July 2018

Comparison of Conditioning Procedures to Condition Praise as a Reinforcer for Children with Autism

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Comparison of Conditioning Procedures to Condition Praise as a Reinforcer for Children with Autism

by

Cynthia P. Livingston

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy Degree in Applied Behavior Analysis Department of Child and Family Studies College of Behavioral and Community Sciences University of South Florida

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Date of Approval: June 28, 2018

Keywords: conditioned reinforcement, developmental disabilities

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Acknowledgements

I would like to thank my doctoral advisor, Andrew Samaha, for his guidance through the dissertation process, and other projects I have had the opportunity to work on because of him. You helped shape my behavior to be a better scientist and future advisor, and I cannot thank you enough. Good job, Andrew!

I would also like to thank Marissa Novotny and Spencer Gauert for their help in conducting these studies. I could not have completed it without their assistance.

Finally, I want to thank Josh Gomillion, Yudelkis Fuste, Rachel Suberman, Chelsea Schubiger, and Jennifer Cook for their assistance in helping keep my sanity throughout the dissertation process.
Dedication

I dedicate this manuscript to my grandpa, Gene Livingston. He was an avid consumer of science, and never ceased to be interested in my participation in the expansion and dissemination of it. He was my favorite intellectual, and is greatly missed.
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**Abstract**

Autism Spectrum Disorder is a developmental disability characterized by social, behavioral, and communicative impairments. A primary characteristic of Autism is impairment in social skills. Along the same lines, praise, defined as the statement of approval or admiration, does not always function as a reinforcer for this population. One way to combat this is to condition praise as a reinforcer. The literature on conditioned reinforcement encompasses many procedural variations that have been shown to increase the reinforcing value of neutral stimuli. One variation new to the conditioned reinforcement literature includes observational conditioning. With observational conditioning, initially neutral stimulus are established as reinforcers through observation of others receiving an initially neural stimulus, contingent on some response, while the same neutral stimulus is restricted to the observer for engagement the same response. Few component analyses of observational conditioning procedures have been conducted. Identification of its key aspects and further clarification of its generality will improve understanding of the effect and lead to more reliable clinical endpoints. The purpose of the current proposal is twofold. The purpose of Study 1 was to compare the effects of the observational conditioning procedure to observational conditioning plus response restriction in children diagnosed with Autism. The purpose of Study 2 was to assess the effects of observational conditioning plus response restriction to condition praise as a reinforcer in children diagnosed with Autism.
Chapter 1: Autism Spectrum Disorder

Autism Spectrum Disorder (ASD) is a developmental disability characterized by social, behavioral, and communicative impairments (Centers for Disease Control and Prevention [CDC], 2016). According to the CDC, about 1 in 68 children in the United States have been diagnosed with ASD, with the percentage of children diagnosed with ASD increasing from 2002 and 2012. Although ASD can be detected at 18 months or before, a diagnosis at the age of 2 has been shown to be reliable (Lord et al., 2006).

The Diagnostic and Statistical Manual of Mental Disorders (DSM-V-TR; American Psychiatric Association, 2013) defines ASD as a developmental disability that is the result of a neurological disorder affecting the normal brain functioning, influencing social interaction and communication skills development. Additionally, individuals with ASD have deficits in verbal and non-verbal communication, social interactions, and engagement in play activities. Moreover, the diagnostic criteria for ASD encompass severity, based on the individual’s social communication impairments, as well as restricted, repetitive patterns of behavior. Other abnormal behaviors exhibited by individuals with ASD not included in the diagnostic criteria include abnormal sleep patterns, self-injurious behavior, aggression, temper tantrums, and unusual eating habits (Dominick, Davis, Lainhart, Tager-Flusberg, & Folstein, 2007). Although there is no known cure for ASD, research has shown there are effective, research-based, treatments for teaching and increasing variety of skills, and decreasing problematic behaviors in individuals with ASD (CDC, 2015).
Chapter 2: Social Interaction and Social Avoidance

A primary characteristic of autism spectrum disorder (ASD) includes a qualitative impairment in social skills (American Psychiatric Association, 2013). Studies focusing on impairments in social skills in individuals with ASD often involve teaching or increasing target behavior. These targets typically include variations of social interactions and engagement (Kamps et al, 1992; Odom & Strain, 1986). For example, Odom and Strain (1986) compared two interventions, peer initiation and teacher prompts, for increasing three children diagnosed with ASD’s social interactions. In their study, social initiations were categorized into seven types of positive social interactions. The categories included (a) play organizer, any vocalizations or responses to vocalization wherein the subject specifies an activity, suggests an idea for play, or directs a peer to engage in a play behavior, (b) share, offers or gives an object to a peer or accepts an object from a peer by taking the object in his or her hand or using it in play, (c) share request, asks a peer to give an object to the speaker, (d) assistance, helps a peer complete a task or desired action which the peer could not complete alone, (e) assistance request, asking a peer to help the speaker complete a task or action that the speaker could not complete alone, (f) complimentary statement, verbal statement indicating affection, attraction, or praise, (g) and affection, patting, hugging, kissing, or holding hands with another child.

Additionally, studies focusing on social impairments in individuals with ASD often include social avoidance as a target behavior. For example, individuals with ASD might engage in problem behavior to avoid or escape social interactions, which can be conceptualized as a type of social avoidance. Hagopian, Wilson, and Wilder (2001) conducted two consecutive
functional analyses (FA) to identify the function of an individual with ASD’s aggression and self-injurious-behavior (SIB). During the first FA, elevated responding was observed during the play condition. Because of this, a second modified FA was conducted to include a social demand and tangible condition. The results indicated problem behavior was maintained by escape from attention and access to tangibles. Harper, Iwata, and Camp (2013) examined a larger set of FA and identified two patterns of responding observed during a standard FA that indicated a possible social avoidance or escape from social demands function. These patterns included elevated responding in the play condition, or elevated responding during the play and demand conditions. If one of these two patterns of responding was observed, a modified FA was conducted in which a social demand and control condition were rapidly alternated in a pairwise design. During the social demand condition, the therapist stayed within 0.75 m of the subject and delivered physical contact and verbal attention every 5 s. Higher levels of responding were observed during the social demand condition as compared to the control condition, indicating an escape from social demand function. Hagopian et al. (2001) and Harper et al. (2013) provide examples of the influence of social interactions on problem behavior in individuals with ASD.

In addition to engaging in problem behavior to escape or avoid social interactions, individuals with ASD are less likely to engage in social interactions, and spend more time playing alone than their typically-developing peers (Koegel, Koegel, Frea, & Fredeen, 2001). For example, Koegel et al. (2001) conducted a descriptive assessment on five children diagnosed with ASD’s social interactions with peers and adults, appropriate on-task engagement, and the number of task stimuli the subjects engaged with during 20-minute observation periods. Additionally, the same behavior was recorded for five typically-developing peers, to be used as a comparison. The results indicated the subjects with ASD interacted with about the same number
of task objects as the typically-developing peers. Moreover, the subjects with ASD seldom or never engaged in social interactions with the their peers, while the typically-developing peers engaged in approximately 15 social interactions per 20-minute session. Interestingly, the number of social interactions with adults was similar across the two groups, possibly indicating a more prominent social interactions deficit with peers than adults. Nevertheless, this study demonstrates individuals with ASD’s often engage in less social interactions than their typically-developing peers. Moreover, a large number of other studies have demonstrated a social-interactions deficit prior to intervention.

For example, Shabani et al. (2002) used an ABAB reversal design to assess the effects of tactile prompting on social initiations with three children with ASD. For all three subjects, social initiations seldom or never occurred during the initial baseline. Following the implementation of the intervention, tactile prompting, increases in social initiations were observed, this pattern of responding was observed again in subsequent baseline and tactile prompting intervention phases for all three subjects. The results of this study, along with others (e.g., Dozier et al. 2012; Leaf et al., 2016), suggest interventions are needed interventions to combat social impairments in individuals with ASD.

Social impairments are problematic as social interactions and initiations have been shown to be important in the acquisition of skills and to obtain reinforcers otherwise unavailable (Dozier, Iwata, Thomason-Sassi, Worsdell, & Wilson, 2012; Harper et al., 2013; Leaf et al., 2012). Ingersoll, Schreibman, and Stahmer (2001) assessed whether there was a correlation between social avoidance and treatment outcome. The level of social avoidance of six children diagnosed with ASD was determined by calculating the percentage of social avoidance attempts. More specifically, dividing the number of social avoidance opportunities, defined as another
child moving within 3 ft of the target subject, or the target subject is moved within 3 ft of another child, by the number of social avoidance attempts, defined as the subject turning head, shifting gaze away, moving away, or protesting within 5 seconds after an avoidance opportunity has occurred.

