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# Conditioned Reinforcement and the Value of Praise in Children with Autism

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# CONDITIONED REINFORCEMENT AND THE VALUE OF PRAISE IN CHILDREN WITH AUTISM

by

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of

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in

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# ABSTRACT

Conditioned Reinforcement and the Value of

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by

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Many efforts in teaching children with autism are focused on increasing the value of social reinforcement. In this study, I assessed the possibility that praise can be conditioned as a reinforcer as a result of established-response pairing procedures for four children with autism in a preschool setting. Using a multiple baseline design, I measured response levels for a basic sorting task in a praise baseline condition using neutral praise statements. Following a praise baseline condition, a pairing procedure was conducted in which praise statements were delivered simultaneously with highly preferred edible reinforcers for engaging in the target response, on a VR schedule of every three to five responses. Next a praise (test) condition was introduced in which only the praise statements previously paired with edible reinforcers were provided for engaging in the target response. Response levels during the praise (test) condition remained relatively high for two participants, suggesting that the praise statements were conditioned as reinforcers.

(25 pages)

# PUBLIC ABSTRACT

## Conditioned Reinforcement and the Value of Praise in Children with Autism

by

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Many efforts in teaching children with autism are focused on increasing the value of praise as a reward for work. Increasing the value of praise can help children with autism to work in a natural setting, without requiring constant rewards of food or toys for work. In this study, I analyzed a pairing method—a technique of providing verbal praise while simultaneously providing a food reward—to assess whether it would result in an increased value for praise for participants in the study. First, a baseline phase was conducted in which praise statements were provided as a reward for a certain task to see how quickly participants would engage in the task. In the next phase, a pairing condition was implemented in which participants were prompted to engage in the same task; food was provided along with praise as a reward for working on the given task. Finally, during the test phase, praise was again provided as the sole reward for the task, and I measured how quickly participants worked on the task to evaluate whether the value of praise had been increased. During the test phase two participants continued to engage in the task relatively quickly, suggesting that the value of praise had been increased for these two participants.

CONTENTS

Page

# LIST OF FIGURES

# INTRODUCTION

Many individuals with autism spectrum disorder (ASD) and other intellectual disabilities show little preference for the reinforcing effects of praise (Hagopian, Wilson, & Wilder, 2001; Kale, Kaye, Whelan, & Hopkins, 1968; Lovaas et al., 1966). Teachers and clinicians can address this issue in one of two ways. First, they can avoid the use of praise as a reinforcer, or second, they can conduct an intervention in an attempt to establish praise as a reinforcer.

Due to the frequent use of praise as a reinforcer in the natural environment, many researchers and practitioners have focused heavily on trying to increase the value of praise for individuals with disabilities. This is both to vary sources of reinforcement during teaching, thus avoiding satiation for certain reinforcers, and to prepare individuals with intellectual disabilities for situations in natural settings in which praise will be regularly employed as a reinforcer. Efforts to increase the reinforcing value of praise involve pairing procedures in which praise (a neutral stimulus) is paired with primary reinforcers such as edibles in order to give some reinforcing value to praise and allow it to become a conditioned reinforcer.

Two main techniques of pairing procedures have developed over the past few decades. One method is referred to as is new-response pairing, in which a neutral stimulus is paired with a primary reinforcer without reinforcement being made contingent on any target response. Next, the previously neutral stimulus is presented contingent on a new response to determine whether the previously neutral stimulus has acquired some reinforcing value and will increase responding. Also referred to as stimulus pairing, this method has been used and studied for many years (Dozier, Iwata, Thomason-Sassi,

Worsdell, & Wilson, 2012; Williams, 1994). Another method is called established-response pairing, in which a neutral stimulus is paired with a primary reinforcer (such as edibles) and both are delivered together contingent upon emission of a target response. Then, the presentation of the primary reinforcer is removed to determine whether the already established response will be maintained by the previously neutral stimulus. Also known as response-stimulus pairing, this method has received much attention among behavior analysts and researchers (Dozier et al., 2012; Kelleher & Gollub, 1962).

