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A COMPARISON OF TWO PAIRING PROCEDURES TO ESTABLISH PRAISE AS A REINFORCER

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Some individuals with intellectual disabilities do not respond to praise as a reinforcer, which may limit their ability to learn. We evaluated 2 procedures (stimulus pairing and response–stimulus pairing), both of which involved pairing previously neutral praise statements with preferred edible items, to determine their usefulness in establishing praise as a reinforcer. Results of Study 1 indicated that stimulus pairing was not effective in conditioning praise as a reinforcer for 3 of 4 subjects; results were inconclusive for the 4th subject. Results of Study 2 indicated that response–stimulus pairing was effective in conditioning praise as a reinforcer for 4 of 8 subjects. After conditioning, praise also increased the occurrence of additional target responses for these 4 subjects.

Key words: conditioned reinforcement, praise, social reinforcement

Praise, typically defined as an expression of approval or admiration (Brophy, 1981), is commonly delivered by parents, teachers, peers, and employers after desirable behavior. The reinforcing effects of praise have been documented in numerous studies in which its presentation, alone or in conjunction with other consequences, resulted in the acquisition or maintenance of appropriate behavior such as job performance (Brown, Willis, & Reid, 1981; Wikoff, Anderson, & Crowell, 1983), academic work (Hall, Lund, & Jackson, 1968; McLaughlin, 1982), verbal behavior (Keilitz, Tucker, & Horner, 1973; Sigafoos, Doss, & Reichle, 1989), leisure activity (DiCarlo & Reid, 2004; Duffy & Nietupski, 1985), and social interaction (Barton, 1981; Strain & Timm, 1974). Despite the ubiquitous nature of praise and the powerful effects it can have on human behavior, we still know very little about how

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praise (or other forms of attention) comes to function as a reinforcer. It is generally assumed that praise is a conditioned reinforcer that has acquired its effects through previous association with other reinforcing events (Bijou & Baer, 1961, 1965; Catania, 1998; Mazur, 1998; Skinner, 1953).

Several hypotheses have been proposed to explain how a previously neutral stimulus becomes a conditioned reinforcer or acquires the ability to establish or maintain responding (for reviews, see Fantino, 1977; Gollub, 1977; Williams, 1994). The traditional pairing hypothesis states that the simple pairing of a stimulus with a primary reinforcer (similar to pairing of a neutral stimulus and an unconditioned stimulus in respondent [classical] conditioning) imparts conditioned reinforcing strength to that stimulus. The delay-reduction hypothesis states that the strength of a stimulus as a conditioned reinforcer is a function of the reduction in time to reinforcement correlated with the onset of that stimulus. In a choice situation, for example, responding occurs more in the presence of a stimulus that has been correlated with the shortest delay to the delivery of primary reinforcement.

Many early studies on conditioned reinforcement used extinction to determine whether a previously neutral stimulus had acquired reinforcing properties via pairing. In these experiments, a previously neutral (or arbitrary) stimulus was paired with (presented at the same time as or immediately before) a primary reinforcer (food). After a history of pairings had occurred, the reinforcing effect of the previously neutral stimulus on a target response was examined under extinction (no food). Two commonly used methods have been the new response (Skinner, 1938; Zimmerman, 1957) and the established response (Kelleher & Gollub, 1962). The new-response procedure is similar to a pure stimulus-pairing procedure because it involves pairing a previously neutral stimulus with an already established reinforcer (e.g., an unconditioned reinforcer such as food) independent of programmed responding, and then presenting the previously neutral stimulus contingent on a new response to determine whether that stimulus increases responding. For example, Skinner (1938) described a study in which an audible clicking sound immediately preceded the delivery of food to food-deprived rats on a time-based schedule. In a second phase, a lever was introduced into the experimental chamber, and lever presses resulted in the delivery of the audible click, but food was no longer delivered. Results indicated that the contingent presentation of the click resulted in an increase in lever pressing. The established-response procedure can be conceptualized as a response–stimulus pairing procedure because it involves simultaneously delivering a previously neutral stimulus with an unconditioned reinforcer contingent on a response and then removing the presentation of the unconditioned reinforcer to determine whether the previously neutral stimulus results in maintenance of the already established response. For example, a tone might be paired with the delivery of food contingent on a target response. After a history of response-contingent pairings has been established, the tone continues to be delivered; however, food is no longer delivered. Both procedures have been shown to be effective in establishing neutral stimuli as reinforcers, in that they result in acquisition or maintenance of a response in the absence of the delivery of primary reinforcers. However, we should note that responding may not be maintained, presumably because the previously neutral stimulus is no longer paired with the primary reinforcer, resulting in extinction (Gollub, 1977).

Because both of the above procedures involve presentation of a neutral stimulus with an unconditioned reinforcer (food), they are similar to respondent (classical) conditioning in which an arbitrary stimulus (e.g., click) is paired with an unconditioned stimulus (food). This account is referred to as the stimulus–stimulus account of conditioned reinforcement,

suggesting that all conditioned stimuli also function as conditioned reinforcers (Kelleher, 1966). However, an alternative account is the discriminative-stimulus account of conditioned reinforcement (Keller & Schoenfeld, 1950), which states that the previously neutral stimulus (e.g., click) becomes a discriminative stimulus because it sets the occasion for a response (approaching the food hopper) that produces the unconditioned reinforcer (food). This account states that for a stimulus to become a conditioned reinforcer, it must function as a discriminative stimulus. Although numerous experiments have been conducted to evaluate these two hypotheses, it remains unclear which account is most probable.

Procedures from basic research provide a basis for studying the conditioned reinforcing (or response establishing and maintaining) characteristics of praise (and other forms of attention). The finding that previously neutral stimuli may be conditioned as reinforcers suggests that the reinforcing effect of praise may be strengthened if it is weak initially, and procedures from basic research provide models for studying whether and how this process occurs. One important population for whom this line of research is particularly relevant consists of individuals with intellectual disabilities who are unresponsive to social stimuli.

Studies have shown that some individuals are unresponsive to the reinforcing effects of praise or other social stimuli (Drennen, Gallman, & Sausser, 1969; Ebner, 1965; Kale, Kaye, Whelan, & Hopkins, 1968; Levin & Simmons, 1962; Lovaas et al., 1966; Stahl, Thomson, Leitenberg, & Hasazi, 1974) or may even find social interaction to be aversive (Hagopian, Wilson, & Wilder, 2001; Levin, 1962; Taylor & Carr, 1992). These problems present a special challenge to teachers and clinicians, who may address the issue in one of two ways when attempting to teach appropriate behavior. First, the trainer could rely on primary reinforcers or other forms of nonsocial stimuli. Alternatively, the trainer could initiate an intervention designed to establish social stimuli as reinforcers.