Language use was included as the treatment outcome measure, and was measured using 10-second partial interval recording at intake and 6-months post intervention. The intervention included attending an all-inclusive classroom that consisted of two-thirds typically developing children and one-third children with ASD. The inclusive-classroom setting included a combination of early intervention and developmentally appropriate classroom activities that incorporated incidental teaching and pivotal response training.

The results indicated peer social avoidance predicts outcome for subsequent peer avoidance and language use. That is, subjects who engaged in low levels of social avoidance at intake exhibited more language use at 6-months post intervention than subjects who engaged in high levels of social avoidance at intake. Moreover, social avoidance levels remained the same for subjects who engaged in high levels of social avoidance at intake, whereas subjects who engaged in low levels of social avoidance at intake’s social avoidance decreased. This study provides insight into the influence social impairments might have on the development and persistence of other skill deficits, as well as rationale for assessing and developing procedures for decreasing social impairments.
Chapter 3: Praise as a Reinforcer

Praise, defined as an expression of approval or admiration (Brophy, 1981), is a natural consequence often delivered by peers, caregivers, and employers, contingent on compliance with requests (Dozier et al., 2012; Sutherland, Wehby, & Copeland, 2000). Moreover, response-contingent praise is a non-invasive procedure readily used and recommended in behavioral instruction programs (e.g., Sutherland et al., 2000; Beaulieu, Hanley, & Roberson, 2013). Reasons why praise is readily used and recommended include, it is inexpensive to use, can be delivered quickly, and does not require time to consume. Alternatively, edible and tangible reinforcers can be expensive to purchase and maintain, and consumption of these reinforcer types can take time away from engagement in the target behavior. Moreover, the use of praise as a reinforcer can involve a specific statement of the contingency between the behavior and the reinforcement (Brophy, 1981). Previous research has shown response-contingent praise alone, and in combination with other treatment components, has been an effective procedure for teaching and maintaining appropriate behavior, including job performance (Lerman, Hawkins, Hillman, Shireman, & Nissen, 2015), academic work (Greer, Singer-Dudek, Longano, & Zrinzo, 2008), conversation skills (Polick, Carr, & Hanney, 2012), labeling (Stevens, Sidener, Reeve, & Sidener, 2011), and engagement in leisure activities (Dozier et al., 2012).

For example, Gunby, Carr, and Leblanc (2010) used behavioral skills training, a multicomponent intervention involving instructions, modeling, rehearsal, corrective feedback and praise, to teach abduction-prevention skills to children diagnosed with ASD. A multiple baseline across subjects design was utilized to assess the effects of BST on teaching three boys
diagnosed with ASD to engage in three abduction-prevention skills including saying “no” when presented with an abduction lure, immediately running to a safe area, and reporting the event to a familiar adult. Two baseline probes were conducted prior to the intervention. During these probes, a mock abduction lure was presented to subjects in attempts to measure their engagement in the target behaviors prior to the intervention. Following the two baseline probes, BST was implemented. Behavioral skills training was used to teach the subjects to respond correctly to four common abduction-lures. Each target skill was taught individually using the BST model of verbal instructions, live and video modeling, rehearsal with familiar adults and strangers, and praise with corrective feedback for rehearsal performance. Following BST, post-training probes were conducted in the same fashion as baseline. Follow-up probes were also conducted three-seven weeks post intervention. The results demonstrated BST was effective at teaching all three subjects the abduction-prevention skills, with responding maintaining in follow-up.

Praise alone has also been used to teach individuals diagnosed with ASD communicative skills. For example, Polick et al. (2012) compared the effects of descriptive and general praise alone on the acquisition of intraverbal behavior in two children with Autism Spectrum Disorder (ASD). A multiple baseline across skills plus alternating treatment design was implemented to compare the effects of the two types of praise. During baseline trials, instructions were delivered to subjects, followed by a 5-s pause. After the 5 s elapsed, a redirection statement to move to the next trial was delivered in a neutral tone regardless of correct or incorrect responses. During the treatment phase, general or descriptive praise was provided, contingent on correct responses, and correct responses resulted in the implementation of a least-to-most prompting procedure. Overall, the results indicated descriptive was slightly more effective at teaching interverbal skills, although both forms of praise were effective.
Gundby et al. (2010) and Polick et al. (2012), amongst other studies (e.g., Beaulieu, Hanley, & Roberson, 2013; Lerman, Hawkins, Hillman, Shireman, & Nissen, 2015) provide evidence for the utility of providing praise as a reinforcer for individuals with ASD. However, praise does not always function as a reinforcer for individuals with ASD who exhibit a deficit in social interactions. Consequently, other skill deficits (e.g., communicative behavior, Harper et al., 2013) can occur, and more invasive interventions are used to teach these skills.

Mace, Mauro, Boyajian, and Eckert (1997) assessed the effects of quality of reinforcement and high-probability (high-p) treatment on compliance with demands for two adolescents diagnosed with developmental disabilities. In Experiment 1, a reversal design was used to compare the effects of descriptive praise as a reinforcer for compliance to contingent presentation of high-p sequence plus praise, food, or praise plus food. During baseline, low-probability (low-p) task instructions were delivered, and contingent on compliance, a descriptive praise statement was delivered. Following baseline, treatment was implemented and was identical to baseline, except a sequence of three or four high-p instructions preceded the low-p task instruction for some tasks. For some low-p tasks, the effect of reinforcer quality on compliance was also assessed in an ABABDDBC reversal design, including praise only, food only, and praise plus food. The results of Experiment 1 indicated praise alone (baseline) was not effective at reinforcing compliance for low-p task demands, as compared with the high-p sequence plus praise only. The results of the comparison of the reinforcer quality assessment also indicated praise alone (baseline) was not effective at increasing compliance to low-p task instructions. When the high-p sequence plus food and high-p sequences plus food and praise phases were implemented, an increase in compliance was observed. Interestingly, the high-p plus praise alone phase did not result in increases in compliance, as compared to baseline and the other two reinforcer quality
phases. The results of this study suggests praise alone is not effective at increasing compliance with low-p task demands, and there is a need for a more intrusive intervention.

Given the results of the aforementioned studies, there is rationale for the establishment of praise as a reinforcer with individuals diagnosed with ASD. However, despite the prevalence of use and effectiveness of praise, little is known about how praise is established as a reinforcer. Assumedly, praise is a conditioned reinforcer established through its’ association with already established reinforcers (Skinner, 1953). However, there are various conditioning procedures that can be used to produce this association.
Chapter 4: Conditioned Reinforcement

Reinforcement, or concepts like it, plays a prominent role in theories of learning. Most such theories distinguish between stimuli that function as reinforcers prior to any explicit learning, and stimuli that function as reinforcers only after some learning history. The latter is commonly termed ‘conditioned reinforcement.’ That is, conditioned reinforcement can be defined as an initially neutral stimulus or event acquiring value because of its relation to primary reinforcement, and subsequently can function as a reinforcer (Williams, 1994). The establishment of a previously neutral stimulus as a reinforcer is most generally considered to be the result of Pavlovian conditioning. That is, the same principles responsible for a neutral stimulus acquiring eliciting effects when it becomes predictive of the unconditioned stimulus can also account for a previously neutral functioning as a reinforcer when it becomes associated with an established reinforcer when predictive of a primary reinforcer (Shahan, 2010). The literature on conditioned reinforcement encompasses many procedural variations that have been shown to produce this association, resulting in the establishment of a conditioned reinforcer.
Pairing Procedures.

Two similar pairing procedures include stimulus-stimulus and response-stimulus conditioning. Stimulus-stimulus conditioning, or stimulus pairing, involves the pairing of an unconditioned stimulus with an already established reinforcer, independent of responding. Response-stimulus conditioning involves pairing the neutral stimulus with an already established reinforcer, contingent on some response (Dozier et al., 2012).