Bugelski (1938) analyzed the effects of a basic established-response pairing procedure for a bar pressing response in rats. First, two groups of rats were trained to press a bar. Food pellets were provided on an FR-1 schedule for each bar press emitted. Next, a click was repeatedly paired with delivery of food for the bar pressing response. Finally, en extinction condition was introduced in which one group received no food and heard no click for bar pressing, and the other group heard the click but received no food. The group to which the click was presented showed significantly higher rates of bar pressing under extinction than the group to which the click was not presented. These results suggest that pairing the click with food presentation imparted reinforcing value to the click itself, thus establishing it as a conditioned reinforcer.

In another study, Theobald and Paul (1976) analyzed the effects of established-response and new-response procedures on the value of praise as a reinforcer. Subjects were 40 adults with intellectual disabilities who lived in residential treatment facilities. The subjects were divided into two groups, with one group having a history of non-contingent pairings of tangible reinforcers and praise, and the other having a history of contingent pairings of tangibles and praise. Researchers examined levels of responding

on a marble-dropping task in baseline, praise, and paired praise and tangibles conditions. Participants who had a history of non-contingent (stimulus-stimulus) pairings showed higher responding during the paired praise and tangibles condition, but rates quickly decreased during the praise alone condition. Those participants with a history of contingent (response-stimulus) pairings also showed high rates of responding during the paired praise and tangibles condition, but these rates remained relatively high during the praise alone condition as well. The results of the study suggest that response-stimulus pairing procedures can be more effective in increasing the value of praise than stimulus-stimulus pairings. Some limitations of this study include no repetition of the baseline, praise alone, or praise and tangibles paired conditions, as well as a lack of a functional responses for the participants involved. Despite these limitations, however, this study helped to further the general understanding of pairing procedures and their effect on conditioned reinforcer value, and to distinguish between the effectiveness of stimulus-stimulus and response-stimulus pairing procedures.

Dozier et al. (2012) conducted a study in which they compared two pairing procedures to determine whether they could condition praise as a reinforcer for adults with intellectual disabilities. The participants were twelve individuals with intellectual disabilities who attended an adult day program or a school for intellectually disabled students. Prior to both studies, 10 novel praise statements were chosen for each participant, with which they were unlikely to have any prior experience. In Study 1, a stimulus pairing procedure was analyzed in which neutral praise statements were paired with edible reinforcers in order to determine whether these pairings could condition praise as a reinforcer. Responses for 4 participants were measured first in a baseline

condition in which no consequences were provided for engaging in the target response. Next, a praise condition was introduced in which varied praise statements were provided for the target response. Following this phase, a pairing condition was introduced. During this condition, both praise and edibles were provided on an FT 15-s schedule. Next, a praise (test) condition was identical to the first praise condition except that it followed pairing sessions for each participant. Last, a praise (test food present) condition was introduced in which previously identified highly preferred edible reinforcers were present, but were not provided for engaging in the target response. The purpose of this condition was to determine whether the edible reinforcers would act as discriminative stimuli for the target response. Results of Study 1 showed near-zero levels of responding in three of the four participants studied. The fourth participant's responding showed relatively high levels of responding during the praise (test) condition. However, following a return to baseline, another praise (test) condition was implemented, and responding quickly returned to near-zero levels again. The results of Study 1 suggest that the stimulus pairing procedure did not condition praise as a reinforcer for the participants studied.

In Study 2, the researchers analyzed the effects of an established response procedure for eight participants. Prior to the beginning of the study, participants were given a history of parings of praise and edible reinforcers contingent on a target response. During a baseline condition no consequences were given for emission of the target response. Next, a praise condition was introduced in which praise was provided for each occurrence of the target response on an FR 1 schedule. Following this condition, researchers applied a food plus praise condition in which the target response resulted in

delivery of a preferred edible reinforcer and one of 10 pre-determined praise statements. Results showed dramatic increases in responding during the food plus praise condition for 4 participants with a quick return to very low levels during praise and baseline conditions. Responding for 4 other participants, however, was found at much higher levels during praise conditions and near-zero responding during repeated baseline conditions. For these four participants, two more responses were introduced, to determine whether the reinforcing effects of praise seen in earlier phases would persist long enough to facilitate the acquisition of a new response. Responding for new target responses again showed high rates during praise conditions and low rates during baseline. These results suggest that the response-stimulus pairing procedure was effective in half of the participants in conditioning praise as a reinforcer.

