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EVALUATION OF CLIENT PREFERENCE FOR FUNCTION-BASED TREATMENT PACKAGES

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Functional communication training (FCT) and noncontingent reinforcement (NCR) are commonly prescribed treatments that are based on the results of a functional analysis. Both treatments involve delivery of the reinforcer that is responsible for the maintenance of destructive behavior. One major difference between the two treatment procedures is that client responding determines reinforcement delivery with FCT (e.g., reinforcement of communication is delivered on a fixed-ratio 1 schedule) but not with NCR (e.g., reinforcement is delivered on a fixed-time 30-s schedule). In the current investigation, FCT and NCR were equally effective in reducing 2 participants' destructive behavior that was sensitive to attention as reinforcement. After the treatment analysis, the participants' relative preference for each treatment was evaluated using a modified concurrent-chains procedure. Both participants demonstrated a preference for the FCT procedure. The results are discussed in terms of treatment efficacy and preference for control over when reinforcement is delivered. In addition, a method is demonstrated in which clients with developmental disabilities can participate in selecting treatments that are designed to reduce their destructive behavior.

DESCRIPTORS: concurrent-chains procedure, concurrent operants, developmental disabilities, functional communication training, noncontingent reinforcement, choice

Identification of environmental variables that maintain problem behavior via functional analysis methods (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994) has enabled clinicians to design effective individualized treatments to reduce the problem behavior of clients with developmental disabilities. Functional communication training (FCT) (Carr & Durand, 1985; Fisher et al., 1993; Horner & Day, 1991; Wacker et al., 1990) and noncontingent reinforcement (NCR) (Hagopian, Fisher, & Legacy, 1994; Vollmer, Iwata, Zarcone, Smith, & Mazaleski, 1993) are two commonly prescribed treatments. During functional communication training, the reinforcer identified as maintaining the problem behavior is delivered contingent upon an alternative (communicative) response. During noncontingent reinforcement, the reinforcer identified as maintaining the problem behavior is delivered on a time-based schedule, independent of an individual's responding. Both procedures typically involve an extinction component in which destructive behavior no longer produces the identified reinforcer. When a clinician is choosing between FCT and NCR (or other interventions), three variables that may be important to consider are treatment practicality, efficacy, and social acceptability (or consumer preference).

Vollmer et al. (1993) suggested that NCR may be easier to implement than differential reinforcement (DR) procedures because the individual's behavior has to be closely monitored in order to deliver reinforcement at

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the appropriate time with DR treatments. However, FCT may transfer to and be maintained in novel environments because the participant is taught to emit a response that could be recognized and reinforced by individuals who are not trained in the treatment procedure (Durand & Carr, 1991). In general, practical considerations that may impinge upon treatment selection may often be idiosyncratic and vary from one clinical situation to another. For example, Hagopian et al. (1994) selected NCR as a treatment for attention-maintained destructive behavior with a set of identical quadruplets because it was more practical for the parents to deliver attention on a time-based schedule rather than each time 1 of the 4 children requested it.

When we consider treatment efficacy as a factor in choosing between FCT and NCR, one potential advantage of FCT is that reinforcement is delivered when, and only when, the client requests it. That is, with FCT, the reinforcer that is responsible for behavioral maintenance is delivered contingent upon communication, but, with NCR, reinforcement is delivered on a time-based scheduled independent of client responding. This difference between the two treatments, response-dependent and response-independent reinforcement delivery, is said to give the client control over reinforcement delivery with FCT but not with NCR (Carr & Durand, 1985; Kahng, Iwata, DeLeon, & Worsdell, 1997). Carr and Durand have suggested that this variable, control over reinforcement, may contribute to the effectiveness of FCT. However, the importance of control over reinforcement remains in question, given that (a) both FCT and NCR have generally produced rapid and dramatic reductions in problem behavior (Carr & Durand, 1985; Vollmer et al., 1993), and (b) the two investigations that have directly examined the effects of reinforcement control have produced conflicting results (Kahng et al., 1997; Wacker et al., 1990).