**Stimulus-stimulus conditioning.** Stimulus-stimulus conditioning, or stimulus pairing, typically involves the pairing of a neutral stimulus with an established stimulus, independent of a response. Skinner (1938, p.83) described a procedure in which the sound of a food magazine acquired reinforcing value through its correlation with a primary reinforcer, food pellets. Four rats were placed in the operant chamber and 60 pairings of food pellets and the sound of the magazine were presented, independent of a response. Following the response-independent pairings, an empty magazine was connected to a lever. Instances of a new response, lever presses, now resulted in the delivery of the magazine sounds, however food was no longer paired with the magazine sound. Initially, lever pressing was acquired and maintained by the sound of the magazine in the absence of food, demonstrating the sound of the magazine functioned as a conditioned reinforcer although the effects were temporary. Furthermore, these results indicate the sound of the magazine, in the absence of food, was sufficient to teach a new response, lever pressing. However, following the initial reinforcing effect, the heights of the curves appear similar to those obtained during extinction.

Dozier et al. (2012) used a stimulus pairing procedure to condition praise as a reinforcer for four adults diagnosed with intellectual developmental disabilities (IDD). Prior to conditioning, baseline and praise sessions were conducted. During baseline, there were no
programmed consequences for engagement in the target response. During praise conditions, one praise statement was provided contingent on each occurrence of the target response. If responding indicated praise did not function as a reinforcer for the target behavior, the stimulus pairing procedure was implemented. During each conditioning session, the experimenter delivered one praise statement and one edible reinforcer in quick succession, on a fixed-time 15-s schedule. After 200 pairings, a test session was conducted, which was identical to the baseline praise condition. Pairings and test sessions alternated in that fashion for several cycles. This session was included to assess whether the presence of food alone served as a discriminative stimulus. Between 1600-2400 pairings were implemented per subject. The results indicated the stimulus-pairing procedure was ineffective at conditioning praise as a reinforcer for three of the four subjects, with inconclusive results obtained for the fourth subject.

Although the results of Dozier et al. (2012) indicated stimulus-pairing was an ineffective conditioning procedure for conditioning praise as a reinforcer, previous research assessing the effects of stimulus-stimulus conditioning appear to have established certain vocalizations as conditioned reinforcers, as evidence by subjects’ subsequent emissions of the same vocalizations following condition. This might be an example of behavior maintained by automatic conditioned automatic reinforcement (Miguel, Carr, and Michael, 2002; Sundberg, Michael, Partington, and Sundberg, 1996; Yoon and Bennet, 2000). Sundberg et al. (1996) first demonstrated the effects of the stimulus-stimulus pairing procedures at establishing automatic conditioned reinforcement with 5 children. Prior to and following conditioning, observations were conducted and the subjects’ vocalization of target and non-target sounds were recorded. During the stimulus-stimulus conditioning procedure, a familiar adult emitted the target sounds, immediately followed by the presentation of an established reinforcer (e.g. tickles, clapping, etc.).
conditioning session continued for 1-2 minutes, with approximately 15 pairings were included per minute. Following this, subjects began to emit the new vocal responses providing evidence for the effectiveness of the stimulus-stimulus pairing procedure. However, there were several limitations, including an inconsistent number of pairings across sessions and subjects, there were no controls for possible adventitious reinforcement during conditioning trials, the absence of a single subjects design, and effects of the conditioning procedure were only assessed during one session.

Miguel et al. (2002) addressed these limitations in their systematic replication of the Sundberg et al. The stimulus-stimulus pairing procedure to increase the frequency of one-syllable vocalizations of three children diagnosed with autism. Prior to implementing the conditioning procedure, 5-min observation sessions were conducted as a baseline to determine if vocalizations would occur prior to conditioning. During baseline sessions, toys were made available to the subject and there was little to minimal interaction between the subject and experimenter. A control condition was implemented following baseline. During this condition, the experimenter emitted the target vocalization five times and delivered a preferred edible 20 seconds after the fifth vocalization. If at any point the subject emitted the target vocalization during the 20-s interval between the experimenter’s vocalization and delivery of the edible item, the timer was reset, delaying the preferred edible. This procedure was included in attempts to prevent adventitious reinforcement. Following the control condition, the stimulus-stimulus pairing procedure was implemented. Sessions lengths were identical to the control condition. During stimulus-stimulus conditioning sessions, the experimenter would emit five target vocalizations in the presence of the subject, with preferred edible items delivered immediately following the first three vocalizations. If at any point the subject emitted the target vocalization
during the conditioning sessions, the next trial was delayed 20 seconds, to prevent adventitious reinforcement. Following stimulus-stimulus conditioning, a reverse to baseline was implemented to assess the effects of the conditioning procedure on subjects’ vocalizations of the target sound. The results indicated the stimulus-stimulus pairing procedure was effective at conditioning two subjects’ one-syllable vocalizations, as evidenced by the increase in subjects’ utterance of the target sound. However, these effects were temporary. Nevertheless, the results provide implications for an effective procedure for conditioning engagement in behaviors as a form of automatic reinforcement. Although previous research has demonstrated stimulus-stimulus pairing can be an effective conditioning procedure, Dozier et al.’s (2012) unsuccessful implementation of the stimulus-stimulus conditioning procedure provides justification for further investigation into variables influencing the effectiveness of stimulus-stimulus conditioning, as well as other potentially more effective conditioning procedures.

**Response-stimulus conditioning.** Similar to stimulus-stimulus conditioning, response-stimulus conditioning involves the pairing of an initially neutral stimulus with an established reinforcer. However, response-stimulus conditioning involves the pairing of a neutral stimulus and established reinforcer contingent on a response. Bugelski (1938) used this procedure to condition a food magazine click as a conditioned reinforcer. More specifically, Bugelski trained two groups of rats to press a lever for food reinforcement. Contingent on lever presses, the sound of the food magazine delivering food, or magazine click, was paired with the delivery of food. It is important to note that this procedure is distinguished from Skinner’s (1938) description because the current one involves making pairing episodes contingent on a response whereas the latter provided the pairing independent of behavior. Thirty pairing trials were implemented for each group, with a 10-min break implemented between the first and second set
of 15 pairing trials. Following the paring trials, the 64 rats were split into two groups of 32, and lever presses were placed on extinction. That is, lever presses no longer resulted in the delivery of food. However, in the experimental group of rats, the magazine click was still delivered contingent of lever presses while the control group did not receive food or magazine clicks, contingent on lever presses. Following the initial exposure to extinction, each group of 32 rats was split into two groups of 16 and extinction was implemented again. However, for 16 of the 32 rats in each group, the extinction conditions were reversed. More specifically, of the rats that heard the magazine click during the initial extinction (experimental group), 16 of those rats did not hear the click during the second exposure to extinction. Of the rats in the group that did not hear the magazine click during the initial extinction (control group), 16 of those rats now heard the magazine click contingent on lever presses. The remaining 32 rats in the two groups were exposed to the same conditions as in the initial exposure to extinction. The results indicated the experimental group that received the click contingent on responding during the initial exposure to extinction responded more than the control group that did not receive food or a magazine click for lever presses. The results of the second administration of extinction indicated more responding occurred in the group in which clicks were administered in only the second exposure to extinction, followed by the group that was exposed to the click during both exposures to extinction. Moreover, the rats that only received the click during the first exposure to extinction responded more than the group that never received the click for lever presses during both exposures to extinction. Overall, the results of the first and second administration of extinction demonstrated rates of lever presses were higher when the magazine click was provided contingent of lever presses during food extinction. As such, the response-stimulus pairing procedure was effective at conditioning the magazine click as a conditioned reinforcer.
Dozier et al. (2012), also used the response-stimulus conditioning procedure to condition praise as a reinforcer for 8 adults diagnosed with IDD. During pre- and post- conditioning phases, baseline and praise conditions were rapidly alternated. During baseline, there were no programmed consequences for engagement in the target response. During the praise condition, one praise statement was delivered contingent on the target response, on a fixed-ratio 1 (FR 1) schedule of reinforcement. Following the pre-conditioning phases, the response-stimulus conditioning phase was implemented. During conditioning sessions, praise and a preferred edible item were simultaneously delivered, contingent on the target response, on a FR 1 schedule of reinforcement. The post-conditioning phase was then implemented, and was identical to the pre-conditioning phase. If responding maintained during praise sessions in the post-conditioning phase, indicating praise was conditioned as a reinforcer, a reinforcement assessment was conducted. The purpose of the reinforcement assessment was to assess the effects of praise as a reinforcer for new responses not included in conditioning. Overall, the results indicated the response-stimulus conditioning procedure was effective at conditioning praise as a reinforcer for four of the eight subjects. Furthermore, for subjects of which response-stimulus was effective, the additional reinforcement assessment indicated praise functioned as a reinforcer for responses not included during conditioning, extending the utility of response-stimulus conditioning.