Relatively few applied studies have described attempts to establish the reinforcing effects of social stimuli such as praise, and those based on the pairing hypothesis typically have used the response–stimulus procedure. For example, studies have involved pairing attention with established positive reinforcers such as food, tokens, or preferred activities or with negative reinforcers such as escape from or avoidance of aversive events contingent on a target response; then the response is subsequently examined under extinction (Chadwick & Day, 1971; Dorow, 1980; Drennen et al., 1969; Miller & Drennen, 1970; Stahl et al., 1974). Although results of these studies have suggested that the procedure was effective in conditioning social stimuli as a reinforcer, several limitations temper these conclusions, including (a) no baseline for the target response, (b) no test of the effect of the social stimulus prior to conditioning, (c) use of group designs that did not permit examination of within-subject changes, (d) lack of experimental control (i.e., maintenance of the target response not only under conditions of contingent social stimuli but also under no-consequence conditions, suggesting that the target response was or became automatically reinforcing), (e) brief evaluation periods under social stimulus delivery conditions, and (f) modest experimental effects.

In summary, some applied studies have suggested promise for establishing social stimuli as reinforcers using the response–stimulus pairing procedure; however, no applied studies have used the stimulus-pairing procedure. Interestingly, Theobold and Paul (1976) showed preliminary evidence that response–stimulus pairings were more effective than stimulus pairings in conditioning praise as a reinforcer. The experimenters measured responding on a marble-dropping task under baseline and contingent praise conditions for two groups of subjects. One group had a history

Table 1
Subject Characteristics

Subject	Age (years)	Diagnosis or sensory impairments	Receptive or expressive ability
Jill	39	Severe MR, Down syndrome	1- to 2-step instructions, gestures and limited signs
Lily	47	Moderate to severe MR	1- to 2-step instructions, gestures
Bill	38	Mild MR	3- to 5-step instructions, vocal-verbal
Ben	42	Mild MR	3- to 5-step instructions, vocal-verbal
Alicia	26	Severe MR	1-step instructions, gestures
Mike	23	Severe MR	1- to 2-step instructions, gestures
Rick	56	Severe MR	1- to 2-step instructions, gestures
Riley	54	Moderate MR	3- to 5-step instructions, vocal-verbal
Larry	48	Moderate MR, seizure disorder, hearing impaired	3- to 5-step instructions, gestures and limited signs
Chris	36	Moderate MR	3- to 5-step instructions, vocal-verbal
Eric	17	Severe MR, autism	3- to 5-step instructions, gestures and limited signs
Shari	48	Moderate MR	3- to 5-step instructions, vocal-verbal

Note. MR = mental retardation.

of stimulus pairings between social stimuli and tangible reinforcers, whereas the other group had a history of response–stimulus pairings of social stimuli and tangible reinforcers. Although these different pairing histories were not programmed (they were observed to occur in the natural environment), results indicated that the histories had different effects: Subjects who had a history of response–stimulus pairings showed an increase and maintenance in responding on the marble-dropping task when praise only was delivered, whereas subjects who had a history of stimulus–stimulus pairings did not show maintenance in responding (they showed extinction-like performance).

The purpose of the current study was to determine whether simple pairing of neutral stimuli (praise) with primary reinforcers (food) would be effective in establishing praise statements as reinforcers for simple target behaviors displayed by individuals with intellectual disabilities. In Study 1, we examined the effects of stimulus pairing to determine whether previously neutral praise statements would result in acquisition of a target response. In Study 2, we examined the effects of response–stimulus pairing to determine whether previously neutral praise statements would result in maintenance of a target response. We chose to examine the two pairing procedures rather than other procedures for two reasons. First, results of previous applied research tentatively suggest that the pairing procedure might be a simple and effective way to condition reinforcers, although limitations of those studies do not allow a clear determination of the effects of pairing. Second, although extinction following a history of pairing may result in weak and transient effects of conditioned reinforcement, it is possible that responding would be maintained for longer periods under conditions of extinction for humans. We hypothesized that this might be the case given that much human behavior is maintained by reinforcers that are not primary reinforcers and under conditions in which primary reinforcers rarely continue to be paired with primary reinforcers.

GENERAL METHOD

Subjects and Setting

Twelve individuals who attended either an adult day program or a school for students with intellectual disabilities participated in Study 1 or Study 2. Subjects were included if they did not respond during a 5-min probe session (conducted prior to the study) in which praise was delivered on a fixed-ratio (FR) 1 schedule for a simple response (data available from the first author). Table 1 lists subject information, including age, diagnosis, and receptive (instruction following) and expressive (communicative modality) skills. Sessions were conducted in

workshop areas or classrooms that contained tables, chairs, and session materials. Sessions lasted 10 min and were conducted two to four times per day, 4 to 5 days per week.

Reinforcer Selection and Praise Statements

Prior to the start of the study, a paired-stimulus preference assessment (Fisher et al., 1992) was conducted to identify highly preferred edible items for each subject. The three items selected most frequently were used in subsequent experiments. In addition, 10 novel praise statements, with which subjects were unlikely to have a history, were chosen for each subject. Praise statements were generated on an individual basis from a larger list and included phrases such as "get on with your bad self," "you go girl," and "keep on rockin' in the free world." Praise statements were delivered with an enthusiastic voice tone and inflection.

Response Measurement and Interobserver Agreement

Target behaviors were chosen on an individual basis. In some cases, target responses were communicative (Eric and Chris) or vocational (Larry). In other cases, targets consisted of simple motor responses that could be performed quickly and measured easily. Target responses included (a) arm raising (Jill, Alicia, Mike, Riley, Eric, and Shari), (b) hand clapping (Rick, Chris, Eric, and Shari), (c) signing "My name is —" (Chris and Eric), (d) knee touching (Lily), (e) standing from chair (Larry), (f) stair stepping (Larry), (g) disc sorting (Larry), (h) jumping jacks (Chris), (i) toe touching (Bill and Ben), and (j) microswitch pressing (Shari).

Trained observers used laptop computers to record the frequency of target responses, edible item delivery, and praise delivery. A second observer simultaneously and independently collected data during at least 25% of the sessions for each subject. In comparing observers' records, agreement percentages were calculated by first dividing session time into 10-s intervals. Percentage agreement was calculated by dividing the smaller number of recorded responses in each interval by the larger number and averaging these fractions across the session. Mean percentage agreement across subjects was 95% (range, 79% to 100%, across sessions) for the target behavior, 95% (range, 79% to 100%, across sessions) for edible item delivery, and 94% (range, 79% to 100%, across sessions) for praise delivery.