Few if any studies have examined the social acceptability of or consumer preferences for either FCT or NCR. Most investigations on this topic have used indirect measures (e.g., rating scales) to assess the social acceptability of behavioral interventions used with persons with developmental disabilities (see Miltenberger, 1990, for a review). In general, the opinions of caregivers (e.g., parents, school personnel) rather than those of the individual who receives behavioral treatment have been assessed with these measures. One notable exception was a study in which individuals with mental retardation completed a simplified rating scale designed to assess the social acceptability of DR and time-out procedures (Miltenberger, Suda, Lennox, & Lindeman, 1991). However, such an approach would not be applicable to individuals with severe to profound levels of retardation who have limited communication skills. Schwartz and Baer (1991) pointed out that having a client choose a given treatment is the decisive measure of a program's social validity.

One potential method for directly assessing social acceptability or consumer preference with the individual receiving behavioral treatment would be to present the treatment alternatives in a choice paradigm using a concurrent-chains procedure. This procedure has been demonstrated to be an effective method for evaluating preference for different types or schedules of reinforcement (e.g., Catania & Sagvolden, 1980; Herrnstein, 1964). In typical procedures, two responses (e.g., two keys) are concurrently available and associated with identical but independent schedules of reinforcement during initial links. Different schedules or types of reinforcement in the terminal links are obtained by responding on the different operants in the initial links. The relative response rates in the initial links are a direct

measure of the individual's relative preferences for the schedules that are presented in the terminal links (Catania, 1992).

The purpose of the current investigation was to evaluate the effectiveness of two function-based treatments, NCR and FCT, for 2 clients whose destructive behavior was sensitive to adult attention as reinforcement. Following a demonstration of the effectiveness of the two treatments, we used a modification of a concurrent-chains procedure (Herrnstein, 1964) to evaluate the client's preference for the two treatments.

METHOD

Participants

Two individuals with severe behavior problems were admitted to an inpatient unit specializing in the assessment and treatment of destructive behavior. Tony was a 4-year-old boy who had been diagnosed with cerebral palsy and a seizure disorder. His destructive behavior interfered with formal testing; therefore, his cognitive level was unknown. He had been diagnosed in the past with learning and speech delays. His destructive behavior included aggression (hitting, kicking, pushing, pinching, hair pulling, scratching, and face grabbing) and disruption (throwing objects, banging walls, tearing or breaking objects). He could follow simple one- and two-step instructions and ambulated without assistance. Carla was an 8-year-old girl who had been diagnosed with mild mental retardation, attention deficit disorder, oppositional defiant disorder, seizure disorder, and translocation of the fourth chromosome. Carla's destructive behavior included aggression (hitting, kicking, pinching, scratching, biting, and throwing objects at people) and disruption (banging on surfaces, throwing objects, and swiping objects off surfaces). Carla could communicate verbally, but because of articulation problems, her oral communication was sometimes unintelligible. Carla was ambulatory and could follow simple one- and two-step instructions.

Phase 1: Functional Analysis

Design, Setting, and Procedure

A functional analysis was conducted with both participants. A multielement design was used to assess target behaviors across four conditions: social attention, demand, tangible, and toy play (Iwata et al., 1982/1994). Sessions were 10 min long and were conducted in a random order for each client. Sessions were conducted in an individual treatment room (3 m by 3 m) equipped with a one-way mirror.

During social attention sessions, the client was given toys and was instructed to play. The therapist presented social attention in the form of a brief verbal reprimand contingent upon target destructive responses. All other responses were ignored. During the demand session, the therapist used sequential verbal, gestural, and physical prompts every 10 s until the client either complied with the request or engaged in a destructive behavior. If the client complied with the request following a verbal or gestural prompt, he or she received praise from the therapist. If the client displayed destructive behavior, the therapist terminated the instruction and removed the task materials for 30 s (i.e., the client was permitted to escape the demand). A combination of academic and self-care tasks were presented to Tony, and academic tasks were presented to Carla. During tangible sessions, the client was allowed to play with preferred activities or items for 2 min prior to the start of the session. The preferred objects were automobile magazines and toy cars for Tony and television for Carla. When the session began, the therapist withdrew the preferred objects (Tony) or terminated the activity (Carla). Following each occurrence of destructive behavior, the ther-

apist resumed the activity (Carla) or returned the items (Tony) for 30 s. All other responses were ignored. During toy play, the therapist played with the client and delivered social attention once every 30 s contingent on the first 5-s period in which the targeted destructive behavior did not occur.