**Observational Learning**

Observational learning has been defined as learning new operants and higher-order operants via observation of contingencies of reinforcement (DeQuinzio, & Taylor, 2015; Greer, Dudek - Singer, & Gautreaux, 2006). Observational learning procedures have been used to teach a number of skills, including discrimination between reinforced and unreinforced behaviors (DeQuinzio, & Taylor, 2015), engagement in response chains (Werts, Caldwell, & Wolery,
1996), and communication skills (Brody, Lahey, & Combs, 1978). Additionally, observational learning has been used to alter preference. For example, Leaf et al. (2012) used an observational conditioning procedure to increase preference for previously low preference toys preferred toys for three children diagnosed with ASD. An ABABA reversal design was used to assess the effects of an observational learning intervention on subjects’ preference for low-preference toys. Prior to the intervention, low- and high-preference toys were identified via a paired stimulus preference assessment Fisher et al. (1992). Following the preference assessment, a reinforcement assessment was conducted to assess subjects’ rates of responding for the low- and high-preference toys before and after the observational conditioning procedure was conducted. During baseline of the reinforcement assessment each session included 10 trials, completion of the target task resulted in a choice to play with either the low-preference toy, or the high-preference toy. Selections resulted in 10 s accesses to the selected The observational learning sessions was similar to baseline, except a preferred adult was present during all sessions, the preferred adult completed the target task during each of the ten trials, and the preferred adult’s completion of the target task resulted in the presentation of a choice between the subject’s low- and high-preference toys, and the preferred adult would select the low-preference toy. Additionally, the preferred adult would make comments about wanting to select the low-preference toy, and not wanting to select the high-preference toy while engaging in the target task. The results indicated the observational learning intervention was effective at increasing subject’s preference for the previously low-preference toys for all three subjects. The results of this study and others (cf. Leaf, et al., 2015) provide evidence observational learning might not only teach new operants, but also influence value and preference for stimuli.
**Observational conditioning.** Observational conditioning is a more recent conditioning procedure that, unlike the above-mentioned conditioning procedures, does not ostensibly involve the pairing of an initially neutral stimulus with an established reinforcer. Instead, initially neutral stimulus are established as reinforcers through observation of others receiving an initially neural stimulus, contingent on some response, while the same neutral stimulus is restricted to the observer for engagement the same response. For example, Greer and Singer-Dudek (2008) implemented the observational conditioning procedure to establish plastic disks and strings as reinforcers for five children diagnosed with mild-to moderate language delays. The effects of the conditioning procedure were assessed across performance (previously learned) tasks, in a pre and post intervention reversal design, and learning (response acquisition) tasks, in a pre and post intervention assessment. During the pre and post intervention reversal design for the performance task, subjects were prompted to engage in a response (e.g., matching). Contingent on the correct response, either one edible item, in the food phase, or one plastic disk, in the disk phase, was delivered contingent on the correct response. Performance task sessions continued for 10 trials. During the pre and post intervention session for the learning task sessions, plastic disks were delivered contingent on correct responses, and incorrect responses resulted in the experimenter’s verbal correction and a prompt to engage in the target response as instructed by the experimenter. Twenty trials were included in each learning task session. Once responding in pre intervention performance and learning task sessions indicated the plastic disks did not function as a reinforcer, the observational conditioning procedure was implemented. During conditioning sessions, a peer confederate sat at a table next to the target subject, across from the experimenter. A partition board was placed on the table so the target subject could not see the confederate’s correct or incorrect responses, but could see the experimenter’s delivery of the
plastic disk to the confederate. The target task during conditioning differed from the performance and learning tasks, and was a task both the peer confederate and target subject had previously mastered. At the start of each trial in the 10-trial session, the target subject and confederate were simultaneously prompted to engage in the target response. For the confederate, one plastic disk was delivered contingent on correct responses. For the target subject, no programmed consequences were in place for correct or incorrect responses. That is, the target subject was restricted from receiving the plastic disks for engaging in the target response, but could observe the confederate’s receipt of the restricted stimulus. Sessions continued until the subject repeatedly requested access to the plastic disks, or attempted to take the peer confederate’s plastic disks. Once this termination criterion was met, the performance and learning task post intervention conditions were implemented.

Overall, the results indicated the observational conditioning procedure was effective at conditioning plastic disks or stings as reinforcer for all five subjects. Moreover, increases in correct responses following conditioning were observed in both the performance and learning tasks post intervention conditions. These patterns of responding indicated the initially neutral stimulus now functioned a conditioned reinforcer for increasing previously learned skills, as well as for the acquisition of new skills.

To extend the utility of the observational conditioning procedure, Singer-Dudek, Oblak, and Greer (2011) assessed the effects of the procedure on conditioning books as reinforcers. The results were similar to those obtained by Greer and Singer-Dudek (2008) in that observational conditioning was effective at conditioning an initially neutral stimulus as a conditioned reinforcer for performance and learning tasks. Furthermore, Singer-Dudek et al. also included free-play probes, to assess whether manipulation of books would increase in a free-play setting.
The results of the free-play probes indicated an increase in manipulation of books following conditioning. Overall, these post conditioning patterns of responding were observed up to 4 weeks post intervention.

More recently, Zrinzo and Greer (2013) used a modification of the Greer and Singer-Dudek (2008) observational conditioning procedures to condition plastic disks as reinforcers for engaging in academic tasks. Zrinzo and Greer demonstrated the modified procedure, involving the elimination of the presence of the therapist and view of the peer confederate during conditioning, was effective at conditioning reinforcers. Zrinzo and Greer’s elimination of components of the Greer and Singer-Dudek observational conditioning procedures provides a more feasible method for conditioning reinforcers. The successful elimination of components of the Greer and Singer-Dudek procedure provides rational for the identification of other unnecessary components. The elimination of other components in the original observational conditioning procedure might also be effective at conditioning reinforcers. If unnecessary components were to be identified and removed, the observational conditioning procedure would be a more feasible and efficient procedure to implement. In addition to the components assessed in Zrinzo and Greer (i.e., view of the experimenter and peer confederate) the specific components of the procedures outlined by Greer and Singer-Dudek include (a) providing task materials to both the target and peer confederate, (b) simultaneously prompting the target subject and peer confederate, (c) the inclusion of a known peer as the confederate, (d) the partition board blocking the target subject’s view of the peer confederate’s responding, (e) the absence of delivery of the stimulus to the target subject for correct response, (f) and the target subject’s observation of the delivery of the stimulus to the peer confederate for correct responses. Future research should assess the necessity of each of these components. Moreover, Greer and Singer-
Dudek hypothesize the absence of the delivery of the stimulus contingent on the target subject’s engagement in the target response is necessary to the effectiveness of the procedure. However, research assessing the necessity of these this component does not exist. It is possible the procedure would be similarly effective if access to the task stimuli was removed for the target subject (i.e., response restriction), and only the observation of the peer receiving the stimulus component was included.

**Observational conditioning and conditioning praise as a reinforcer.** Greer, Singer-Dudek, Longano, and Zrinzo (2008) extended the utility of Greer and Singer-Dudek’s (2008) observational conditioning procedure by assessing its effects at conditioning praise as a reinforcer with four 3-7 year old children diagnosed with either a disability or health impairment. The study design included a pre- and post- ABAB reversal design to assess the effects of observational conditioning on maintenance of previously learned skills, and to compare the effects of praise as a reinforcer to preferred edible items before and following conditioning. Prior to the implementation of the observational conditioning procedure, the pre learned-skills assessment was implemented by alternating contingent edible and contingent vocal praise phases. Additionally, a multiple baseline across subjects design was included to assess the effects of observational conditioning on previously unlearned skills. During baseline sessions, praise was provided contingent on correct responses, and correction was provided contingent on incorrect responses. Following the pre learned-skills assessment and baseline of the unlearned-skills assessment, the observational conditioning procedure was implemented. The observational conditioning procedures was identical to those described in Greer and Singer-Dudek (2008), with the exception that the experimenter stood behind the subjects and delivered the task demand from behind to limit the amount of attention provided delivered. Additionally, the experimenter
delivered vocal attention to the peer confederate from behind, contingent on correct responses. Following observational conditioning, post assessments were conducted for the learned and unlearned skills in the same manner as in the pre ABAB reversal and baseline, respectively. However, for two subjects, only an AB design was included in the learned skills post assessment. Overall, the results indicated observational conditioning was effective at conditioning praise as a reinforcer for both learned and unlearned skills for all four subjects. More specifically, increases in rates of correct responding during contingent-praise phases were observed in the post ABAB reversal design, as compared to pre. Additionally, rates of correct responding during post contingent-praise phases were similar or higher than those observed in post contingent-edible phases. Data from the unlearned skills assessment indicated an increase in correct responding of the unlearned skills following observational conditioning for all four subjects.

