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Determining the reinforcing value of social consequences and establishing social consequences as reinforcers: a replication

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**Determining the Reinforcing Value of Social Consequences
and Establishing Social Consequences as Reinforcers: A Replication**

A Thesis Presented

by

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In partial fulfillment of the requirements

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Table of Contents

ABSTRACT.....	4
INTRODUCTION.....	5
METHOD.....	10
Participant.....	10
Setting and Materials.....	11
Variables and Definitions.....	11
Measurement and IOA.....	11
Procedure.....	12
RESULTS.....	16
DISCUSSION.....	18
REFERENCES.....	24
FIGURE CAPTIONS.....	26
FIGURES.....	27

Abstract

Social consequences, such as praise, do not function as reinforcers for many individuals with autism. The current study replicated the procedures of Gibson (2009) in order to condition 2 social stimuli, verbal praise and thumbs up, as reinforcers for a 3-year-old boy with autism. Two procedures, stimulus-stimulus pairing and an S^D procedure, were evaluated. The stimulus-stimulus pairing procedure involved delivering the to-be-conditioned stimulus and immediately following it with a known reinforcer. The S^D procedure involved establishing the to-be-conditioned stimulus as discriminative for a response that produced the same known reinforcer. Results indicated that the stimulus-stimulus pairing procedure was ineffective, while the S^D procedure effectively conditioned both social stimuli as reinforcers.

Determining the Reinforcing Value of Social Consequences and Establishing Social Consequences as Reinforcers: A Replication

Many intervention programs rely on the delivery of a reinforcing stimulus to increase desirable, appropriate behavior in the clinical setting. The reinforcing value of such stimuli is assessed in order to ensure that they effectively function as reinforcers. Previous research demonstrates that stimuli identified as unconditioned or primary reinforcers can effectively alter behavior. As a result, practitioners working with individuals with developmental disabilities often rely heavily on the use of primary, in most cases edible, reinforcers (Smaby, MacDonald, Ahearn, & Dube, 2007). While the use of such reinforcers can effectively increase appropriate, adaptive behavior, there are several disadvantages associated with using them too frequently. Among these disadvantages are the influences of satiation and deprivation, as well as problems associated with delays between response emission and reinforcement delivery (Kelleher & Gollub, 1962). Further, primary reinforcers are not commonly delivered in typical classrooms, and thus may not be considered socially acceptable.

An alternative to the use of primary reinforcers is the use of conditioned reinforcers, which researchers have also demonstrated to effectively increase behavior. Cooper, Heron, and Heward (2007) define conditioned reinforcers as neutral events or stimuli that gain the capability to function as reinforcers through pairing with one or more unconditioned or conditioned reinforcers. Through repeated pairing, the previously neutral stimulus acquires the reinforcement value of the reinforcer(s) with which it has been paired. Using conditioned reinforcers in the applied setting has several advantages (Kazdin & Bootzin, 1972). It can reduce the time that elapses between the occurrence of a response and the delivery of a reinforcer and can permit the reinforcement of a response at any time. In addition, generalized conditioned reinforcers, that is,

those conditioned reinforcers that derive their reinforcing effects from being paired with many other reinforcers, may be less sensitive to the effects of satiation than primary reinforcers.

Research has shown that a frequently used conditioned reinforcer, the token, has been effective with people from diverse populations and in a variety of settings. For example, token economies have been used with psychiatric patients, children with ADHD, adolescents with behavior disorders, students with learning disabilities, workers in industrial settings, prison inmates, and university students (Tarbox, Ghezzi, & Wilson, 2006).

While the use of conditioned reinforcers and token economies in applied settings is both effective and widely accepted, methods for establishing such stimuli as reinforcers outside the laboratory are not well understood. Factors that influence the effectiveness of conditioned reinforcers include the schedule on which the stimulus is paired with the primary reinforcer as well as the percentage of times that the stimulus is followed by reinforcement (Williams, 1994). Kelleher and Gollub (1962) noted the significance of the number of pairings between the primary reinforcer and the to-be conditioned stimulus. Little research, however, exists that describes precise procedures or a suggested number of pairings that will yield an effective conditioned reinforcer.