For Carla, additional functional analysis sessions were conducted because the results of the multielement analysis were unclear. We believed that the rapidly alternating conditions in the multielement design may have interfered with the establishment of discriminative control over Carla's destructive behavior. Therefore, a sequential pairwise analysis was conducted in which each test condition was compared to the toy-play condition (Iwata, Duncan, Zarcone, Lerman, & Shore, 1994). The pairwise method was used to facilitate the discriminatibility of the conditions and to control for the possibility of multiple treatment interference as a result of the multielement design. The conditions during the pairwise comparisons were identical to those of the multielement analysis except that different tangible items (books and photographs) were used. The tangible items were changed because we observed that Carla engaged in destructive behavior on the living unit when these items were removed.

Data Collection, Target Behavior, and Interrater Agreement

During all functional analysis sessions, trained observers used laptop computers to record the frequency of destructive behaviors. Destructive behaviors were aggression and disruption (as defined above). Two observers scored destructive responses simultaneously but independently during 57% of the sessions for Tony and 69% of the sessions for Carla. Agreement coefficients were calculated by partitioning each session into 10-s intervals and dividing the number of exact agreements on the occurrence of behavior by the sum of agreements plus disagreements multiplied by 100%. Mean exact agreement for destructive behavior was 93% for Tony and 97% for Carla.

Phase 2: Evaluation of FCT and NCR Treatments

Design, Setting, and Procedure

The effects of FCT and NCR on the attention-maintained destructive behavior of both clients were evaluated via a combination multielement and ABAB design. Phase A, baseline, was followed by Phase B, the simultaneous assessment of the two treatments (FCT and NCR). A return to baseline and a subsequent return to the simultaneous treatment evaluation were conducted. Approximately three to five sessions were conducted per session block (six to 10 sessions per day). A 5-min break occurred between each session. All sessions were conducted in an individual treatment room (3 m by 3 m) equipped with a one-way mirror.

Baseline. The baseline condition was similar to the social attention condition of the functional analysis. The client was given toys and was instructed to play. Contingent on destructive behavior, the therapist delivered approximately 20 s of attention in the form of verbal reprimands (e.g., "don't do that"). All other responses were ignored.

FCT training trials. Following baseline but prior to the simultaneous comparison of FCT and NCR treatment procedures, training trials were conducted to teach the clients alternative responses that would result in access to adult attention. The alternative behaviors for Tony were verbal responses that included saying the therapist's name or saying, "play with me." The alternative response for Carla was giving a card (12 cm by 12 cm) to the therapist. The communicative responses were selected based on the individual's expressive language abilities and the advice of the consulting speech pathologist.

Three 10-min training sessions were conducted with Tony and eight 10-min training sessions were conducted with Carla to teach the alternative responses. In Tony's first training session, the therapist verbally prompted Tony to emit either of the two communicative phrases to request attention every 30 s, and destructive behavior no longer produced attention (extinction). Tony independently communicated for attention throughout the following two training sessions. For Carla, the training consisted of a backward chaining procedure in which she was physically guided to give the card to the therapist, and attention was delivered for 20 s. No differential consequence was provided for destructive behavior (extinction). The amount of guidance provided to Carla to emit the communicative response was decreased to a verbal prompt over the course of three training sessions. Subsequently, the verbal prompting was eliminated and Carla independently communicated for attention throughout the last two training sessions.

Treatment comparison. The stimulus materials included in the treatment sessions were the same as those described for baseline (i.e., a therapist, chair, and toys were available). During the FCT treatment sessions, the client was placed in a room with the same toys as in baseline, the communication card (Carla only), and a therapist. In addition, a blue laminated poster board (80 cm by 52 cm for Tony and 30 cm by 22 cm for Carla) was placed on the wall during the FCT treatment sessions. This item was included in an attempt to establish an association with a salient stimulus (blue poster board) and the session contingencies (reinforcement of a communicative response). If the client emitted the communication response (i.e., saying the therapist's name or "play with me" for Tony and handing the card to the therapist for Carla), the therapist delivered 20 s of attention (verbal praise and interactive play). If the client engaged in destructive behavior, no differential consequence occurred (i.e., extinction).