Overall, the results of Greer et al. (2008) indicated observational conditioning could be used as a procedure for conditioning praise as a reinforcer. Given these results, and the results of Zrinzo and Greer (2013), it is possible that a procedure that eliminates one or more of components of the original observational conditioning procedure might be effective and efficient at conditioning praise as a reinforcer. Moreover, assessing the effects of observational conditioning in individuals with ASD would extend the utility of the observational conditioning procedure. Therefore, the purpose of Study 1 was to compare the effects of the Greer and Singer-Dudek (2008) observational conditioning procedure to observational conditioning plus response restriction in children diagnosed with ASD. Arbitrary stimuli the subjects did not have previous exposure to were included as the putative neutral stimuli that were conditioned as reinforcers. The purpose of using unfamiliar arbitrary stimuli was to decrease potential confounds that might occur with conditioning stimuli subjects had previous exposure to outside
of study sessions (e.g., praise statements). The purpose of Study 2 was to assess the effects of the most effective observational conditioning procedure identified in Study 1 (observational conditioning plus response-restriction) to condition praise as a reinforcer in children diagnosed with ASD.
Chapter 5: General Method

Subjects and Setting

Three children (Rose; 13, James; 11, and Beverly; 9) were included in Study 1, and three children (Austin; 4, Rose; 13, and Edward; 6) were included in Study 2. Subjects’ names have been changed to protect their privacy. All subjects were diagnosed with Autism Spectrum Disorder, and were recruited from a local early intervention company. Sessions were 5 min in length, unless otherwise noted, and were conducted one to five times per day, one to five days per week.

Materials

Materials for both Study 1 and Study 2 included task materials selected on an individual basis (e.g., matching pictures, blocks and a bucket). Task materials included during the reinforcement assessment differed from those included during conditioning phases. During the observational conditioning phases, an opaque partition for blocking target subjects’ view of the confederates’ responding was also included. Additionally, during Study 1 only, two arbitrary items, in which the subjects had no history with (two different sets of laminated paper tokens), were included as the neutral stimuli. A clear jar to deliver the stimuli during operational conditioning sessions was also included.

Response Measurement and Reliability

The primary dependent variable for Study 1 and Study 2 was frequency of the target response during the reinforcer assessment. Data were also collected on the frequency of the control response during reinforcement assessment sessions, as well as the percentage of correct
responses during the observational conditioning phase (Study 1 only). For Study 1 and 2, treatment integrity data was also collected on the experimenter’s delivery of stimuli for subjects’ responding to the target during the reinforcement assessment and the confederate experimenter’s correct responses during observational conditioning sessions. For Study 1, treatment integrity was evaluated for at least 28% of all reinforcement assessment sessions, and at least 22% of conditioning sessions. Mean treatment integrity during the reinforcement assessment, across subjects, was 99.89% (range, 99.67% to 100%) for the reinforcement assessment. Mean treatment integrity data during conditioning sessions was 99.67% (range, 99% to 100%) for the experimenter, and 100% (range, 100% to 100%) for the confederate experimenter. For Study 2, treatment integrity was evaluated for at least 32% of all reinforcement assessment sessions, and at least 20% of conditioning sessions. Mean treatment integrity during the reinforcement assessment, across subjects, was 99.93% (range, 99.8% to 100%) for the reinforcement assessment. Mean treatment integrity data during conditioning sessions was 99.7% (range, 99.3% to 100%) for the experimenter and confederate.

Trained observers used a smartphone application to record the frequency of the target responses and the delivery of praise and the neutral stimulus. A second observer simultaneously and independently collected data during of the sessions for each subject. To calculate interobserver agreement (IOA), each session time was divided into 10-s intervals. Agreement was calculated by dividing the smaller number of responses within each interval, by the larger number or responses, and averaging the fractions across the session. For Study 1, reliability was assessed for at least 32% of reinforcement assessment sessions and 27% of conditioning sessions. Mean percentage agreement across subjects was 90% (range, 81% to 100%, across sessions) during reinforcement assessment sessions, and 99% (range, 87% to 100%, across
sessions) during conditioning sessions. For Study 2, reliability was assessed for at least 22% of reinforcement assessment sessions and 27% of conditioning sessions. Mean percentage agreement for the reinforcement assessment, across subjects, was 95.81% (range, 91.63% to 98.17%, across sessions).

**Experimental Design**

During Study 1, a nonconcurrent multiple baseline across subjects, plus embedded multielement experimental design was included. The multiple baseline design was included to assess the effects of observational conditioning on responding for previously neutral stimuli before, during, and following conditioning. The multielement design was included to compare the two observationally conditioned stimuli during reinforcement assessment and conditioning phases in Study 1. During Study 2, a nonconcurrent multiple baseline across subjects design was included to assess effects of observational conditioning plus response restriction on conditioning praise as a reinforcer.
Chapter 6: Study 1 Method

The purpose of Study 1 was to compare the effects of observational conditioning with and without response restriction on previously neutral stimuli as conditioned reinforcers for children diagnosed with Autism Spectrum Disorder.

Baseline Reinforcement Assessment

This phase was conducted prior to the observational conditioning phase to determine whether the two stimuli did not function as reinforcers. Both conditions were conducted in a concurrent operant arrangement that included two sets of identical task stimuli, only differing in color and consequence. The same task stimuli were included across conditions.

Standard stimulus. Pre-session was implemented prior to the start of each session. During pre-session exposure, the subjects were prompted to engage in the target and control responses, and the corresponding consequences were provided. At the start of each session, subjects were told they could do as much or as little work as they want, and task stimuli were made available. Target responses resulted in the delivery of one standard stimulus (SS) on a fixed ratio 1 (FR1) schedule of reinforcement. No programmed consequences (extinction) were delivered for engagement in the control response. The experimenter did not talk to the subject during this condition.

Response-restriction stimulus. This condition was identical to the Standard Stimulus condition, however target responses resulted in the delivery of one response-restriction stimulus (RR) on a FR 1 schedule of reinforcement. The RR stimulus differed in color and shape from the stimulus included in the standard stimulus condition.
**Observational Conditioning Phases**

During both observational conditioning phases, a confederate (i.e., another experimenter) was present, in addition to the subject and experimenter. Subjects sat on the same side of the table and an opaque partition (i.e., separating wall) was placed on the table so that the subject could only see the head and shoulders of the confederate, but not the table in front of the confederate (i.e., the subject can see the delivery or absence of reinforcement to confederate, but not the confederate’s responding). The target response differed from the target response included in the reinforcement assessment. Task stimuli colors for each conditioning phase were the same as those used in the reinforcement assessment, correlating with each neutral stimulus. Ten trials were included in each session. Prior to the start of each session, pre-session exposure was implemented, in which both the subject and confederate were prompted to engage in the target response. At the start of each trial, the experimenter delivered the prompt to engage in the target response. This continued until all ten trials were completed. Following five conditioning sessions, the reinforcer assessment was conducted to assess the effects of observational conditioning on responding.

**Standard observational conditioning.** The purpose of this phase was to establish a previously neutral stimulus as a reinforcer using the standard observational conditioning procedures as described by Greer and Singer-Dudek (2008) to condition the SS as a reinforcer.

**Target subject contingencies.** No programmed consequences for subjects’ correct or incorrect responses.

**Confederate contingencies.** Correct responses resulted in the delivery of one SS stimulus.
**Observational conditioning plus response restriction.** The purpose of this phase was to establish a previously neutral stimulus as a reinforcer, using the observational conditioning procedures, plus response-restriction. During this phase, task materials were only made available to the confederate. However, the prompt to engage in the response was directed towards both the target subject and the confederate.

**Target Subject contingencies.** The target subject did not have access to the task stimuli and, therefore, was not able to engage in the target response. No consequences were provided for any behavior (extinction), and no form of attention was provided to the target subject during this phase.