As described above, token economies have been used with a range of populations, including children with autism (Tarbox et al., 2006). However, in comparison with typically developing children, the behavior of those with autism may not be reinforced by social stimuli. In addition, children with autism may require a denser schedule of reinforcement for appropriate behavior, and as such, the availability of immediate and frequent reinforcement with the use of tokens may prove useful. Tarbox et al. demonstrated that token reinforcement and schedule thinning increased the attending behavior of a young child with autism during Discrete Trial

Training (DTT). The effectiveness of the schedule thinning showed that the number of tokens required for back-up reinforcement could be increased without decreasing attending that was established through token reinforcement. In addition, Tarbox et al. concluded that token reinforcement is most effective in sustaining attending when reinforcement is available and when tokens can be exchanged without delay. These results are consistent with the findings in the literature on conditioned reinforcement.

As discussed above, social stimuli often function as conditioned reinforcers for typically developing individuals, but may not function as reinforcers for individuals with autism. Lovaas et al. (1966) defined a social reinforcer as a stimulus provided by one person which, when contingent upon the behavior of another person, serves to modify that behavior. Like other previously neutral stimuli, social stimuli, such as the praise statements “That’s right” or “Good job” gain their reinforcing properties through their relation to other reinforcers (Skinner, 1953). These, and similar consequences, reinforce the behavior of many people. For example, parents often use such praise statements to alter the behavior of their children. Unlike typically developing individuals who show preference for social reinforcers, individuals with developmental disabilities are often unaffected by social consequences (Lovaas et al.) or may exhibit undesirable behavior (Smaby et al., 2007). Without the availability of social consequences, teachers may rely heavily on edible or activity reinforcers, which introduces the problems of deprivation, satiation, and delay of reinforcement.

Given the importance of social reinforcement, identifying social stimuli that effectively increase behavior becomes an important objective. Smaby et al. (2007) evaluated a method for assessing preference for and reinforcing effectiveness of social consequences in individuals with developmental disabilities. Preference for social consequences was determined by assessing

levels of responding to access different social stimuli. A preferred social consequence was one that resulted in the greatest difference in response rates compared to baseline levels. The effectiveness of social stimuli as reinforcers was evaluated by comparing responding maintained by each social consequence to responding in an extinction condition. Although Smaby et al. contributed a method for practitioners to identify potentially reinforcing social stimuli for individuals with developmental disabilities, they did not offer a method for establishing these stimuli as reinforcers. Unfortunately, many individuals are insensitive to social stimuli and more research that examines methods for establishing these social stimuli as conditioned reinforcers is needed.

Lovaas et al. (1966) hypothesized that social stimuli commonly acquire their reinforcing efficacy through their association with already potent reinforcers, such as food or relief of pain, and as a result, social stimuli can be viewed as conditioned or secondary reinforcers. In an attempt to establish and maintain social stimuli as reinforcers for children with developmental disabilities, Lovaas et al. compared a traditional stimulus-stimulus pairing procedure with a procedure in which the social stimulus was established as a discriminative stimulus (the “ S^D procedure”). Using the stimulus-stimulus pairing procedure, the word “good” was paired with food delivery. Following hundreds of pairing trials, the reinforcing effectiveness of the word “good” was evaluated by an assessment in which this social stimulus was delivered contingent on a response. Results from this reinforcer assessment demonstrated that the pairing procedure was not effective in establishing the social stimulus as a reinforcer. Using the S^D procedure, the social stimulus was first established as an S^D for a primary reinforcer, food. Once this was established, the effectiveness of the social stimulus as a conditioned reinforcer was again evaluated. Results from this assessment demonstrated that when it was established as

discriminative for responses that produce food, the social stimulus was effectively conditioned as a reinforcer. These results suggest that the S^D procedure may be effective in establishing social consequences as conditioned reinforcers for children with developmental disabilities.

Holth (personal communication, 2008) investigated an S^D procedure for establishing social stimuli as conditioned reinforcers. Similar to the procedure utilized by Lovaas et al. (1966), a neutral social stimulus was established as an S^D for a specific response. This response then produced the primary reinforcer. The conditioned reinforcing value of the social stimulus was tested by delivering the conditioned stimulus as a consequence contingent on an arbitrary response. The results from this study suggest that the S^D procedure established the neutral social stimulus as a conditioned reinforcer.