Study 1: Stimulus Pairing

The purpose of Study 1 was to determine whether stimulus pairings of neutral praise statements and edible reinforcers could be used to condition praise as a reinforcer. First, a reinforcer test (see below) was conducted to determine whether the highly preferred edible items functioned as reinforcers. Second, an assessment was conducted to determine whether a target response would occur in the absence of reinforcement (baseline) or for the delivery of praise statements (praise). Finally, praise statements were paired with preferred edible items for five consecutive 10-min sessions, and then a test session was conducted in which the effectiveness of praise in increasing and maintaining the target response was assessed. During the reinforcer test and pairing sessions, all three highly preferred edible items were delivered within a session to decrease the possibility of satiation to a particular item (Egel, 1980, 1981).

Subjects

Four individuals (Jill, Lily, Bill, and Ben) participated in Study 1.

Reinforcer Test

Prior to evaluation of the effects of stimulus pairing, a reinforcer test was conducted to determine whether the edible items selected from the preference assessment functioned as reinforcers. A response was chosen for each subject during the reinforcer test: switch pressing for Jill, stair stepping for Bill, and hand raising for Lily and Ben. These responses were used only during the reinforcer test (and not during subsequent parts of the study) to avoid any possible history effects of this

response with edible reinforcement. Five-minute sessions were conducted during two conditions presented in a reversal design. Before the start of each session, the therapist modeled the target response. After the subject imitated the response, the contingencies programmed for that particular session were implemented. The conditions were baseline, in which no programmed consequences were delivered after target responses, and reinforcement, in which each target response resulted in delivery of one of three highly preferred edible items (rotated in a quasirandom fashion) on an FR 1 schedule. Results of the reinforcer test showed that responding was uniformly low for all subjects during baseline and was consistently higher during reinforcement, indicating that preferred edible items were, in fact, effective reinforcers (data available from the first author).

Design and Procedure

The stimulus-pairing procedure involved providing a history of pairings between the 10 novel praise statements and preferred edible items. These pairings occurred on a fixed-time (FT) 15-s schedule independent of performance (i.e., noncontingently) during 10-min sessions, such that 40 pairings occurred each session. Following every five pairing sessions (200 pairing trials), a 10-min session was conducted in which only praise was delivered on an FR 1 schedule for responding. These sessions were conducted to determine whether increased rates of the target response would emerge with the delivery of praise. Prior to the start of all sessions (except pairing sessions), the subject was prompted to engage in the target response to ensure that he or she could engage in the response. However, contingencies that would be delivered during the subsequent sessions were not implemented during these presession prompts. Subjects engaged in the target response when prompted before all sessions. In addition, task materials were present during all conditions except pairing sessions. The effects of the stimulus-pairing procedure were assessed using an ABC (Jill, Lily, and Bill) or reversal (Ben) design.

Baseline. Task materials were present, and no programmed consequences were delivered for engaging in the target response.

Praise. Task materials were present, and each target response resulted in the delivery of one of 10 praise statements on a quasirandom basis (the same praise statement was not delivered twice consecutively).

Pairing (food plus praise). The therapist delivered a praise statement (rotated on a quasirandom basis) that was immediately followed by delivery of one of the highly preferred edible items on an FT 15-s schedule.

Praise (test). This condition was identical to the praise condition; however, each of these sessions followed five pairing (food plus praise) sessions.

Praise (test food present). The purpose of this additional test was to determine whether the mere presence of the edible items would serve as a discriminative stimulus and thereby occasion the target response. These sessions were identical to praise (test) sessions; however, the edible items were present (on a plate) but were not delivered during the session. One praise (test food present) session was conducted with Lily and Bill.

Results and Discussion

Figure 1 shows the rate of responding during stimulus pairing for all four subjects. Little or no responding occurred during baseline and initial praise conditions for all subjects. During the next phase, each praise (test) session was conducted after 200 pairings of praise plus food. Despite this pairing history (1,800, 2,400, and 1,600 pairings for Jill, Lily, and Bill, respectively), responding for three of the four subjects (Jill, Lily, and Bill) showed no appreciable increase, in spite of the fact that food was present during some of the praise (test) sessions for Lily and Bill. By contrast, Ben's responding increased during the first praise (test) condition. Therefore, we implemented a reversal design to see if the results could be replicated. Ben's responding decreased during the return to baseline and increased