While many researchers have focused on the effects of response-stimulus pairing procedures, few applied studies have given attention to children with intellectual disabilities, choosing instead to study pairing procedures in adults. Another limitation of these studies is their lack of functional responses among participants. That is, most evaluated the reinforcing effects on arbitrary responses in isolated research settings. For these reasons, the purpose of my study was to analyze the effects of established response pairing procedures on functional responses in children with autism in a classroom setting. The specific research question to be addressed in this study was: can established response pairing procedures condition praise as a reinforcer for children with autism in an applied setting?

# METHOD

## Participants

Participants included four boys diagnosed with autism, two of whom actually completed the entire study. These boys attended a preschool for children with ASD and other developmental disorders. The participants were between 3 and 5 years old. Participants were selected if the head teacher believed they could benefit from an intervention intended to increase the value of praise as a reinforcer and if praise did not function as a reinforcer for their responding, as determined by a probing procedure in which they were prompted to engage in simple tasks similar to those programmed for their teaching but still novel. These probing sessions were conducted in the students' normal working area – partitioned sections of the classroom for individual instruction. Participants were excluded if they had a poor record of attendance at the school (i.e. if they have missed more than 4 days in the last month) and if praise was found to function as a reinforcer already for tasks used during probing sessions. Specific probing procedures will be outlined below.

## Setting

For this study, sessions were conducted inside the preschool classroom the students already attended. The session room was a partitioned section of the preschool class, 2.4 m long and 1.5 m wide. These were the partitioned rooms in which participants' regular instructional sessions were already conducted. In the session room, there was a table (0.6 m wide and 0.9 long) and two small chairs. A small chest of

drawers with educational supplies, as well as a storage bin for toys and reinforcers was also in the room.

## Dependent Variable

### Responses Per Minute

This was defined as the number of times the participant engaged in the target response during a 2-minute session.

### Response Definition and Data Collection

Trained employees of the preschool which the participants attend served as data collectors for all assessments. Observers used pencil and paper to record responses. During preference assessments, therapists recorded responses in the presence of stimuli including selection and avoidance. Selection included placing the edible stimuli past the plane of the lips (all stimuli used were edibles). Avoidance included pushing the stimulus away, or crying or saying “no.” Highly preferred stimuli were those with the highest percentage of times chosen when presented. Selection percentage data was recorded by dividing the number of times a reinforcer was chosen by the number of times it was presented, and multiplying by 100.

During the pairing procedure, observers scored all correct responses following successive modeling and physical prompts. The target response was sorting plastic silverware by type. Silverware included forks, spoons, and knives. A correct completion of the target task was defined as placing one piece of silverware in the correct container by type. The silverware was placed in front of the student in a container, and three containers were provided to sort the silverware by type.

During praise, pairing, and praise test conditions, observers used paper and pencil to record responses. Data sheets included space to record responses per minute for the silverware sorting response. A timer was used to record session length. Rate was calculated by dividing the total number of responses emitted in a session by the number of minutes in the session.

**Interobserver Agreement**

An independent second observer personally observed at least 20% of sessions and scored the number of correct responses during praise, pairing, and praise (test) conditions. Interobserver agreement was calculated using the frequency ratio method by dividing the smaller total recorded by the larger total recorded to produce an agreement percentage. Mean percentage agreement across subjects was 99% (range, 97% to 100% across sessions) for the target behavior. Mean percentage agreement for the baseline condition was 100%, for the pairing condition 100%, and for the test condition 99% (range, 97% to 100%).

**Research Design**

For this study I used a multiple baseline design in which the praise baseline condition for participants was of varying lengths (e.g., five sessions for the first participant, seven for the second, nine for the third, etc.) to demonstrate that the pairing procedure was likely responsible for observed changes rather than the changes being caused by extraneous variables.

## Procedure

**Stimulus preference assessment.** This phase was designed to identify highly preferred primary reinforcers for each participant. Once identified, these reinforcers were used in later phases of the study. I used a variety of items typically used in the preschool the participants attend. Examples include Cheezit® crackers, Lays® potato chips, Doritos® chips, Sour Patch Kids® candies, and Chex® cereal.