Gibson (2009) evaluated two procedures, an S^D procedure, similar to the one used by Holth (2008) and a stimulus-stimulus pairing procedure, to determine which, if either, would effectively condition social consequences as reinforcers. Gibson's study consisted of eight phases which included a preference assessment to identify a highly preferred edible item, a reinforcer assessment with the preferred edible item, a reinforcer assessment with unconditioned social consequences, and two conditioning procedures: a stimulus-stimulus pairing procedure and an S^D procedure. Probe sessions followed each conditioning phase to determine if the procedures were effective in conditioning the social stimuli as reinforcers.

Gibson (2009) concluded that neither social stimulus, praise statements nor back pats, was effectively conditioned as a reinforcer using the stimulus-stimulus pairing procedure. However, following the S^D procedure, stable, low rates of responding were maintained when either of the conditioned social stimuli were delivered contingent on responding. These rates of responding were differentially higher than response rates in extinction but lower than response

rates maintained by token delivery, which suggests that the social consequences may have been established as weak conditioned reinforcers using the S^D procedure. It is important to emphasize, however, that rates of responding were substantially higher when the previously-conditioned (i.e., not part of the study) tokens were delivered contingent on responding as compared to when social consequences were delivered. Further research is needed to determine whether the S^D procedure is an effective method for establishing social consequences as conditioned reinforcers in children with developmental disabilities.

The purpose of the current study was to replicate the Gibson (2009) procedures, assessing the reinforcing value of two social stimuli, verbal praise and thumbs up, following stimulus-stimulus pairing and S^D procedures to determine which procedure, if either, would effectively condition social consequences as reinforcers.

Method

Participant

One student, Sam, participated in the current study. Sam was a 3-year-old boy diagnosed with autism. He attended an intensive early intervention program for children with autism. His academic objectives included establishment of tokens as conditioned reinforcers by pairing tokens with edibles. Sam did not earn tokens as part of his daily programming; instead, teachers gave him edible items and toys contingent on his appropriate responses.

Sam had communication deficits, and as a result he used simple one to two word phrases to request desired items or activities. Sam vocalized primarily to request or reject tasks, but unintelligible speech was frequently observed. Sam appeared to be interested in certain social situations (e.g., singing with teachers, tickles), but displayed social skill deficits in other areas

(e.g., interacting with peers). He was selected to participate in the present study in order to establish naturally-occurring social stimuli, such as verbal praise, as reinforcers.

Setting and Materials

All sessions took place in a small cubicle-like space in Sam's preschool classroom. This area contained a desk and two small chairs; potentially distracting items were removed from the area. Materials included a timer, camera, and hand-held counter. Various edible items were used in the preference assessment and based on this assessment, his most highly-preferred item (popcorn) was used throughout various phases of the study.

Dependent Variable and Response Definition

The dependent variable during the preference assessment was a selection response. Selection was defined as picking up the item and putting it in the mouth. The selection response was not scored if Sam expelled the item within 5 s of placing it in his mouth.

During each of the reinforcer assessments, the dependent variable was a hand raise. A hand raise was defined as any instance in which Sam lifted his arm so that his elbow was at or above his ear and his hand was at a height greater than his head. In order for the next response to be scored he must first lower his hand and elbow below ear height. If he raised both hands at the same time, only one response was scored.

This study assessed the reinforcing value of two social consequences, praise and thumbs up. In the praise condition, the experimenter said in an enthusiastic tone and at conversational level either "Great job," "Nice work," or "That's fantastic", following a response. In the thumbs up condition, the experimenter delivered a one-handed thumbs up (fingers tucked into palm with thumb vertical in the air) paired with a smile following a response.

Measurement Method and IOA

The experimenter or another trained therapist served as the primary observer for each session. During preference assessment sessions, the experimenters collected selection data for each trial. The data sheet included which stimuli were presented, the positioning of the stimuli, and which stimulus was selected. Percent selection was determined for each stimulus by dividing the number of times the item was selected by the total number of times it was presented and multiplying this number by 100. A second trained observer collected reliability data during 33.3% of sessions. Interobserver agreement (IOA) for selection was 100%.

During reinforcement assessment sessions, experimenters either recorded the response frequency with a counter or videotaped sessions and tallied response frequency while viewing the video. Response rate was calculated by dividing the number of responses in the session by the duration of the session.