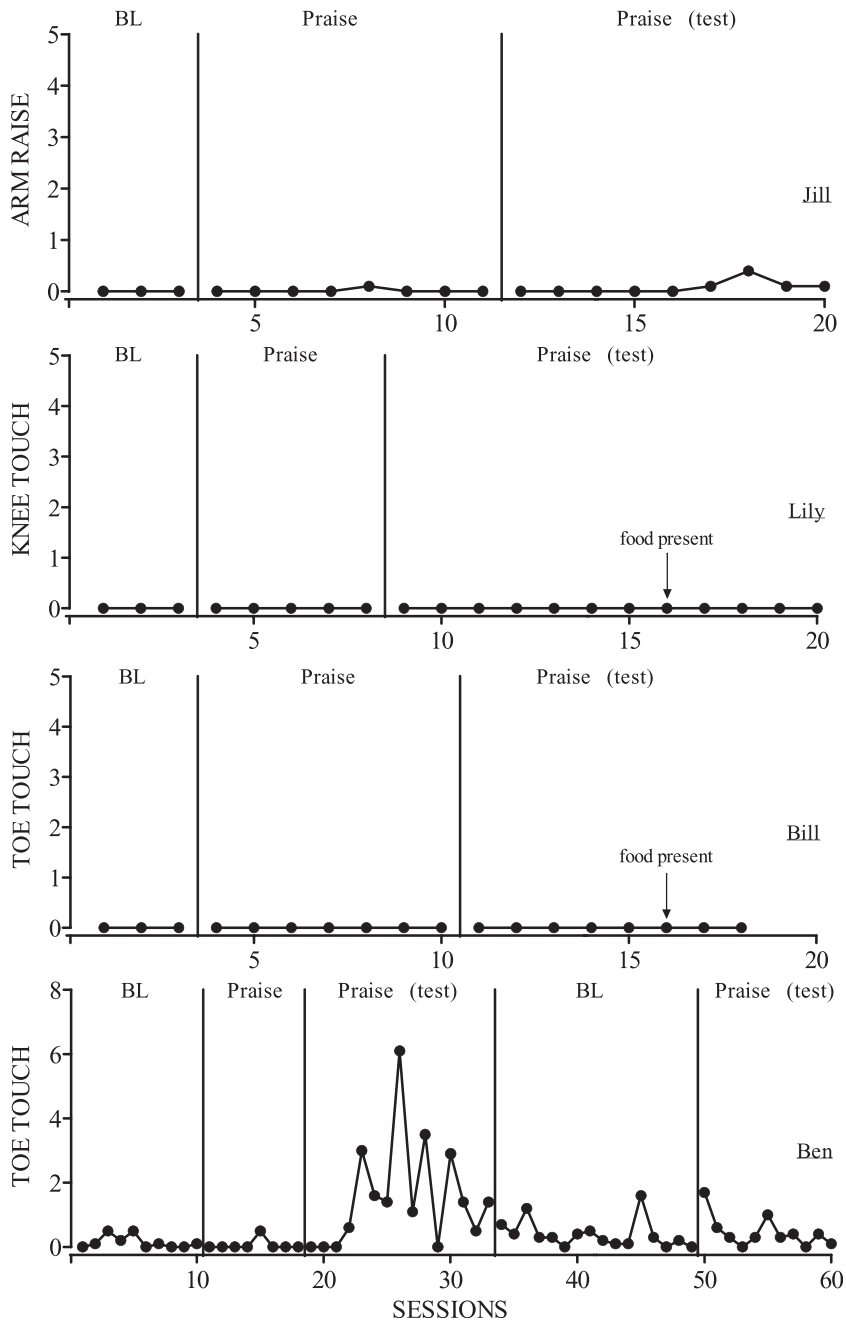

Figure 1. Responses per minute of target responses across baseline, praise, and praise (test) conditions of the stimulus-pairing procedure (Study 1).

during the initial session in the second praise (test) condition; it was not maintained, however. Overall, the results indicated that praise did not initially function as a reinforcer for any of the four subjects, as shown by low levels of responding in the praise condition. Stimulus pairing was not effective in conditioning praise as a reinforcer for three subjects (Jill, Lily, and

Bill), and results were inconclusive for the fourth (Ben). Ben's data apparently illustrate what has been noted in the basic literature; continued presentation of the conditioned reinforcer in the absence of the unconditioned reinforcer leads to extinction (although, in this case, pairing sessions continued to occur). Finally, the presence of food during praise (test) sessions for Lily and Bill did not result in an increase in responding; thus, the presence of unconditioned reinforcers did not have a discriminative effect on responding.

Study 2: Response–Stimulus Pairing

Subjects, Design, and Procedure

Eight individuals (Alicia, Mike, Rick, Riley, Larry, Chris, Eric, and Shari) participated in Study 2, which involved an evaluation of response–stimulus pairing similar to that described by Kelleher and Gollub (1962). Subjects were given a history of pairings between neutral praise statements and edible items that were delivered contingent on a target response. Subsequently, edible items were no longer delivered to determine whether the target response maintained under contingent praise conditions. Prior to all sessions, the subject was prompted to engage in the target response to ensure that he or she (a) could engage in the target response and (b) experience the contingency in effect during that upcoming session. Baseline and praise conditions (see below) were alternated in a multielement design both before and after the pairing condition. If, following the pairing procedure, responding was maintained in the presence of praise alone, a further test of the reinforcing effects of praise was conducted by attempting to strengthen additional responses for which food had never been paired with praise. A reversal design (Larry) or multiple baseline design (Chris, Eric, and Shari) was used to evaluate the effects of praise on the acquisition of additional target responses.

Baseline. This condition was identical to the baseline condition in Study 1: No consequences were delivered for occurrences of the target response.

Praise. The target response resulted in the delivery of one of 10 praise statements (delivered in a quasirandom order) on an FR 1 schedule.

Food plus praise. The target response resulted in simultaneous delivery of one of 10 praise statements and one of three preferred edible items (also delivered in quasirandom order) on an FR 1 schedule.

Results and Discussion

Figure 2 shows that Alicia, Mike, Rick, and Riley engaged in zero or near-zero rates of responding during both initial baseline and praise conditions. In the next phase, increases in responding occurred for all subjects when food and praise were simultaneously delivered on an FR 1 schedule. During the final phase, a return to the baseline versus praise conditions resulted in a decrease to zero or near-zero rates of responding for all four subjects. Because no increase in responding was observed in the praise condition relative to baseline after pairing, it appeared that the response–stimulus pairing procedure was ineffective in conditioning praise as a reinforcer for these four subjects.

Figure 3 shows results obtained for Larry, Chris, Eric, and Shari. Larry engaged in zero instances of Target Response 1 (R1; standing from chair) during both the initial baseline and praise conditions. His responding increased when food and praise were delivered contingent on the target response. In the next phase, when responding under baseline and praise conditions was again assessed, responding decreased to low levels during baseline sessions but was maintained at high levels during praise sessions. Because his responding was maintained under praise alone (after previously being paired with food items), we determined whether praise could then be used to increase two additional target responses: stair stepping (R2) and disk sorting (R3). No instances of R2 occurred during baseline. In subsequent phases, R2 increased when praise alone was delivered as a consequence, decreased when praise was removed in a reversal to baseline, and increased