I conducted three MSWO preference assessments following procedures described by Carr, Nicholson, and Higbee (2000). Five edible reinforcers were presented to a participant, and the observer gave a verbal prompt to "pick one." Once the participant chooses a reinforcer access was granted for 30 s or until it was consumed by the participant. The remaining four reinforcers were presented again, and the procedure continued until all reinforcers were either selected (edible reinforcer passed the plane of a participant) or until the participant rejected the item (saying "no," crying, moving away from item). The item chosen first was ranked first for that trial, the item chosen second ranked second, and so on. This procedure was repeated three times for each participant, and after the third assessment, ranks were added to identify the most highly preferred reinforcer(s) (those with the lowest rank number overall). Preference assessments were conducted regularly throughout the study to ensure the use of the most highly preferred edible reinforcers.

## General Procedures

The task for this study was a free operant sorting task. Participants were given a container of roughly 200 pieces of plastic silverware consisting of forks, spoons, and

knives. The instructor gave successive modeling and physical prompts as needed until the participant emitted one correct response himself. Sessions lasted for 2 minutes.

**Praise baseline.** During the praise baseline condition, a minimum of five sessions were conducted with each participant with later participants experiencing more sessions due to the multiple baseline design employed. Neutral praise statements were given for emission of the target response on a VR-2 to VR-5 schedule. I used a VR schedule for two reasons: first, VR schedules typically result in a high rate of responding with few pauses in responding after reinforcement is provided; and second, responses which are reinforced intermittently show higher resistance to extinction. Responses were recorded for 2 minutes for each session. Prior to each session, the therapist prompted the participant to complete the task using successive modeling and physical prompts to assure that the participant was able to engage in the response.

**Pairing procedure.** Before beginning a pairing session, the therapist again prompted the participant to engage in the target response using modeling and physical prompts in a least-to-most intrusive prompting pattern to ensure the participant could engage in the response. Praise statements were delivered in random order. Statements were determined for each participant based on a probing procedure in which participants were prompted to engage in the sorting task and praise statements were delivered for each occurrence of the target behavior. The praise statements included were phrases such as "rock on," "righteous," and "epic." These statements were delivered with an enthusiastic voice and inflection. Statements which result in near zero levels of responding were included in the study. The rate of reinforcement was determined based on rates of responding during the praise baseline condition.

**Post-pairing praise evaluation.** Once responding during pairing sessions showed a consistent pattern, praise (test) condition sessions were introduced during which only the previously neutral praise statement were delivered for engaging in the target response. Sessions again lasted 2 minutes, and the therapist measured responses per minute for the target response.

## RESULTS

Figure 1 shows data for each participant during the preference assessment. Instructors provided participants with either the first or second ranked edible reinforcer during praise baseline, pairing, and praise (test) conditions of the study. All reinforcers were selected during assessments and no avoidance behaviors were recorded.

Figure 2 displays responses per minute during praise baseline, pairing, and praise (test) conditions. Chris' responding began at near-zero levels, but showed a consistent increase across sessions during the baseline condition and never showed a steady level of responding. As a result, I did not introduce the pairing or test conditions for Chris because it would have been difficult to assess whether any change in responding was a result of the pairing procedure or merely from practice effect by the participant.