Interobserver agreement data were collected in 42% of reinforcer assessment sessions across all phases of the study. A trained second observer, who used the same criteria as the primary observer, either collected data during the sessions or watched the video tape after the sessions and scored responses. Agreement was calculated for each session with a second observer by dividing the smaller count by the larger count and multiplying by 100. The mean IOA score for all reinforcer assessment sessions was 98.8% agreement.

Procedure

Phase 1: Preference Assessment with Edible Items. In order to identify a highly-preferred edible item, a 16-item Paired Stimulus preference assessment was administered using edible items. This assessment closely followed the procedures outlined by Fisher et al. (1992). The 16 edible items were placed in pairs within arm's reach of the participant. Each stimulus was paired

with every other stimulus in a quasi-random order. Each stimulus pair was available for 10 s. Selection was recorded if the participant picked up an item and placed it in his mouth. If the participant expelled the item within 5 s of placing it in his mouth, selection was not scored. Any attempt to select both items was blocked. If no item was selected following 10 s, both items were removed and no response was scored.

Phase 2a: Reinforcer Assessment with Highly Preferred Edible. The purpose of this assessment was to determine whether the high-preference item identified via the preference assessment in Phase 1 functioned as a reinforcer. In order to demonstrate this, FR1 edible conditions were alternated with extinction conditions in an alternating treatments design. In the FR1 edible condition, popcorn, the highly-preferred edible identified in the preference assessment, was delivered contingent upon every response. In the extinction condition, no programmed consequences were delivered contingent on the response. The free operant response used in both conditions was the hand raise. Each session lasted 3 min. Prior to each session, the experimenter conducted two demonstration trials. The experimenter stated, “raise hand,” and modeled the target response. In the FR1 condition the experimenter delivered the highly preferred edible contingent on hand raising; during the extinction condition, the experiment did nothing following hand raising. Following the demonstration trials, the experimenter provided one of the following instructions: “You can raise your hand as many times as you want and you will earn popcorn” (FR1 edible condition) or “You can raise your hand as many times as you want and you will not earn anything” (extinction condition). Sessions continued until either stable responding or differential responding between the two conditions occurred.

Phase 2b: Baseline Reinforcer Assessment with Social Consequences. This assessment determined if two social consequences, praise and thumbs up, functioned as reinforcers prior to

conditioning. It was similar to Phase 2a in that each session lasted 3 min and began with two demonstration trials. Four conditions, verbal praise, thumbs up, extinction, and high-preference edible, were alternated in quasi-random order using a multi-element design. The edible and extinction conditions were identical to Phase 2a. During the verbal praise condition, the experimenter provided the following instruction: “You may raise your hand as many times as you want and you will earn “great job, nice work, that’s fantastic.” During the thumbs up condition, the experimenter provided the following instruction: “You may raise your hand as many times as you want and you will earn (the experimenter then modeled thumbs up paired with a smile). Sessions continued until stable responding was achieved.

Phase 3: Stimulus-Stimulus Pairing Procedure. A stimulus-stimulus pairing procedure was used to establish two neutral social stimuli as conditioned reinforcers. In order to establish verbal praise statements as a reinforcer, the experimenter stated one of the three statements then immediately placed the highly-preferred edible (popcorn) in to the participant’s mouth. A similar procedure was conducted with the thumbs up stimulus. Four sessions with 10 pairings in each were carried out for each neutral social stimulus. Therefore, each neutral stimulus was paired with a primary reinforcer 40 times prior to Phase 4 Reinforcer Probe Sessions.

Phase 4: Reinforcer Probe Sessions. Probe sessions were conducted following Phase 3 to determine whether the stimulus-stimulus pairing procedure was effective in establishing the previously neutral social stimuli as conditioned reinforcers. The sessions were conducted identically to those in Phase 2b. Conditions were presented in a ratio of three praise statements as consequence, three thumbs up as consequence, one extinction, and one edible condition. Because the participant emitted problem behavior (crying) during the third probe phase, the ratio of conditions was reduced to one praise statement as consequence, one thumbs up as

consequence, and one edible condition. In addition, after 120 pairing trials, the duration of the probe sessions was decreased to two minutes for the remainder of the study. Phases 3 and 4 were alternated until stable responding occurred in Phase 4 sessions or until the response rates in the social-consequence Phase 4 sessions matched those of Phase 2a.