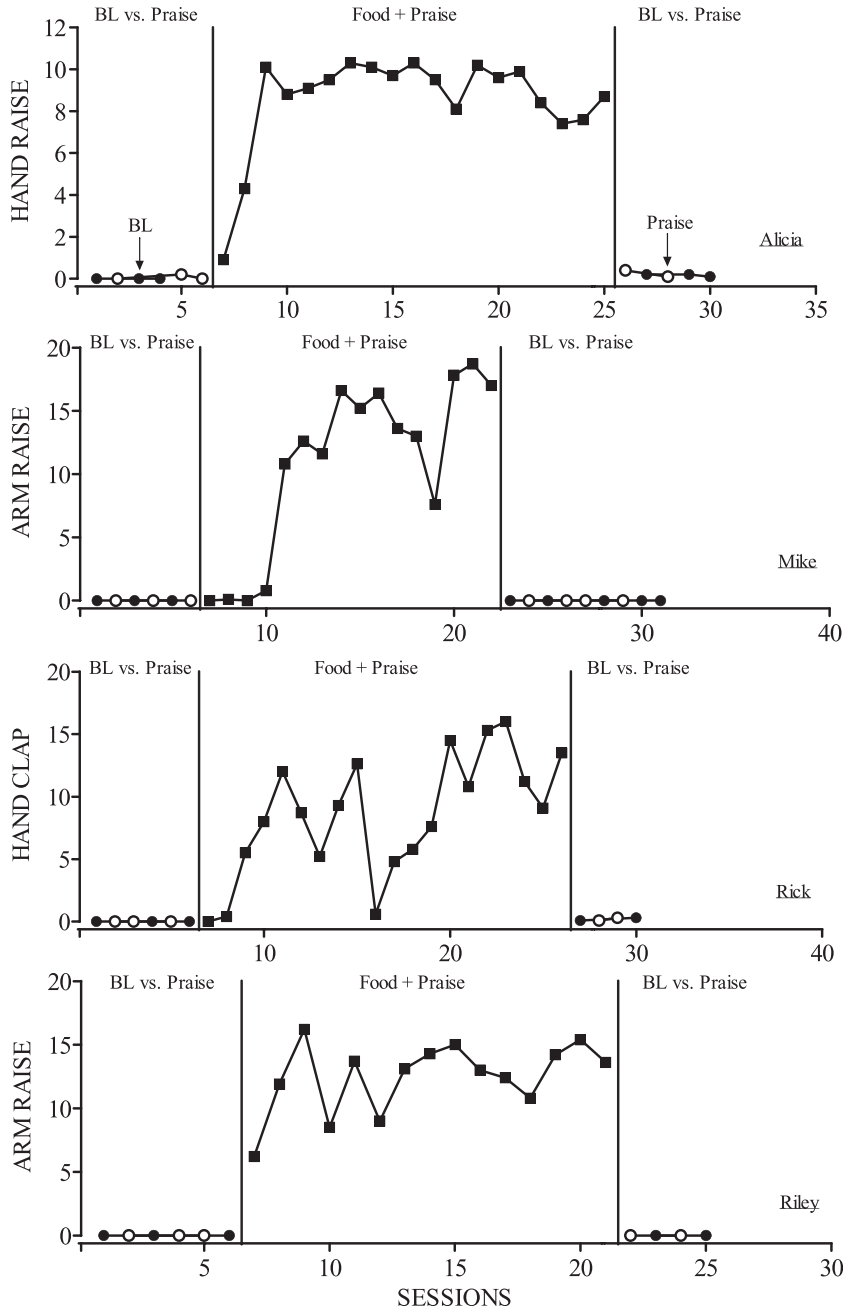

Figure 2. Responses per minute of target responses across baseline, praise, and food plus praise conditions of the response–stimulus pairing procedure for Alicia, Mike, Rick, and Riley (Study 2).

again when praise was reinstated. These results were replicated for a third target response (R3).

The bottom three panels of Figure 3 show the results obtained for Chris, Eric, and Shari. For all three subjects, zero or low rates of responding occurred during baseline and praise conditions for Target Response 1 (hand clap for Chris, arm raise for Eric and Shari). In the next

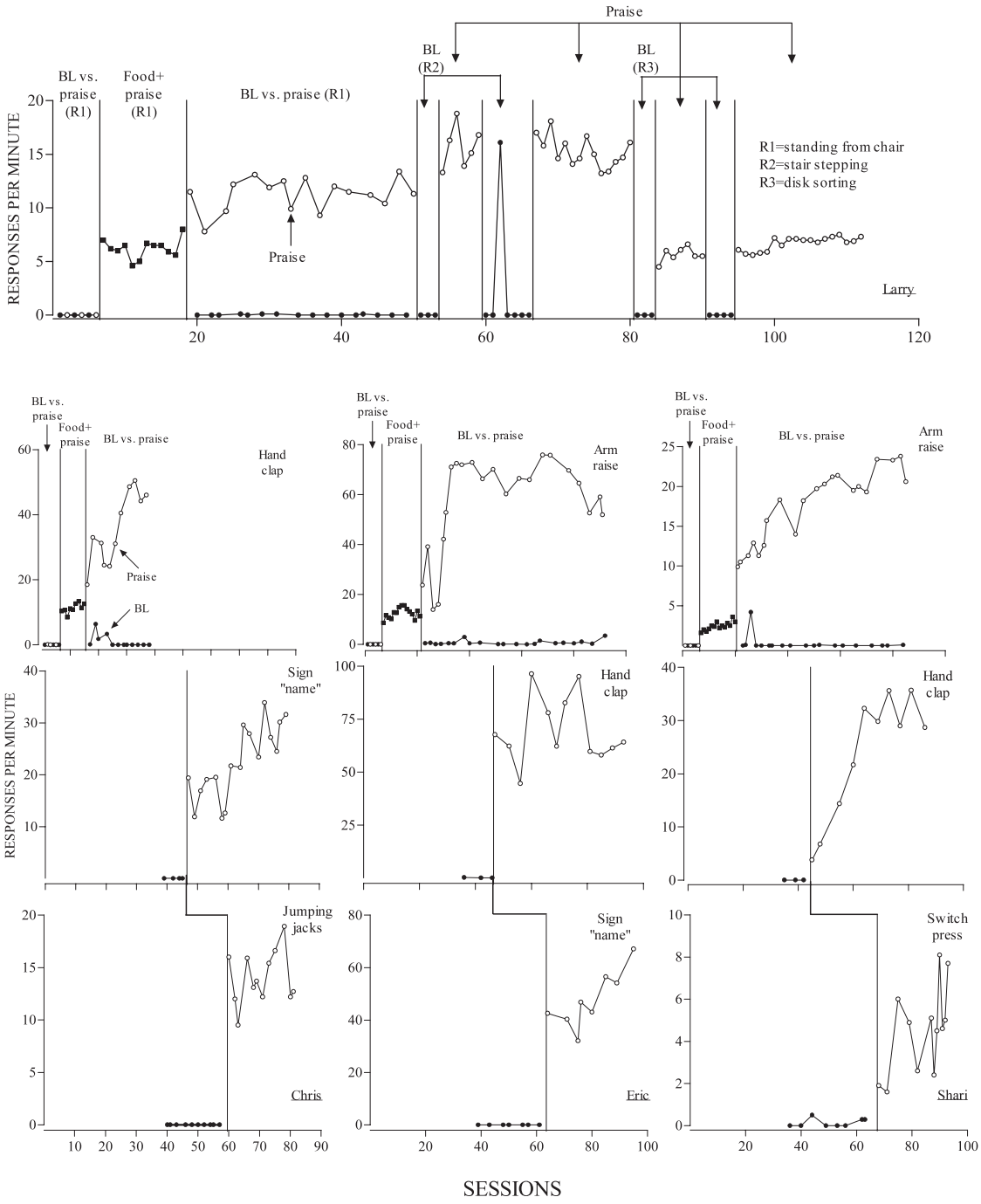

Figure 3. Responses per minute of Target Response 1 across baseline, praise, and food plus praise conditions and Target Responses 2 and 3 across baseline and praise conditions of the response–stimulus pairing procedure for Larry, Chris, Eric, and Shari (Study 2).

phase, increases in responding occurred for all three subjects when food and praise were paired contingent on the target response. In the return to baseline versus praise condition, responding for all three subjects decreased to low levels under the baseline condition but was maintained at high levels under the praise condition. Subsequently, two additional target responses were increased for each subject with the delivery of response-contingent praise. Specifically, responding occurred at low rates under baseline conditions and increased when praise was delivered contingent on responding.