During NCR sessions, the stimulus conditions were similar to those described for the FCT sessions with two exceptions: The communication card was not available (Carla only) and a red laminated poster board (80 cm by 52 cm for Tony and 30 cm by 22 cm for Carla) was placed on the wall. The red poster board was included in an attempt to establish an association with a salient stimulus and the session contingencies (the noncontingent delivery of attention). Destructive and communicative responding resulted in no differential consequences. The therapist delivered 20 s of attention (verbal praise and interactive play) on a time-based schedule independent of the client's behavior. The schedule of reinforcement in the NCR sessions was yoked to the preceding FCT session.

During the FCT sessions, a data collector recorded the occurrence of each communicative response on a sheet that was partitioned into 60 10-s intervals. During NCR sessions, the 20 s of attention was delivered at the approximate times (in the same intervals) that attention was requested in the previous FCT session. This procedure resulted in the same amount and temporal distribution of reinforcement delivered during FCT and NCR sessions.

Data Collection, Target Behavior, and Interrater Agreement

During all treatment analysis sessions, trained observers used laptop computers to record the frequency of destructive behaviors. The frequency of communication responses (saying the therapist's name or "play with me" for Tony and handing the card to the therapist for Carla) were recorded during all treatment analysis sessions for Tony and only during FCT sessions for Carla (Carla could not emit the communication response in baseline or NCR because the card was not

available). For both clients, destructive behaviors were aggression and disruption, as described above. For the treatment analysis, biting was added to Carla's definition of aggression because this behavior had been observed on the unit after the functional analysis. Two independent observers scored communicative and destructive responses simultaneously but independently during 50% of the sessions for Tony and 45% of the sessions for Carla. Mean exact agreement for destructive behavior was 97.6% and 94% and for communication responses was 94.6% and 99.4% for Tony and Carla, respectively.

Phase 3: Evaluation of Client Preference

Design, Setting, and Procedure

Each client's relative preference for treatment was evaluated using a modified concurrent-chains procedure (concurrent-operants arrangement). In most concurrent-chains experiments, equal and independent schedules are arranged for two operants in the initial links. In this paradigm, responding for the different operants results in access to different schedules in the terminal links. This procedure has been used most often to evaluate preference for different types or schedules of reinforcement, because responding to produce access to the terminal links (reinforcing effectiveness of the terminal links) is separated from the contingencies that maintain responding in the terminal links (Catania, 1992). Switch pressing was selected as the operant in the initial links in this investigation. Three treatment procedures (FCT, NCR, and extinction) were available in the terminal links. Switch pressing outside of the room (initial links) resulted in a 2-min period in the room (terminal links) in which the contingencies varied according to the switch that was pressed. The contingencies of the terminal links were conducted in an individual treatment room (3 m by 3 m) equipped with a one-way mirror. The contingencies of the initial links were conducted in areas located outside the door of the treatment room (unit play area for Carla and hospital hallway for Tony).

Training trials. Prior to the evaluation of treatment preference, training sessions exposed the participants to the different contingencies arranged for pressing each of the switches. Three switches (22 cm by 14 cm), each covered with a different colored piece of construction paper (blue, red, or white), were located on a table outside of a room. Each colored switch was paired with a different treatment contingency: the blue switch with FCT, the red switch with NCR, and the white switch with extinction. In the first training session, physical guidance was used to train the switch-pressing response. That is, the therapist stood behind the participant and physically guided him or her to press a switch. The order of switch pressing was determined randomly. Switch pressing resulted in the client entering the room, and the contingencies associated with the pressed switch were implemented for 2 min. For example, if the client was physically guided to press the red switch, he or she entered the room, and the NCR procedure was implemented for 2 min. After 2 min, the client exited the room and was positioned in front of the switches. This procedure was repeated until the client had been guided to press each of the switches three times and thus was exposed to the contingencies associated with each switch three times, for a total of 6 min of exposure to each set of contingencies. The stimulus materials included in the terminal links were the same as those described for baseline (i.e., therapist, chair, and toys). Colored poster boards corresponding to the treatment contingencies (blue for FCT, red

for NCR, and white for extinction) were posted in the terminal links.