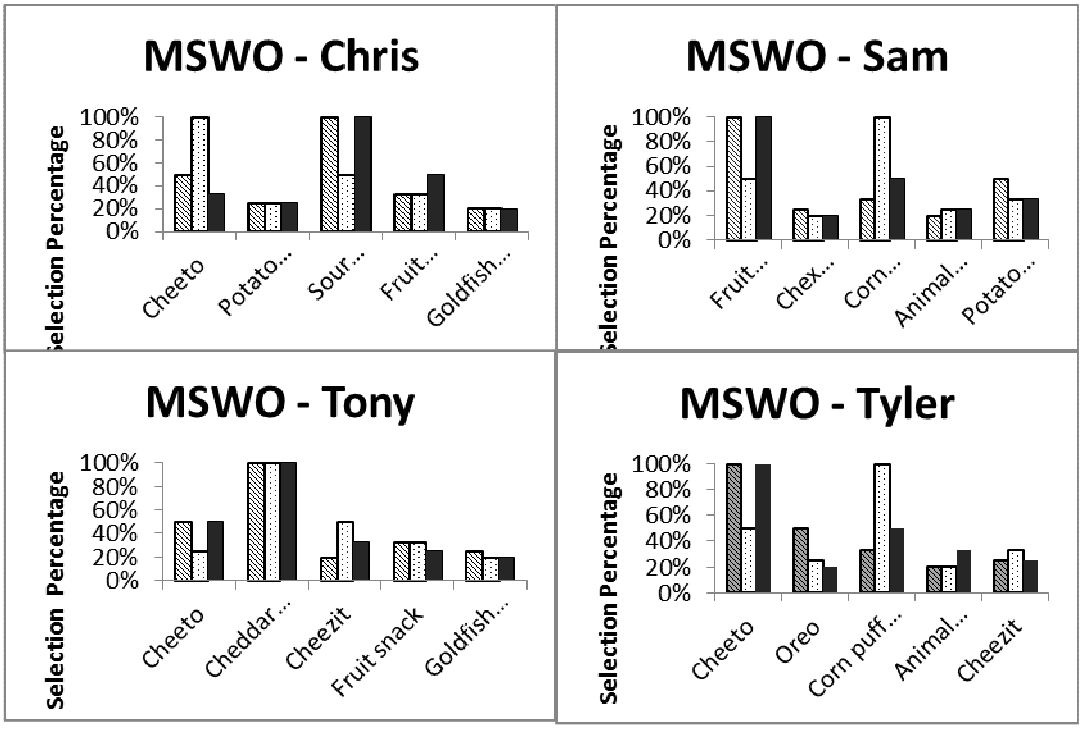


*Figure 1*. Selection percentages of edible reinforcers in MSWO.