The results of Study 2 indicate that praise initially (before the conditioning procedure) did not function as a reinforcer for responding of any of the eight subjects. However, after implementation of response–stimulus pairing, responding was maintained under praise alone for four subjects. In addition, praise was effective in increasing the occurrence of additional target responses for these individuals. Overall, results indicate that response–stimulus pairing may be useful in conditioning praise as a reinforcer and that, once established as a reinforcer, the effects of praise may extend to other responses.

GENERAL DISCUSSION

We evaluated two relatively simple procedures that involved pairing previously neutral praise statements with primary reinforcers. Results indicated that stimulus pairing (Study 1) did not establish praise as a reinforcer, whereas response–stimulus pairing (Study 2) effectively established praise as a reinforcer for four of the eight subjects. Furthermore, with subjects for whom response–stimulus pairing was effective, praise also functioned as a reinforcer for other responses that did not have a history with contingent food or contingent food plus praise.

Given previous and current discussions among basic researchers regarding the explanatory value of conditioned reinforcement, it is important to discuss the results of our study in that context. Results for the four subjects in Study 2, for whom response–stimulus pairing was effective, provide support for conditioned reinforcement as a basic principle (i.e., the response-strengthening effects of conditioned reinforcers that are similar to those of primary reinforcers) and are consistent with data from similar studies in basic research. This is noteworthy in light of recent evidence in the basic literature suggesting that conditioned reinforcers do not function as response-strengthening stimuli similar to primary reinforcers (Fantino & Romanowich, 2007; Shahan & Podlesnik, 2008). In fact, some of our data are consistent with this notion because thousands of pairings of praise with primary reinforcers did not result in praise functioning as a reinforcer in the absence of primary reinforcers for any of the subjects in Study 1 and for half of those in Study 2. At a more conceptual level, some have suggested that stimuli function as reinforcers only to the extent that they are discriminative for a reduction in the delay to primary reinforcement (Fantino, 1977). Others have suggested that, although stimuli that are paired with primary reinforcers may maintain responding, the stimulus is not a conditioned reinforcer, but rather is a discriminative stimulus for a molar relation between overall response rate and rate of primary reinforcement (Davison & Baum, 2006).

Results from Study 2 showed that for some subjects, praise acquired response-strengthening properties that continued to be effective under conditions of extinction and for strengthening a new response. These results are not consistent with the current conceptualization of conditioned reinforcement or previous results that used a similar conceptualization in basic research. One explanation is that there are numerous differences between basic and applied research, including the subjects, responses, stimuli, experimental versus naturalistic histories, and experimental procedures. For example,

the neutral stimuli used in our study with human subjects were not truly novel. Although we used statements that subjects had not heard previously, they resembled consequences (spoken words) that subjects had experienced throughout their lifetimes. In addition, it is difficult to separate the effects of praise and other forms of attention (e.g., voice tone, eye contact, posture, facial expressions) for which subjects likely had significant histories.

The applied implication of our data is that response–stimulus pairing may be a viable procedure for conditioning praise as a reinforcer. The behavior of some individuals is not sensitive to praise or other forms of attention as a reinforcer (Lovaas et al., 1966; Miller & Drennen, 1970), which often results in long-term reliance on edible or other material items as sources of reinforcement. Although these reinforcers produce behavior change, it is important to establish praise as a reinforcer for several reasons: (a) Praise is easier to administer than edible items and some leisure items, (b) it is less likely to interfere with ongoing behaviors compared to other stimuli, and (c) it is used as a consequence in numerous everyday contexts and by many people. The present data suggest one way to achieve that result.

It is important to note that our studies were not designed to be a direct comparison between procedures; rather, we were interested in the extent to which either produced positive results. Thus, it is possible that differences across subjects or procedures may have accounted for some difference in effectiveness. Nevertheless, the results are noteworthy in light of the fact that the procedures were similar except for one important feature. That is, both procedures involved pairings of praise and food on a relatively dense schedule; however, the key difference was that the paired stimuli were delivered in the absence of a contingency for any target response under the stimulus-pairing arrangement but were contingent on a response under the response–stimulus pairing arrangement. Thus, it is possible that an important aspect of pairing for conditioning praise may be the presence of a contingency between a response and its consequences. Future researchers should compare the procedures directly, especially in light of the lack of experimental effects (for some subjects) with both pairing methods.

The procedures and results of Studies 1 and 2 extend those of Theobold and Paul (1976) by programming a history of pairing and showing that this history influences responding under contingent praise conditions. This finding raises the question of whether conditioning would be more likely to occur (or would occur more rapidly) when paired stimuli are delivered contingent on the response that is later tested under extinction (i.e., the removal of food and the continued delivery of praise) or if it would be equally effective to deliver the paired stimuli contingent on one response and test whether a different response would be acquired under praise-only conditions. Although results for four subjects (Larry, Chris, Eric, and Shari) in Study 2 suggest that providing a history of pairings contingent on one response resulted in the acquisition of additional responses, it is unclear whether this would have occurred if the initial target response had not been tested first.

Although results of Study 1 suggest that stimulus pairing did not condition praise as a reinforcer, it is possible that the procedure might have been effective under different conditions. Given the lack of engagement in the target response by Jill, Lily, and Bill in Study 1, it is possible that other variables may have impeded conditioning of praise as a reinforcer. First, it is possible that responding did not occur because subjects were unable to engage in the response; however, presession prompts suggested that all subjects were able to engage in the target response. Second, it is possible that the edible items used in Study 1 did not function as effective reinforcers for the target responses used in Study 1, and therefore, were unlikely to produce a conditioned rein-

forcement effect when paired with neutral stimuli. However, these subjects subsequently participated in other evaluations in which food served as a reinforcer for these particular responses (data available from the first author). Finally, it is possible that stimulus pairing required more pairings to be effective. However, given that over 1,000 pairings were provided for each subject in Study 1, it seems unlikely that a larger number would be very practical. Different methods of stimulus pairing also may have been more effective in conditioning praise as a reinforcer. We scheduled pairings once every 15 s; perhaps less predictable schedules (i.e., variable-time schedules) would be more effective. Continuous access to food items during sessions in which praise was delivered (or vice versa) would allow a different sort of pairing than discretely paired deliveries. Finally, pairing praise with many different types of reinforcers (i.e., leisure items and a larger variety of foods) may have resulted in conditioning praise as a reinforcer.