In subsequent training sessions, the therapist stood behind the participant and verbally prompted the participant to press a switch once every 20 s if the participant did not press a switch independently. Pressing any switch resulted in immediate praise from the therapist (e.g., "Good pressing the red switch") and access to the terminal link. Simultaneous switch pressing was blocked. Training sessions continued until independent switch pressing (pressing any switch without verbal prompting) occurred during 85% of the trials. Training was completed in two 20-min sessions for Tony and five 20-min sessions for Carla.

Attempts were made to promote independent switch pressing and control for unplanned events that might bias a client toward pressing a given switch during the training and preference sessions. During all sessions, the therapist stood behind the client in the initial links so that the therapist would not make any inadvertent movements (e.g., eye contact with a switch) that might bias the client to press a particular switch. Therapists were trained to deliver the prompt ("Press the switch") in a neutral tone of voice. Praise for switch pressing was delivered for pressing any switch, and therapists were trained to deliver the praise statement in the same tone of voice for all switch pressing. Therapists were also trained to deliver attention in the FCT and NCR conditions in an identical manner. During each session, the same therapist implemented the FCT, NCR, and extinction contingencies to attempt to insure that the procedures were implemented similarly within a session and to control for the participant pressing a switch to obtain a particular therapist. However, different individuals served as therapists across sessions. The first author monitored the therapist's behavior during the sessions to attempt to insure that he or she performed consistently across sessions. After the participant pressed the switch and entered the room, the position of the switches was altered randomly because of potential effects of position preference. Finally, the materials present in the room (toys, chair) were the same for each treatment procedure.

Preference evaluation. Preference evaluation sessions were similar to training sessions. The colored switches were located on a table outside the room. Prior to the onset of the session, the client was physically guided to press each switch (red, blue, and white) once and to obtain the contingencies associated with each switch in the terminal links. This was done to insure that the client was exposed to the different contingency arrangements that operated in the terminal links. When the session began, the therapist stood behind the client and verbally prompted him or her to press a switch once every 20 s if the participant did not press a switch independently. Pressing any switch resulted in immediate praise (e.g., "Good pressing the red switch") and access to the terminal link. Simultaneous switch pressing was blocked, and the therapist provided no differential consequences for destructive or communicative behavior in the initial links. The stimulus materials included in the terminal links were the same as those described for baseline and training trials (i.e., therapist, chair, and toys). In addition, the corresponding colored poster boards (blue for FCT, red for NCR, and white for extinction) were posted in the terminal links. Each treatment preference session was 20 min in duration, allowing for a maximum of 10 switch presses per session.

In the initial links, the schedule was held constant at fixed-ratio (FR) 1 across the three switches and throughout all sessions. Switch pressing in the initial links resulted in a 2-min period in the terminal links in

which the contingencies in the room were implemented in accordance with the switch that was pressed. After 2 min, the client left the room and returned to the contingencies that operated in the initial links. Pressing the blue switch resulted in a 2-min period of FCT contingencies. In this terminal link, communication resulted in 20 s of attention (verbal praise and interactive play), and destructive behavior produced no differential consequence. Pressing the red switch resulted in a 2-min period of NCR. In this terminal link, no differential consequence was provided for destructive behavior, and attention (as described above) was delivered on a fixed-time schedule that was yoked to the previous 2-min period of FCT (as described for the previous treatment evaluation). That is, the client received the same amount of reinforcement at approximately the same time during the 2-min period of NCR as he or she had received in the previous 2-min period of FCT. The third switch (white) served as a control. Pressing the white switch resulted in a 2-min period of extinction contingencies in the terminal link in which attention was unavailable for all responding (i.e., the therapist did not deliver differential consequences for either destructive or communication responses).

Data Collection, Target Behavior, and Interrater Agreement

During all preference evaluation sessions, two trained observers independently recorded the frequency of switch presses using paper-and-pencil measures. An agreement coefficient was calculated for each participant's preference evaluation by dividing the smaller number by the larger number for each switch across sessions and multiplying by 100%. Interrater agreement was collected for 100% of the sessions. Agreement was 100% for Tony and 97% for Carla.