**Confederate contingencies.** Correct responses resulted in the delivery one RR stimulus.

**Post-Reinforcement Assessment**

This phase was implemented following the observational conditioning phases, and was identical to the baseline reinforcement assessment.
Chapter 7: Study 1 Results

Figure 1 depicts the rate of target responses in both conditions during the reinforcement assessment data for all three subjects. During baseline, James and Rose engaged in low to no responding in both the standard stimulus (SS) and response-restriction stimulus (RR) conditions. Conversely, Beverly engaged in low to moderate levels of responding, with undifferentiated responding between the two conditions. During conditioning, an increase in responding, with no differentiation between conditions, was observed for all three subjects. However, the pattern of responding differed across subjects. For Rose, an increase in responding was observed in the latter half of the phase. Conversely, an increase in James’s responding was observed at the start of conditioning, and maintained throughout. Beverly’s responding increased during conditioning, and became more stable, as compared to baseline. During the post-conditioning phase, responding differed across subjects. For Rose, responding initially increased, but became more variable. However, no responding occurred during the last six sessions in the phase. No differentiation across conditions was observed. For Jack, responding gradually decreased in both conditions, with no differentiation between conditions. Beverly’s responding decreased somewhat, with no differentiation between conditions observed.

Figure 2 depicts the average absolute rate of target responding for each condition during the reinforcement assessment for all three subjects. Overall, average rates were higher in both conditions, as compared to baseline, for all three subjects. For Rose, higher average rates of responding were observed in SS, as compared to RR, during conditioning. Conversely, during post, higher average rates were observed in RR, as compared to SS. Uniquely, Rose showed the
highest rates during the post phase (compared to baseline and conditioning). For James, higher average rates of responding were observed in RR, as compared to SS, in both the conditioning and post phases. The highest rates of responding were observed during the conditioning phase. Beverly’s average rate of responding was highest during the RR, as compared to SS, during the conditioning phase. Conversely, average rates of responding were highest during the SS condition during the post phase. Similar to James, the highest rates of responding were observed during the conditioning phase.

Figure 3 depicts proportion of baseline responding during the conditioning and post phases. This analysis helps identify differences across conditioning procedures that controls for idiosyncratic differences in baseline. Data were calculated by averaging the rates of responding across all baseline sessions, and dividing the rate of responding for each session in conditioning and post phases by that number. Overall, responding was higher during the conditioning and post phases, as compared to baseline, for all three subjects. Additionally, responding was undifferentiated between RR and SS for all three subjects. For Rose, responding was variable, and more so during the post phase. For James, responding was stable during the conditioning phase, with a decreasing trend observed during the post phase. A similar pattern of responding was observed for Beverly.

Figure 4 depicts the average proportion of baseline responding during conditioning and post phases for all three subjects. For all subjects in both conditions in conditioning and post phases, the target responding was higher, as compared to baseline. For Rose, overall, the average proportion of baseline responding was higher in post in both conditions, as compared to conditioning. Additionally, the average proportion of baseline for the two conditions was similar during the conditioning phases, and was slightly higher in RR in post. For James, overall, the
average proportion of baseline was higher in both conditioning during conditioning, as compared to post, with slightly higher averages for RR in both phases, as compared to SS. For Beverly, overall, the average proportion of baseline was higher in conditioning, as compared to post, for both conditions. Slightly higher averages were observed for RR during conditioning, and for SS during post.

Figure 5 depicts responding during the post-conditioning phase as a proportion of the previous conditioning phase. This analysis is intended to highlight differences in post-conditioning while controlling for rate during conditioning. Data were calculated by averaging the rates of responding for each of the conditions during the conditioning phase and dividing the rate of responding for each session in the post phase by that number. For Rose, responding was variable, however responding was higher during a majority of post sessions, as compared to the average rate of responding during conditioning. Responding during RR and SS was undifferentiated. For James, responding was lower during the post phase, as compared to the conditioning phase, with no differentiation between RR and SS. A similar pattern of responding was observed for Beverly.

Figure 6 depicts the rate of target and control responses in both conditions during the reinforcement assessment data for all three subjects. Because the data in Figures 1, 2, and 3 were described in relation to the effects of the two conditioning procedures on the target rate of responses in each condition, the data in Figure 3 will be described in relation to the comparison of the target and control rates of responding during both conditions. This analysis is intended to address the question of the degree to which conditioning not only affected responding during each condition, but also whether those effects were specific to the (target) response that resulted in access to the conditioned stimulus. During baseline, target and control responses were
undifferentiated for all three subjects. For Rose and James, during both the conditioning and post phases, target and control rate of response appear to be undifferentiated. However, for Rose, differentiation is observed during the last size sessions of the post phase, with higher control rates or responding observed. For Beverly, differentiation between target and control rate of responding was observed in both the conditioning and post phases. Moreover, in the post phase, differentiation between control rates of responding during the RR and SS conditions is observed, with higher control rates of responding observed during RR, as compared to SS.

Figure 7 provides a clearer comparison of target and control rate of responses with proportion of control data depicted. For all three subjects, responding was variable, but overall target rate of responding was higher in both conditions during conditioning and post phases, as compared to baseline. Additionally, responding was undifferentiated between the two conditions in all phases for all three subjects, with the exception for Beverly, whose responding was differentiated between RR and SS during post.

Figure 8 depicts the average proportion of control responding in all phases for all three subjects. For Rose, an increase in the average proportion of control in both conditions was observed during conditioning and post phases. A higher average proportion of control was observed for SS during conditioning, and for RR during post. For James, an increase in the average proportion of control in both conditions was observed during conditioning and post phases, although the increase was less so for RR in post. Overall, a higher average proportion of control was observed for SS during conditioning and post. An increase in the average proportion of control in both conditions was also observed during conditioning and post phases for Beverly. A higher average proportion of control was observed for RR during conditioning, and for SS during post.
Figure 9 depicts the percent of correct responses during standard observational conditioning for all three subjects. Rose’s percent of correct response was initially low, however an increase was observed around session 9, and maintained throughout the rest of conditioning. James’ percent of correct response occurred at high levels throughout the entirety of conditioning. Beverly’s percent of correct responses was initially high, but gradually decreased across sessions.
Figure 1. Rate of target responses for all subjects (Study 1).
Figure 2: Average rate of target responses for all three subjects (Study 1)
Figure 3: Proportion of baseline target responding for all subjects (Study 1)
Figure 4. Proportion of baseline target responding during conditioning and post (Study 1).
Figure 5. Proportion of conditioning target responding during post (Study 1).
Figure 6. Rate of target and control during all phases (Study).
Figure 7. Proportion of control response in both conditions during all phases (Study 1).
Figure 8. Average proportion of control responding during all phases (Study 1).
Figure 9. Percent of correct responses during standard-observational conditioning (Study 1).
Chapter 8: Study 2 Discussion

Overall, results of the Study 1 indicated standard observational conditioning and observational conditioning plus response restriction both established previously neutral stimuli as reinforcers for children with Autism Spectrum Disorder (ASD) and that those effects maintained to varying degrees following conditioning. Moreover, response-restriction may have been slightly more effective insofar as it resulted in a higher average rate of the target response in both conditioning and post-conditioning (Figure 1).

The results of the current study have implications for the observational conditioning procedure. That is, because observational conditioning plus response-restriction procedure was as, if not slight more, effective as standard observational conditioning, it might be said that the subject’s responding during observational conditioning is likely not an essential component to the procedure’s effectiveness. Additionally, the current study included experimenters as the confederates, as opposed to same-aged peers. Given the results of the study, it might be inferred that peer confederates are an unnecessary component of the procedure, as well. Similarly, the current study’s target population differed from Greer and Singer-Dudek. This study included children with ASD, whereas Greer and Singer-Dudek included children with speech and language impairments. As such, the current study extends the generality of observational conditioning effects to children with ASD.

Although the current study systematically replicated Greer and Singer-Dudek (2008) by demonstrating standard observational conditioning was effective at conditioning stimuli as reinforcers for children with ASD, there are several procedural differences between the two
studies worth noting. First, as previously mentioned, the current study included experimenters as the confederates, as opposed to same age peers, and included children with ASD as subjects. Second, the termination criteria for conditioning differed in the current study from Greer and Singer-Dudek (2008). That is, Greer and Singer-Dudek terminated conditioning following three consecutive sessions in which the subject attempted to take, or successfully took, the stimuli from the peer confederate. Conversely, this study’s termination criterion was based on the subject’s responding during the reinforcement assessment. More specifically, the current study also differs from Greer and Singer-Dudek in that reinforcement assessment sessions were conducted following five conditioning sessions. If stable responding was observed during the reinforcement assessment, the conditioning phase was terminated, and the post phase was implemented. With the current study’s termination criteria, more conditioning sessions were conducted, as compared to Greer and Singer-Dudek. Moreover, the inclusion of two conditioning procedures for comparison also increased the number of conditioning sessions subjects were exposed to. Interestingly, different patterns of responding were observed for two subjects during standard observational conditioning in the current study, as compared to what was reported by Greer and Singer-Dudek. That is, the previous study showed an extinction effect across conditioning sessions. Conversely, for Rose and James, responding maintained throughout conditioning. Beverly’s responding during standard observational condition was similar to the previous study’s results. However, anecdotally, overtime, conditioning sessions appeared to be aversive for Beverly. Possibly because of this, Beverly’s refused to come to sessions during post-conditioning and withdrawn from the study. It is possible the prolonged exposure to the conditioning procedures resulted in Beverly’s refusal to come to sessions.