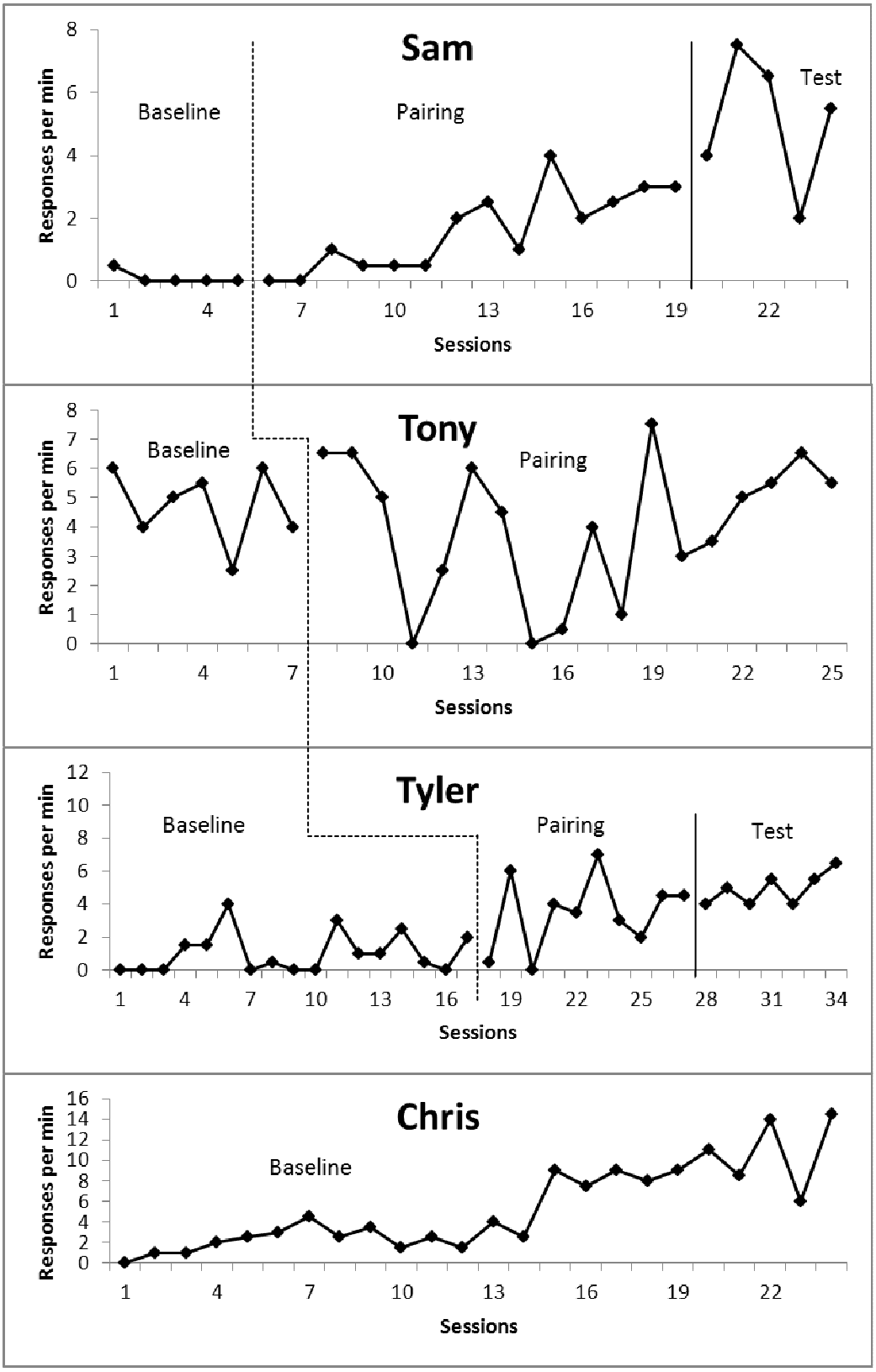


*Figure 2.* Responses for baseline, pairing, and test conditions.

Responding for Tony showed a relatively consistent pattern during the baseline condition with only limited variation. During the pairing condition, however, responding showed large inconsistencies in frequency. Due to these inconsistencies the test condition was not introduced for Tony. Sam's responding initially showed near-zero levels during the praise baseline condition. This was followed by a steady increase during the pairing condition, suggesting that the presence of edible reinforcement was responsible for the increase in responding. Once responding exhibited a consistently high pattern, the test condition was introduced. During the test condition, responding remained high, with 3 of the 5 sessions showing response levels much higher than the highest level during the pairing phase. These data suggest that the value of the praise statements was increased for Sam as a result of the pairing procedure. However, the data for Sam's responding could also suggest an alternative explanation. The increase during the test phase could be an extinction burst, resulting in temporary higher response rates after reinforcement (edibles) was removed. Due to the summer school schedule, sessions ceased after only five test sessions. Ideally, more sessions would be conducted to see whether the increased responding would be maintained over time, thus helping to clarify whether responding suggested an extinction burst or whether the value of praise had been increased. At first Tyler's responding showed inconsistencies during baseline, eventually settling at a low level of responses per minute. During the pairing condition responding quickly increased to much higher levels. Next, responding remained at levels at or above those recorded during the pairing condition. These data suggest that the value of praise was also increased for Tyler as a result of the pairing procedure. In short, data for the two participants who completed all phases of the study (Sam and Tyler) suggest that

established response pairing procedures was effective in conditioning praise as a reinforcer for both participants.

## DISCUSSION

The findings of this study are consistent with those obtained by Dozier et al. (2012) in suggesting that response-stimulus pairing procedures can increase the value of unconditioned social reinforcement. The implications of these results are far-reaching in their potential benefits. More frequent use of these pairing procedures can lead to more effective use of reinforcers in natural environments, thus allowing desirable behaviors in children with autism to be reinforced outside of programmed teaching.

One limitation of this study is that it was conducted during extended school year services for the participants included in the study. Breaks between school sessions were longer and more frequent, sometimes resulting in up to 2 weeks between teaching sessions. The inconsistency in schedule may have inadvertently affected the results of the study, for example resulting in more sessions during the pairing condition to increase the value of the praise statements. Pairing sessions should ideally be conducted with shorter breaks between sessions since frequent pairing sessions typically result in a faster increase in value for the previously neutral reinforcer. Therefore, future studies in school settings should ideally take place during the typical school year to avoid possible adverse effects on reinforcer strength. Another limitation was the lack of cognitive testing for each participant prior to beginning the study. Cognitive testing would help to determine whether increased responding was a result of the pairing procedure or a result of higher cognitive abilities in a given participant. Other limitations include a small sample size, all male participants, and a relatively narrow scope of diagnoses. Also, only 2 of the 4 participants completed the study in its entirety. These results, therefore, may not be as easily generalized to the population as a whole. Future studies should include larger

sample sizes, female participants and a wider variety of diagnoses to analyze whether established-response pairing procedures can be effective with a greater number of participants, across genders, and across diagnoses.

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