RESULTS

The results of the functional analyses for both participants are presented in Figure 1. Tony exhibited the highest rates of destructive behavior in the social attention condition (M = 18.6 responses per minute), suggesting that his destructive behavior was sensitive to attention as reinforcement. He engaged in lower rates of destructive behavior in the tangible (M = 1.0), demand (M = 1.0), and toy play (M = 0.01) conditions. Carla's rates of destructive behavior initially were low during all conditions of the multielement functional analysis until Session 23. At that point, rates of destructive behavior increased in the social attention and demand conditions (M = 4.5 and 4.3 for social attention and demand, respectively). She engaged in some destructive behavior in the tangible condition of the multielement functional analysis (M = 0.5) and near-zero rates of destructive behavior during the toy play condition (M = 0.1). During the sequential pairwise analysis, Carla consistently engaged in destructive behavior during social attention (M = 8.9), tangible (M = 2.1), and demand (M = 8.4) conditions and engaged in low rates of behavior during the toy play condition (M = 0.4). These results suggested that Carla's destructive behavior was sensitive to social attention, tangible items, and escape from task demands as reinforcement.

The results of the treatment analyses are presented in Figure 2. When communication resulted in no differential consequence and destructive behavior resulted in access to adult attention (baseline), Tony exhibited high rates of destructive behavior (Ms = 2.6 and 1.5) and near-zero levels of communicative responses (Ms = 0 and 0.06). During the FCT condition, when destructive behavior produced no differential consequences and communication resulted in access to adult attention, Tony exhibited

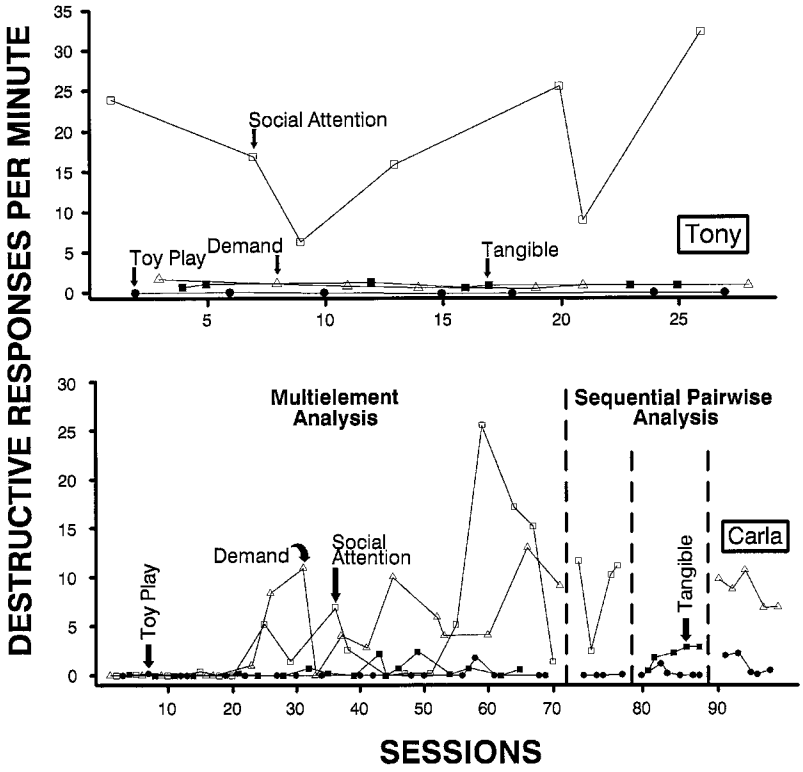

Figure 1. Number of destructive responses per minute during the functional analyses for Tony (top panel) and Carla (bottom panel).

near-zero levels of destructive behavior (*M*s = 0.03 and 0) and high levels of communicative behavior (*M*s = 1.8 and 1.8). During the NCR condition, when attention was provided on a time-based schedule and destructive behavior and communication resulted in no differential consequences, Tony exhibited near-zero levels of destructive behavior (*M*s = 0.1 and 0.2) and communicative behavior (*M*s = 0.03 and 0.2). Both treatment procedures substantially reduced destructive behavior from baseline levels (99% reduction with FCT and 92.7% reduction with NCR).