A third difference between the current study and Greer and Singer-Dudek (2008) includes
the inclusion of a control response during the reinforcement assessment. The inclusion of a control response allowed for an assessment of whether effects of conditioning were specific to responses that resulted in the conditioned stimulus; Greer and Singer-Dudek included no such control. Typically, the strengthening effects of reinforcement are specific to responses within the same operant class. Because the target and control responses resulted in different consequences, they were likely members of different responses classes. If higher or similar levels of responding to the non-consequence control were observed, as compared to the target, it might be inferred that either responding to the target was not a reinforcement effect, but rather a result of some overall increase in behavior in the context, or that conditioning affected the value of the control stimulus. However, if more target responding occurred, as compared to the no-consequence control, it might be inferred the stimulus being delivered, functioned as a conditioned reinforcer.

A fourth difference between the two studies includes the analyses of the data that were included in the current study, that were not included in previous research. First, proportion of baseline responding data were analyzed in the current study. This analysis provided an additional way to identify differences across the two conditioning that control for idiosyncratic differences in baseline. Similarly, the current study also included a proportion of conditioning responding analysis, which allowed for the analysis of changes in responding following the termination of conditioning, while controlling for responding during conditioning. Additionally, with the inclusion of a control response during reinforcement assessment session, a proportion of control responses was calculated for each session to determine the relation between the rate of target and control responses. These data allowed for a clearer analysis of the difference between responding to the target and the no-consequence control, and attempts to address the question of the degree to which conditioning not only affected overall responding during each condition, but
also whether effects were specific to the (target) response that resulted in access to the conditioned stimulus.

Finally, a major difference between this study and Greer and Singer-Dudek (2008) is our comparison of the standard observational conditioning procedure to one in which emission of the target response is restricted. Results of that comparison suggest emission in the target response is not a necessary component.

Although the current study demonstrated both procedures were effective at conditioning previously neutral stimuli as reinforcers, with observational conditioning plus response restriction being slightly more effective, there are several limitations worth noting. First, because the two conditioning procedures were implemented in a multielement fashion, there is the chance of a possible carry-over effect. That is, it is possible exposure to one procedure influenced responding when assessing the effects of the other procedure, and vice versa. Although observational conditioning plus response restriction was slightly more effective than standard observational conditioning, there was only a slight differentiation between the two procedures. It is possible only one of the procedures was effective, and influenced the results for the other procedure. Future research should address this by assessing effects of observational conditioning plus response restriction in isolation, to identify whether there was a possible carryover effect in the current study.

Another limitation of the current study includes the absence of data collected on subject’s observing behavior. It is possible subjects did not attend to the experimenter and confederate’s behavior, and were not exposed to the conditioning trials. However, anecdotally, all subjects did engage in observing behavior during conditioning sessions. Nevertheless, future research should include a direct measure of observing, and, if applicable, identify a way to address any instances
of subject’s failure to observe the experimenter or confederate’s behavior.

As previously mentioned, the current study included experimenters, as opposed to peers, as confederates. It is possible including peer confederates might have been more effective than including an experimenter. Future research should identify confederate characteristics (e.g., sex, age, etc.) that might influence the effectiveness of the conditioning procedure.

Finally, a limitation of the current study includes the adverse effects of the conditioning procedure. Although the results indicated both procedures were effective, as previously mentioned, following extended exposure to conditioning, one subject (Beverly) engaged in behavior possibly indicating the conditioning sessions were aversive. It is possible this influenced the effectiveness of the procedures. Previous research should include measures to identify whether extended exposure to observational conditioning results in subjects’ escape or avoidance maintained problem behavior, and, if applicable, identify ways to decrease the averseness of the procedure.

In addition to addressing these limitations, future research can extend the results of the current study by assessing the effects of both conditioning procedures, but specifically response-restriction, on conditioning other stimuli as reinforcer. For example, previous research has demonstrated observational conditioning is effective at conditioning books as a reinforcer. It is possible observational conditioning plus response restriction would be effective at conditioning books, or similar, as a reinforcer, as well. Similarly, future research can assess the effects of the two procedures on different populations and ages. For example, the current study demonstrated the conditioning procedures were effective on conditioning tokens as reinforcer for children with ASD. It is possible the procedures would be effective with adults with ASD, as well.

Additionally, future research should assess the effects of observational conditioning on
preference. The current study demonstrated both procedures were effective at conditioning tokens as reinforcers, but it is possible the procedure altered subjects preference for the conditioned stimuli, well. Furthermore, the procedures could be effective at increasing preference for already established reinforcers that are less preferred. Future research should assess this to extend the utility of observational conditioning.

The current study removed one of the components of the standard observational conditioning procedure, target subject responding during conditioning, and demonstrated the modified procedure was still effective at conditioning stimuli. Moreover, Zrinzo and Greer (2013) also removed components of the standard procedure, view of the confederate and experimenter, from the standard procedure, and obtained similar results. Future research should examine the other components included in the observational conditioning procedural arrangement to identify all necessary components.

Finally, future research should examine the long-term effects of observational conditioning. To date, no study has assessed maintenance of the procedure’s effects, following extended periods of time following conditioning. By identifying how long the effects last, a more therapeutic conditioning regimen could be determined to facilitate long-term effects.

Overall, the current study demonstrated standard observational conditioning and observational conditioning plus response restriction were effective at conditioning tokens as reinforcers for children with ASD, with the response restriction procedure being slightly more effective. By doing so, the current study extended the procedure’s utility by identifying a more efficient procedural variation that was effective with a new population. However, the current study is not without limitations that should be addressed by future research, in addition to continuing to extend its efficiency and utility to additionally populations, behavior, and
environments.
Chapter 9: Study 2 Method

The purpose of Study 2 was to assess effects of observational conditioning plus response restriction to condition praise as a reinforcer for children diagnosed with Autism Spectrum Disorder.

Praise Statement Selection

The specific praise statement “good job” was arbitrarily selected for each subject. The praise statement was delivered in a neutral tone, and by the same experimenter throughout the study.

Baseline Reinforcement Assessment

This phase was conducted prior to the observational conditioning phase to assess the degree to which praise functions as a reinforcer. Reinforcement assessment sessions were 5 min in length, and were conducted in a concurrent operant arrangement that included identical target and control responses, only differing in color and consequence. During all sessions, task stimuli were made available to subjects. Prior to the start of each session, pre-session exposure was implemented, in which the subjects were prompted to engage in the target and control responses, and corresponding consequences was delivered. At the start of each session, subjects was told they can do as much or as little work as they want, and task stimuli were made available. Target responses resulted in the delivery of one of praise statements on an FR 1 schedule of reinforcement. The praise statement remained consistent throughout the reinforcement assessment, and observational conditioning phases. No programmed consequences were delivered for engagement in the control response. The experimenter did not talk to the subject
during this condition, other than to deliver the praise statement contingent on the target response. The reinforcement assessment phases were conducted until stable responding was observed.

**Generalization Assessment**

A generalization assessment was also conducted to assess whether praise statements not included in conditioning functioned as a reinforcer following conditioning. Prior to conditioning, the pre generalization assessment was conducted in the same manner as the reinforcement assessment. However, 10 different praise statements were included in the generalization assessment, and were delivered on a quasi-random basis. Additionally, the praise statements included in the generalization assessment differed from the praise statement being conditioned.

**Observational Conditioning**

The purpose of this phase was to establish praise as a conditioned reinforcer, using observational conditioning plus response restriction. During all sessions, a confederate (i.e., another experimenter) was present, in addition to the subject and experimenter. The target response differed from the target response included in the reinforcement assessment. The target subject and confederate sat on the same side of the table and an opaque partition (i.e., separating wall) was placed on the table so that the subject can only see the head and shoulders of the confederate, but not the table in front of the confederate (i.e., the subject could see the delivery or absence of reinforcement to confederate, but not the confederate’s responding). The experimenter sat on the other side of the table from the target subject and confederate subject. Each session included 10 trials. At the start of each trial, task materials were presented to only the confederate, and a verbal prompt to engage in the target response was delivered.
simultaneously to the target subject and confederate. Following five observational conditioning
sessions, a reinforcer assessment was conducted to assess the reinforcement effect of praise.