It is possible that the number of praise statements used as neutral stimuli may have affected the results of the pairing procedures in Studies 1 and 2. For example, using one praise statement rather than 10 different praise statements may have produced different effects because the number of pairings with each of 10 praise statements was considerably lower than it would have been had we used fewer (or only one) praise statements. However, we included numerous praise statements to decrease the likelihood that subjects would habituate or satiate to praise during the study.

We examined only two procedures for conditioning reinforcers in this study because they were based on pairing and were very similar. Results of other research suggest that reinforcement-schedule manipulation may represent another way to condition reinforcers. For example, Hopkins (1968) and Kale et al. (1968) described a procedure that involved pairing praise statements with an already established reinforcer (e.g., food or toys) and then gradually thinning the schedule of reinforcement for the established reinforcer. Hopkins showed that attention was not effective in maintaining a young boy's smiling, which was increased initially by the delivery of candy. The experimenters transferred control of smiling to adult interaction by pairing this interaction with candy (contingent on smiling) and then gradually thinning the schedule of candy reinforcement until candy was no longer delivered. Results showed that smiling eventually was maintained under social reinforcement when the schedule of candy delivery was thinned. Studies in which this procedure was used to establish social consequences as a reinforcer did not determine whether these social consequences were already established reinforcers and whether the procedures employed resulted in praise becoming a reinforcer.

Another method is based on the hypothesis that social stimuli maintain responding after being paired with other reinforcers because the social stimuli acquire discriminative properties. For example, Lovaas et al. (1966) first established the word "good" as discriminative for approaching an experimenter by delivering an edible item when approach occurred in the presence of "good." After "good" was established as a discriminative stimulus, the experimenters examined responding on a lever press under two different conditions. During both conditions, lever presses resulted in the delivery of "good." During one condition, the discriminative properties of "good" were maintained ("good" continued to serve as a discriminative stimulus for the delivery of food on a separate and intermittent schedule). During the second condition, however, the discriminative properties of "good" were extinguished ("good" was no longer presented as a discriminative stimulus for food, but food continued to be delivered on an intermittent schedule). Results of this comparison indicated that lever presses were maintained for many sessions under the condition in which the discriminative properties of "good" were maintained; however,

responding eventually extinguished when the discriminative properties were removed.

Most textbooks on applied behavior analysis indicate that conditioned reinforcers are established by simply providing an individual with a history of pairings with primary or already established reinforcers (e.g., Cooper, Heron, & Heward, 2007; Kazdin, 2008; Miltenberger, 2012). This process is typically described as an inevitable one, and very few details are provided. Data from this study indicate that the process is more complicated than a matter of simple pairing, and it is unclear that the outcome is one in which praise actually functions as a conditioned reinforcer. Continued study of the conditions under which praise and other social consequences can be established as reinforcers will provide practical techniques for increasing susceptibility to social reinforcers and will allow us to learn more about how social consequences such as praise are established and maintained as reinforcers for human behavior in general.

REFERENCES

Barton, E. J. (1981). Developing sharing: An analysis of modeling and other behavioral techniques. *Behavior Modification*, *5*, 386–398. doi:10.1177/014544558153007

Bijou, S. W., & Baer, D. M. (1961). *Child development: Vol. 1. A systematic and empirical theory*. New York, NY: Appleton-Century-Crofts. doi:10.1037/11139-000

Bijou, S. W., & Baer, D. M. (1965). *Child development: II. Universal stage of infancy*. New York, NY: Appleton-Century-Crofts.

Brophy, J. (1981). Teacher praise: A functional analysis. *Review of Educational Research, 51,* 5–32. doi:10.3102/00346543051001005

Brown, K. M., Willis, B. S., & Reid, D. H. (1981). Differential effects of supervisor verbal feedback and feedback plus approval on institutional staff performance. *Journal of Organizational Behavior Management*, *3*, 57–68. doi:10.1300/J075v03n01_05

Catania, A. C. (1998). *Learning* (4th ed.). Upper Saddle River, NJ: Prentice Hall.

Chadwick, B. A., & Day, R. C. (1971). Systematic reinforcement: Academic performance of underachieving students. *Journal of Applied Behavior Analysis*, *4*, 311–319. doi:10.1901/jaba.1971.4-311

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

Davison, M., & Baum, W. M. (2006). Do conditional reinforcers count? *Journal of the Experimental Analysis of Behavior*, *86*, 269–283. doi:10.1901/jeab.2006.86-269

DiCarlo, C. F., & Reid, D. H. (2004). Increasing pretend toy play of toddlers with disabilities in an inclusive setting. *Journal of Applied Behavior Analysis*, *37*, 197–207. doi:10.1901/jaba.2004.37-197

Dorow, L. G. (1980). Generalization effects of newly conditioned reinforcers. *Education and Training of the Mentally Retarded*, *15*, 8–14.

Drennen, W., Gallman, W., & Sausser, G. (1969). Verbal operant conditioning of hospitalized psychiatric patients. *Journal of Abnormal Psychology*, *74*, 454–458. doi:10.1037/h0027829

Duffy, A., & Nietupski, J. (1985). Acquisition and maintenance of video game initiation, sustaining and termination skills. *Education and Training of the Mentally Retarded*, *20*, 157–162.

Ebner, E. (1965). Verbal conditioning in schizophrenia as a function of degree of social interaction. *Journal of Personality and Social Psychology*, *5*, 528–532. doi:10.1037/h0021765

Egel, A. L. (1980). The effects of constant vs. varied reinforcer presentation on responding by autistic children. *Journal of Experimental Child Psychology*, *30*, 455–463. doi:10.1016/0022-0965(80)90050-8

Egel, A. L. (1981). Reinforcer variation: Implications for motivating developmentally disabled children. *Journal of Applied Behavior Analysis*, *14*, 345–350. doi:10.1901/jaba.1981.14-345

Fantino, E. (1977). Conditioned reinforcement. In W. K. Honig & J. E. R. Staddon (Eds.), *Handbook of operant behavior* (pp. 313–339). Englewood Cliffs, NJ: Prentice Hall.