Phase 5: Baseline Reinforcer Assessment (Social Consequences). A reinforcer assessment with the two neutral social stimuli, verbal praise and thumbs up, was conducted prior to the start of the second conditioning procedure. This served as baseline for Phase 7 reinforcer assessments. Praise, thumbs up, extinction, and edible conditions were alternated in quasi-random order in a procedure identical to Phase 2b.

Phase 6: S^D Procedure. An S^D procedure, similar to that used by Lovaas et al. (1966) and Holth (2008), was used to establish the neutral social consequences, praise and thumbs up, as conditioned reinforcers. Ten pieces of the highly-preferred edible, popcorn, were placed on a plate in front of and within arm's reach of the participant. During the verbal praise condition, the experimenter delivered one of the praise statements. This praise statement served as a cue (S^D) for the participant to take one of the edible pieces from the plate and consume it. The procedure was repeated until all of the edible pieces were consumed. The same procedure was used in the thumbs up condition. If the participant failed to retrieve an edible item from the plate, the experimenter manually guided him to pick it up. Attempts to take an edible item prior to the delivery of an S^D were blocked. Sessions in which praise statements functioned as the S^D alternated with sessions in which thumbs up functioned as the S^D. For each social stimulus, there were ten pairings per session. Forty pairings (four sessions) were carried out with each neutral social stimulus.

Phase 7: Reinforcer Probe Sessions. Probe sessions, identical to Phase 4, were conducted to determine the reinforcing value of the previously neutral social stimuli, praise and thumbs up. Following the third S^D pairing session, the initial ratio of conditions was reinstated (three praise statements as consequence, three thumbs up as consequence, one extinction, and one edible condition).

Following five S^D pairing sessions, response rates increased during all conditions, including extinction. Anecdotal reports suggested that the sound produced by the counter during probe sessions influenced rates of responding. To systematically evaluate this, a reversal design (ABAB) was conducted in which the sound of the counter was systematically withdrawn, re-presented, and then again withdrawn.

Results

Phase 1: Preference Assessment with Edible Items. The results from the preference assessment are shown in Figure 1. Since popcorn was selected on 93% of presentations, it was used as the highly-preferred edible item throughout the study.

The results for Phases 2 through 7 are shown in Figure 2.

Phase 2a: Reinforcer Assessment with Highly Preferred Edible. Responding during the edible condition (mean 5.6 responses per min, range 0 to 15) was significantly and differentially higher than the extinction condition (mean 0.45 responses per min, range 0 to 1.7). These results demonstrate the highly preferred edible item (popcorn) was an effective reinforcer for the participant.

Phase 2b: Baseline Reinforcer Assessment with Social Consequences. Nearly zero responding occurred in all extinction, thumbs up, and verbal praise conditions. Similar low, stable response rates in all extinction, thumbs up, and verbal praise conditions demonstrated that

prior to conditioning neither social consequence functioned as a reinforcer for the participant. At the end of this phase, the highly-preferred edible (popcorn) was again delivered contingent on responding. Response rates became differentially higher (13 responses per min) than in the other three conditions.

Phase 3: Stimulus-Stimulus Pairing Procedure. Phase 3 consisted of six blocks of pairing sessions (40 trials per block) for a total of 240 stimulus-stimulus pairing trials.

Phase 4: Probe Sessions following Stimulus-Stimulus Pairing Procedure. Response rates in the thumbs up and verbal praise conditions following stimulus-stimulus pairing sessions were similar to Phase 2b baseline levels. Stable, near zero rates of responding were recorded for the extinction, thumbs up, and verbal praise conditions. The first probe session of the edible condition was similar to response rates in baseline. This was followed by a decrease to zero, and then immediately followed by a return to baseline levels. A moderate, stable level of responding was observed for the remainder of the probe sessions for the edible condition in Phase 4.

Phase 5: Baseline Reinforcer Assessment (Social Consequences). During the extinction, thumbs up, and verbal praise conditions there were near zero response rates. Responding during the edible condition was significantly and differentially higher than the other three conditions (mean 22 responses per min, range 21 to 23). Therefore, neither social stimulus was an effective reinforcer prior to the second conditioning procedure.