**Target subject contingencies.** The target subject did not have access to the task stimuli
and, therefore, was not able to engage in the target response. No consequences were provided
for any behavior (i.e., extinction), and no form of attention was provided to the target subject.

**Confederate contingencies.** Correct responses resulted in the delivery of the praise
statement (i.e., “good job”), by the experimenter, in the direction of the confederate. Incorrect
responding did not occur, and integrity data was collected to determine the confederate’s
accuracy.

**Post Reinforcement Assessment**

This phase was implemented following the conditioning phase, and was identical to the
baseline reinforcement assessment phase.

**Post Generalization Assessment**

This phase was implemented following observational conditioning, and was identical to
the pre generalization assessment phase.
Chapter 10: Study 2 Results

Figure 10 depicts the target and control rate or reinforcement during baseline, conditioning, and post conditioning all three subjects. For Austin, target and control responding occurred at similar rates. For Rose, moderate levels of responding to the control response were observed, with no target responding occurring. For Edward, on some occasions, target responding was higher than control responding, however, overall similar levels of target and control responding were observed. During conditioning and post, a similar pattern of responding was observed for all three subjects, as compared to their respective baselines.

Figure 11 depicts proportion of control data during all three phases. For Rose, during all three phases, the proportion of control data remained consistently lower than 1, indicating more control responding occurred, as compared to the target response. For Austin, during all three phases, the proportion of control data were somewhat variable, but remained at or below 1 during all three phases, indicating more control responding occurred, as compared to the target. For Edward, during all three phases, responding remained at or somewhat higher than 1, indicating responding to the target was higher at time, but similar responding between the target and control consistently, and more frequently occurred.

Figure 12 depicts target and control rates of responding during both phases of the generalization assessment for all three subjects. For Austin, similar target and control responding was observed during the pre and post phases. For Rose, during both phases, only control responses occurred. For Edward, overall low levels of responding were observed, with
slightly more target responding occurring, as compared to the control in both the pre and post phases.
Figure 10. Rate of target and control responses during all phases (Study 2).
Figure 11. Proportion of control responding during all phases (Study 2).
Figure 12. Rate of target and control responses during generalization assessment (Study 2).
Chapter 11: Study 2 Discussion

Overall, the results of the Study 2 indicated observational conditioning plus response restriction was not effective at conditioning praise as a reinforcer for three subjects. This result is somewhat surprising given the results of Study 1, in which observational conditioning was effective at conditioning neutral tokens were established as conditioned reinforcers for all subjects. Possible explanations for the general ineffectiveness of the procedure includes the variations made from the original Greer and Singer-Dudek (2008) procedure. More specifically, the current study removed one of the components, target subject responding during conditioning. It is possible if subjects were able to engage in the response during conditioning, the procedure would have been effective at conditioning praise as a reinforcer. Additionally, the current study included children with ASD, whereas Greer and Singer-Dudek included children with mild language impairments. It is possible the conditioning procedure is more effective for some populations than others.

Another possible explanation for the current study’s ineffectiveness includes the number of trails conducted. In the current study, subjects were exposed to 550-750 conditioning trials. Conversely, Dozer et al. (2012) conducted over 1000 response-stimulus conditioning trials before an effect was observed for some subjects. Although a different conditioned procedure was used in Dozier et al., it is possible if more conditioning trials had been conducted in the current study, an effect would have been observed. However, Greer and Singer-Dudek (2008) included only 100-170 observational conditioning trials for each subject before observing an effect. So, it is also possible additional exposure to observational conditioning plus response restriction...
restriction would not have influenced its effectiveness. Nevertheless, future research should assess the effects of varying number of conditioning trials on the effectiveness and maintenance of effects of conditioning procedures.

Finally, the current study attempted to condition praise as a reinforcer, as opposed to a tangible stimulus (e.g., token). It is possible characteristics of a stimulus being conditioned influences effectiveness of conditioning. Interestingly, Greer et al. (2008) was successful at using the Greer and Singer-Dudek (2008) observational conditioning procedure to condition praise as reinforcers for preschool and school-aged children with disabilities, including one child with ASD. It is possible the current study would have demonstrated similar results, had all components of the Greer and Singer-Dudek procedure been included. However, other differences between the current study and Greer et al. provide additional explanations for the differences in results. For instance, upon inspection of the Greet et al. data, it appears all four subjects responded to receive praise, prior to conditioning. An increase in responding was observed, following conditioning, however it is possible praise already functioned as a reinforcer, and the conditioning procedure only increased the reinforcer value of praise. Additionally, Greer et al. varied the praise statements delivered, contingent on correct responses. It is possible varying the praise statements positively influences the effectiveness of conditioning, although it is not clear how that would be the case. Finally, Greer et al. included peer confederates during conditioning. Conversely, the current study included adult confederates. It is possible the characteristics of the confederate influence the effects of conditioning. Given the procedural differences between the current study and Greer et al., it is not clear whether the current study’s removal of one component from the original procedure (i.e., target subject responding) can account for its ineffectiveness, especially given the results of
Study 1. Given the aforementioned, future research should assess the influence on pre-conditioning responding, varying praise statements, and confederate characteristics on the effectiveness of observational conditioning.

Although the current study was not effective at conditioning praise as a reinforcer for children with ASD, there are methodological changes that can be made that might increase its effectiveness. The current study outlined these changes, and provided recommendations for future research.
Chapter 12: General Discussion

Study 1 compared effects of observational conditioning and observational conditioning plus response restriction to condition tokens as reinforcers for children with ASD. The results indicated both procedures were effective, with observational conditioning plus response restriction being slightly more effective. Study 2 assessed the effects of observational conditioning plus response restriction at conditioning praise as a reinforcer for children with ASD, and found it was ineffective. Given the results of both studies, explanations for the results of both studies can be inferred.

Although the results of Study 1 indicated both conditioning procedures were effective at conditioning stimuli as reinforcers, the ineffectiveness of Study 2 has implications for the patterns of responding observed in Study 1. More specifically, the similar patterns of responding observed during the two reinforcement assessment conditions may have been the result stimulus generalization. That is, it is possible observational conditioning plus response restriction (RR) was not effective at conditioning stimuli as reinforcers, but the effects of observational conditioning (SS) generalized to the stimulus included during RR. If this were the case, it would account for the ineffectiveness of RR conditioning praise as a reinforcer in Study 2. Although RR was not effective, it is possible SS would have been effective. Given this, future research should assess the effects of stimulus generalization occurring during the comparison of conditioning procedures. Additionally, future research should assess whether SS is effective at conditioning praise as a reinforcer for children with ASD.
Although stimulus generalization may help explain the results of Study 1 and Study 2, it is possible both procedures were effective, and the characteristics of the stimuli being conditioned influenced the effectiveness of the conditioning procedures. In Study 1, tokens were included as the stimuli to be conditioned as reinforcers. In Study 1, praise (i.e., “good job”) was included as the stimulus to be conditioned as a reinforcer. It is possible subjects were more sensitive to the conditioning procedures when tangible items included, than when vocalizations were included. One possible explanation for this is the subjects’ exposure to the stimuli prior to conditioning. That is, subjects in Study 1 had no history of exposure to the tokens (laminated paper shapes), prior to participating in the study. Conversely, it is very likely subjects in Study 2 were exposed to the praise statement, or similar statements, prior to their participation in the study. Any history of exposure to the stimulus included in conditioning may influence the effectiveness of conditioning. Additionally, as previously mentioned, a primary characteristic of ASD includes a qualitative impairment in social skills (American Psychiatric Association, 2013). It is possible this impairment influences the effectiveness of conditioning procedures, or interventions, that incorporate social interactions. Given this, future research should examine the influence of different characteristics of stimuli on the effectiveness of conditioning procedures.

The data from Study 1 and Study 2 both provide insight into the effectiveness of observational conditioning, specifically related to children with ASD. Study 1 demonstrated observational conditioning and observational conditioning plus response restriction were effective procedures for conditioning stimuli as reinforcer for children with ASD. Moreover, Study 1 and Study 2 incorporate control procedures and data analysis not included in previous conditioned reinforcement studies. Although Study 2 did not produce positive results,
suggestions were made for changes that can be made to both Study 1 and Study 2 by future research to further validate and extend the current studies.
References


