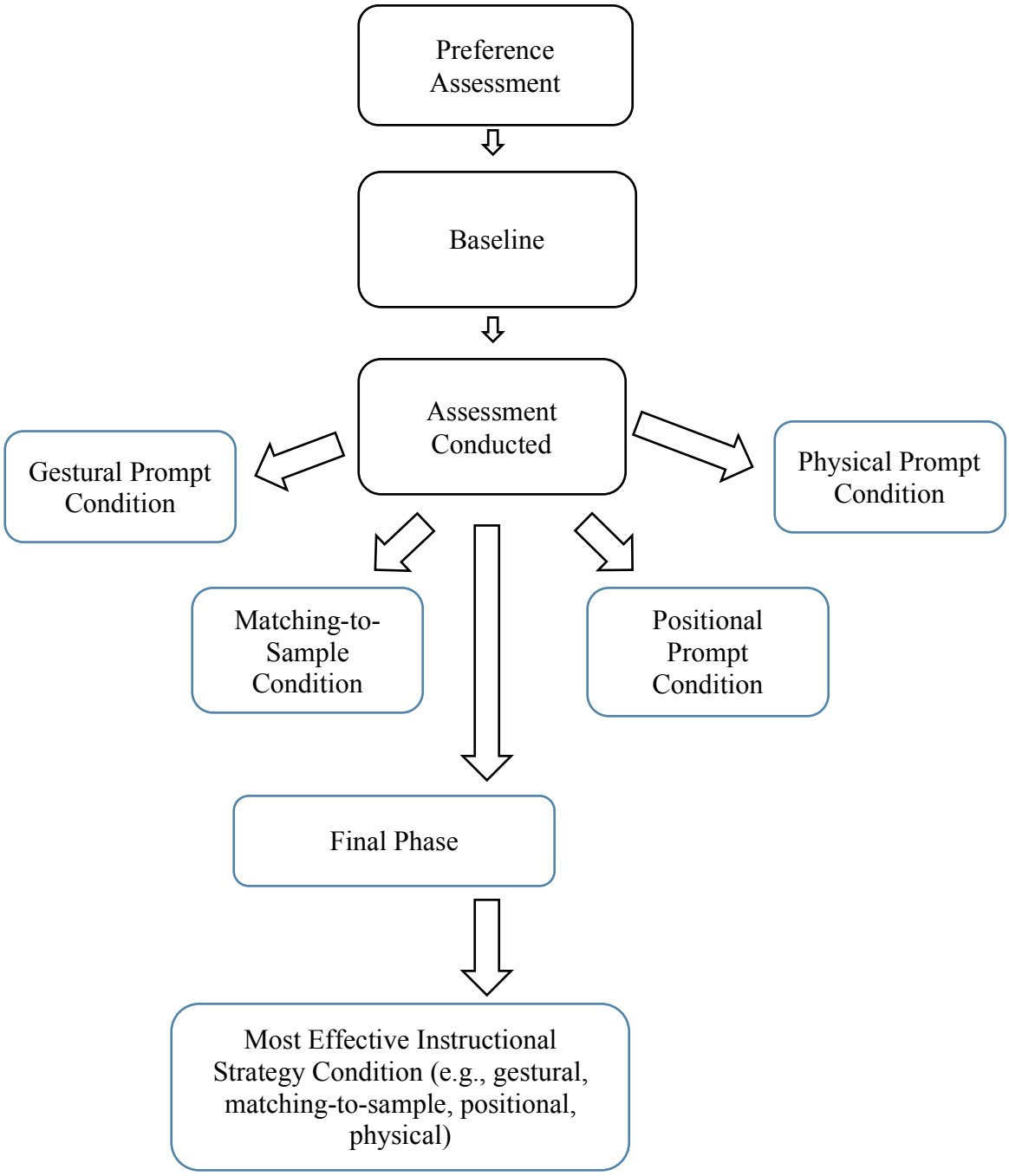
Walpole, C. W., Roscoe, E. M., & Dube, W. V. (2007). Use of a differential observing response to expand restricted stimulus control. *Journal of Applied Behavior Analysis, 40*, 707-712. doi:10.1901/jaba.2007.707-712

Weeks, M., & Gaylord-Ross, R. (1981). Task difficulty and aberrant behavior in severly handicapped students. *Journal of Applied Behavior Analysis, 14*, 449-463.

Appendix A
Datasheet

Date:	**Instructional Strategy:**	**Target:**	**Consecutive Condition:**
Trial	**Correct/Incorrect**	**Correction Trial**	**Correction Used**
1	**+ / --**	**+ / --**	**G Phy Pos. M-S**
2	**+ / --**	**+ / --**	**G Phy Pos. M-S**
3	**+ / --**	**+ / --**	**G Phy Pos. M-S**
4	**+ / --**	**+ / --**	**G Phy Pos. M-S**
5	**+ / --**	**+ / --**	**G Phy Pos. M-S**
6	**+ / --**	**+ / --**	**G Phy Pos. M-S**
7	**+ / --**	**+ / --**	**G Phy Pos. M-S**
8	**+ / --**	**+ / --**	**G Phy Pos. M-S**
9	**+ / --**	**+ / --**	**G Phy Pos. M-S**
10	**+ / --**	**+ / --**	**G Phy Pos. M-S**
	%:	**%:**	

Appendix B
Experiment Flow Chart


Preference Assessment
Baseline
Assessment Conducted
Gestural Prompt Condition
Physical Prompt Condition
Matching-to-Sample Condition
Positional Prompt Condition
Final Phase
Most Effective Instructional Strategy Condition (e.g., gestural, matching-to-sample, positional, physical)