Phase 6: S^D Procedure. Phase 6 consisted of six blocks of pairing sessions (40 trials per block) and a total of 240 trials.

Phase 7: Probe sessions following S^D Procedure. During the initial Phase 7 sessions (With Counter), the participant made no responses in extinction, thumbs up, and verbal praise conditions. However, following session 109, his response rate increased rapidly in all three

conditions. In contrast, the participant produced a stable, moderate level of responding in the edible condition.

Since an increase in responses was seen in the extinction condition when the audible counter was introduced, the counter was systematically removed, re-presented, and removed again to isolate its effects. During the first No Counter phase, similar to the previous With Counter phase, a rapidly increasing trend was noted for the thumbs up and verbal praise conditions. The removal of the counter in the first No Counter condition produced an immediate and drastic decrease in rates of responding in the extinction condition. The response rate during extinction was significantly lower than the response rate in the previous With Counter condition, and also significantly and differentially lower than response rates in the thumbs up and verbal praise conditions. The return to the With Counter condition resulted in similar response rates as the initial With Counter condition in Phase 7. High response rates were observed in the extinction, thumbs up, and verbal praise conditions. The last return to No Counter condition resulted in an immediate and drastic decrease in responses to near zero rates. In comparison, response rates in the thumbs up and verbal praise conditions remained at high levels.

Discussion

In the current study, two procedures to establish social stimuli as conditioned reinforcers in a child with autism were evaluated. Conditioning did not occur when the traditional stimulus-stimulus pairing procedure was used whereas, conditioning did occur when the S^D procedure was used.

The finding that the stimulus-stimulus pairing procedure was ineffective in conditioning social stimuli as reinforcers for a child with autism is consistent with some previous research, but inconsistent with others. Moher, Gould, Hegg and Mahoney (2008) used the stimulus-stimulus

pairing procedure to successfully establish conditioned reinforcers in individuals with autism. However, Lovaas et al. (1966) found that social stimuli were effectively conditioned as reinforcers with the S^D procedure, while stimulus-stimulus pairing failed to produce similar results. Lovaas et al. noted that, according to basic literature of classical conditioning, the organism must attend or orient to the to-be conditioned stimulus in order for learning to take place. Individuals with autism often do not attend to social stimuli. Unlike traditional stimulus pairing, the S^D procedure required the participants to respond to the social stimulus by establishing that stimulus as a discriminative stimulus for the primary reinforcer. Lovaas et al. concluded that discrimination training may be a necessary component to establish social stimuli as reinforcers for individuals who do not respond to naturally-occurring social stimuli.

The current study replicated the Gibson (2009) procedures and produced similar results. Both studies demonstrated that the traditional pairing procedure did not effectively condition social stimuli as reinforcers. However, in both studies, there were only 240 stimulus-stimulus pairing trials. It is possible that this number was insufficient to produce conditioning. In addition, in the current study the S^D procedure produced high response rates in the social stimuli conditions, whereas in the Gibson study, low and stable response rates were maintained in these conditions. The dissimilarity in the results of the two studies may be due to individual participant differences or the possibility that the audible counter in the present study acquired reinforcing properties.

In the present study, the experimenter and/or a second observer used a counter to record frequency of responses during probe sessions. When the participant emitted the target response, the experimenter delivered the programmed consequence and simultaneously pressed the counter, which produced a small, brief, auditory stimulus. In Phases 4 and 5, the participant

rarely emitted the target response in the extinction, thumbs up, and verbal praise conditions. However, following Session 109, he began responding at a high rate in all conditions. It was hypothesized that in the extinction condition this high response rate might be attributable to conditioned reinforcing properties acquired by counter's activation sound. These properties could have been produced by the association of the primary reinforcer and the sound during the edible condition. The results of systematically withdrawing and re-presenting this auditory stimulus demonstrated that such a relation between responding in extinction and the auditory stimulus existed; removal of the auditory stimulus during the extinction condition resulted in low, stable rates of responding. The high response rates in the extinction condition when the auditory stimulus was present suggest that a traditional stimulus-stimulus pairing procedure effectively conditioned the auditory stimulus as a reinforcer. These findings coincide with basic research on conditioned reinforcement. Experiments in which rats were trained to press a bar for food pellets highlight this point. Following training, the group of rats that continued to receive the click of the pellet dispenser contingent on bar pressing during extinction responded at a significantly higher rate than the group that did not receive the click (Williams, 1994). In the current study, the auditory stimulus, initially a neutral event, acquired reinforcing properties due to its relation to primary reinforcement (food), and subsequently served as an effective reinforcer.