Fantino, E., & Romanowich, P. (2007). The effect of conditioned reinforcement rate on choice: A review. *Journal of the Experimental Analysis of Behavior*, *87*, 409–421. doi:10.1901/jeab.2007.87-409

Fisher, W., Piazza, C. C., Bowman, L. G., Hagopian, L. P., Owens, J. C., & Slevin, I. (1992). A comparison of two approaches for identifying reinforcers for persons with severe and profound disabilities. *Journal of Applied Behavior Analysis*, *25*, 491–498. doi:10.1901/jaba.1992.25-491

Gollub, L. (1977). Conditioned reinforcement. In W. K. Honig & J. E. R. Staddon (Eds.), *Handbook of operant behavior* (pp. 288–312). Englewood Cliffs, NJ: Prentice Hall.

Hagopian, L. P., Wilson, D. M., & Wilder, D. A. (2001). Assessment and treatment of problem behavior maintained by escape from attention and access to tangible items. *Journal of Applied Behavior Analysis*, *34*, 229–232. doi:10.1901/jaba.2001.34-229

Hall, R. V., Lund, D., & Jackson, D. (1968). Effects of teacher attention on study behavior. *Journal of*

Applied Behavior Analysis, *1*, 1–12. doi:10.1901/jaba.1968.1-1

Hopkins, B. L. (1968). Effects of candy and social reinforcement, instructions, and reinforcement schedule leaning on the modification and maintenance of smiling. *Journal of Applied Behavior Analysis*, *1*, 121–129. doi:10.1901/jaba.1968.1-121

Kale, R. J., Kaye, J. H., Whelan, P. A., & Hopkins, B. L. (1968). The effects of reinforcement on the modification, maintenance, and generalization of social responses of mental patients. *Journal of Applied Behavior Analysis*, *1*, 307–314. doi:10.1901/jaba.1968.1-307

Kazdin, A. E. (2008). *Behavior modification in applied settings* (6th ed.). Log Grove, IL: Waveland.

Keilitz, I., Tucker, D. J., & Horner, R.D. (1973). Increasing mentally retarded adolescents' verbalizations about current events. *Journal of Applied Behavior Analysis*, *6*, 621–630. doi:10.1901/jaba.1973.6-621

Kelleher, R. T. (1966). Conditioned reinforcement in second-order schedules. *Journal of the Experimental Analysis of Behavior*, *9*, 475–485. doi:10.1901/jeab.1966.9-475

Kelleher, R. T., & Gollub, L. R. (1962). A review of positive conditioned reinforcement. *Journal of the Experimental Analysis of Behavior*, *5*, 543–597. doi:10.1901/jeab.1962.5-543

Keller, F. S., & Schoenfeld, W. N. (1950). *Principles of psychology: A systematic text in the science of behavior*. East Norwalk, CT: Appleton-Century-Crofts. doi:10.1037/11293-000

Levin, G. R. (1962). Response to food and praise by emotionally disturbed boys. *Psychological Reports, 11,* 539–546. doi:10.2466/pr0.1962.11.539

Levin, G. R., & Simmons, J. J. (1962). Response to praise by emotionally disturbed boys. *Psychological Reports*, *11*, 10. doi:10.2466/pr0.1962.11.1.10

Lovaas, O. I., Freitag, G., Kinder, M. I., Rubenstein, B. D., Schaeffer, B., & Simmons, J. Q. (1966). Establishment of social reinforcers in two schizophrenic children on the basis of food. *Journal of Experimental Child Psychology*, *4*, 109–125. doi:10.1016/0022–0965(66)90011-7

Mazur, J. E. (1998). *Learning and behavior* (4th ed.). Upper Saddle River, NJ: Prentice Hall.

McLaughlin, T. F. (1982). The effects of teacher praise on accuracy of math performance for an entire special education classroom. *Behaviorally Engineering*, *7*, 81–86.

Miller, P. M., & Drennen, W. T. (1970). Establishment of social reinforcement as an effective modifier of verbal behavior in chronic psychiatric patients. *Journal of Abnormal Psychology*, *76*, 392–395. doi:10.1037/h0030400

Miltenberger, R. G. (2012). *Behavior modification: Principles and procedures* (5th ed.). Belmont, CA: Wadsworth.

Shahan, T. A., & Podlesnik, C. A. (2008). Conditioned reinforcement value and resistance to change. *Journal of the Experimental Analysis of Behavior*, *89*, 263–298. doi:10.1901/jeab.2008.89-263

Sigafoos, J., Doss, S., & Reichle, J. (1989). Developing mand and tact repertoires in persons with severe developmental disabilities using graphic symbols. *Research in Developmental Disabilities*, *10*, 183–200. doi:10.1016/0891–4222(89)90006-1

Skinner, B. F. (1938). *The behavior of organisms: An experimental analysis*. New York, NY: Appleton-Century-Crofts.

Skinner, B. F. (1953). *Science and human behavior*. New York, NY: The Free Press.

Stahl, J. R., Thomson, L. E., Leitenberg, H., & Hasazi, J. E. (1974). Establishment of praise as a conditioned reinforcer in socially unresponsive psychiatric patients. *Journal of Abnormal Psychology*, *83*, 488–496. doi:10.1037/h0037103

Strain, P. S., & Timm, M. A. (1974). An experimental analysis of social interaction between a behaviorally disordered preschool child and her classroom peers. *Journal of Applied Behavior Analysis*, *7*, 583–590. doi:10.1901/jaba.1974.7-583

Taylor, J. C., & Carr, E. G. (1992). Severe problem behaviors related to social interaction. *Behavior Modification*, *16*, 305–335. doi:10.1177/01454455920163002

Theobold, D. E., & Paul, G. L. (1976). Reinforcing value of praise for chronic mental patients as a function of historical pairing with tangible reinforcers. *Behavior Therapy*, *7*, 192–197.

Wikoff, M., Anderson, D. C., & Crowell, C. R. (1983). Behavior management in a factory setting: Increasing work efficiency. *Journal of Organizational Behavior Management*, *4*, 97–127. doi:10.1300/J075v04n01_04

Williams, B. A. (1994). Conditioned reinforcement: Experimental and theoretical issues. *The Behavior Analyst*, *17*, 261–285.

Zimmerman, D. W. (1957). Durable secondary reinforcement: Method and theory. *Psychological Review*, *64*, 373–383. doi:10.1037/h0041885

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