The finding that the traditional stimulus-stimulus pairing procedure effectively conditioned an auditory stimulus as a reinforcer, but failed to establish social stimuli as reinforcers suggests that the nature of social consequences may make it more difficult to establish such stimuli as reinforcers using this procedure. Conditioning social stimuli may require more complex procedures than simply pairing the neutral social stimulus with an

established primary reinforcer. Dozier (2006) evaluated three methods, the new response procedure, the established response procedure, and the established response with schedule thinning procedure, in an attempt to establish praise as a reinforcer for individuals with developmental disabilities. The new response procedure, similar to a traditional stimulus-stimulus pairing procedure in which a previously neutral stimulus is paired with an established reinforcer, did not effectively condition praise as a reinforcer for three of the four participants; results for the fourth participant were inconclusive. These results are consistent with previous research as well as with the findings of the current study. The established response procedure consisted of pairing the previously neutral stimulus (praise) with the primary reinforcer contingent upon a response. This procedure effectively conditioned praise as a reinforcer for four of the eight participants. The established response with schedule thinning enabled the primary reinforcer to continue to be delivered according to a thin schedule of reinforcement to determine whether praise was able to effectively maintain responding. This procedure effectively maintained responding for all five participants. The author concluded that several approaches are available, but the effectiveness of such methods is idiosyncratic. More research in this area is warranted.

One limitation of the current study was that only two conditioning procedures were evaluated. Including additional procedures that require response contingent consequences, such as the established response procedure assessed by Dozier (2006), may prove to be beneficial. In addition, future research might evaluate the effects of schedules of reinforcement and schedule thinning on the maintenance of responding.

Another limitation was the failure to account for time required to consume the edible item during the reinforcer probe sessions. In Phase 7, rates of responding produced by the social

stimuli, thumbs up and verbal praise, were significantly higher than response rates produced by the edible item. Observation during these sessions revealed that following the delivery of an edible item, the participant did not respond while he was consuming the item. However, during the social stimuli conditions, the participant continued to respond at a high rate with no pauses in responding while the experimenter delivered the social stimulus. Efforts to account for time to consume edible items should be made. In addition, the current study may have been strengthened by testing whether the response generalized to a second experimenter or to novel social stimuli. Including additional probe sessions that delivered the social stimuli contingent on a novel response may have further strengthened this study.

Due to the limited area of research on conditioning social stimuli as reinforcers, there are numerous areas for potential future research. In addition to assessing the effects of response contingent procedures and varying schedules of reinforcement, evaluating individual characteristics may prove to be beneficial. As noted by Dozier (2006) and supported by the difference in results between the current study and Gibson's (2009) study, individual differences may play a large role in whether a particular treatment or procedure will be effective. Identifying participant variables that may lead to effective conditioning may be helpful in identifying the procedure that will be most effective for each participant.

The data presented in the current study suggest that differences in responding may be based on the nature of the reinforcing stimulus (e.g., social or non-social). While stimulus-stimulus pairing effectively conditioned a non-social auditory stimulus as a reinforcer, the same procedure did not condition two social stimuli. The S^D procedure effectively conditioned social stimuli as reinforcers, however the effectiveness of this procedure for conditioning a non-social stimulus could not be systematically evaluated in this study. Future research should examine the

nature of stimuli used and attempt to identify the characteristics of the social stimuli that prevented them from being conditioned as effective reinforcers using the stimulus-stimulus pairing procedure.

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Figure Captions

Figure 1. Percent selection of edible stimuli during a paired stimulus preference assessment.

Figure 2. Responding (hand raising) for Phases 2 through 7. Stimuli delivered contingent on responding were no programmed consequence (EXT), popcorn (EDIBLE), thumbs up (TU), and verbal praise (VP). Arrows denote pairing sessions (Phase 3 and Phase 6).