When Carla's destructive behavior resulted in access to adult attention (baseline), she exhibited high rates of destructive behavior (*M*s = 7.2 and 10.4). Because Carla's communication card was available only in the FCT condition, communicative behavior could occur only in that condition. During the FCT condition, when destructive behavior produced no differential consequences and communication resulted in access to adult attention, Carla exhibited near-zero levels of destructive behavior (*M*s = 0 and 0.7) and higher levels of communicative behavior (*M*s = 0.9 and 0.8). During the NCR condition, when attention was provided on a time-based schedule and destructive behavior resulted in no differential consequences, Carla exhibited near-zero levels of destructive behavior (*M*s = 0.1 and 0.3). Both treatment procedures substantially reduced destructive behavior from baseline levels (95% reduction with FCT and 97.3% reduction with NCR).

During the evaluation of treatment preference, Tony's mean frequency of switch presses was 5.7 to obtain the FCT contingencies, 1.3 to obtain the NCR contingencies, and 1.1 to obtain the extinction con-

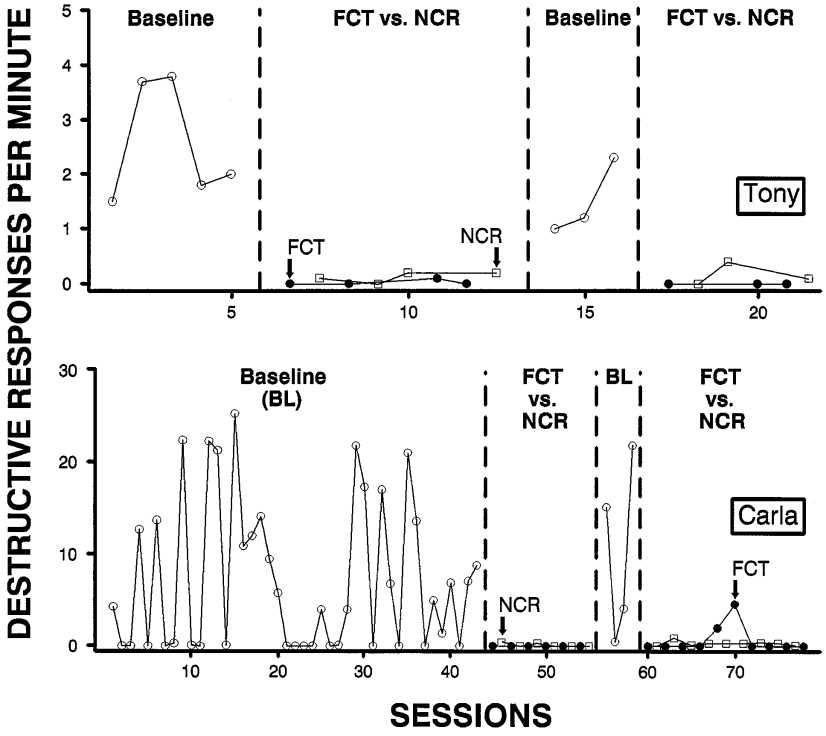

Figure 2. Number of destructive responses per minute during the treatment evaluation of functional communication training (FCT) versus noncontingent reinforcement (NCR) for Tony (top panel) and Carla (bottom panel).

tingencies (see Figure 3). Carla's mean frequency of switch presses was 5.7 to obtain the FCT contingencies, 1.8 to obtain the NCR contingencies, and 0.6 to obtain the extinction contingencies. Thus, both participants demonstrated a preference for the FCT treatment (70% of both participants' responding in the initial links was allocated to FCT).

DISCUSSION

In Phase 1, functional analyses showed that the destructive behavior displayed by 2 individuals was sensitive to attention as reinforcement (Carla's behavior was also sensitive to tangible positive reinforcement and escape). The results of Phase 2 showed that both FCT and NCR rapidly reduced attention-maintained destructive behavior. The results of Phase 3 showed that a variant of a concurrent-chains procedure could be used to assess clients' preference for the treatments, and in both cases the clients showed a clear preference for FCT over NCR.

The results of Phase 2 replicated the findings of Kahng et al. (1997) and suggested that control over reinforcement may not be necessary for producing rapid and clinically significant reductions in destructive behavior. That is, during FCT, the client determined when and how often attention was delivered by emitting the communication response. By contrast, this control over reinforcement was not present during NCR because reinforcement was delivered on a time-based schedule that was yoked to reinforcement delivery during FCT. Because the two treatments reduced destructive behavior to near-zero levels for both participants, it is doubtful that control over reinforcement was

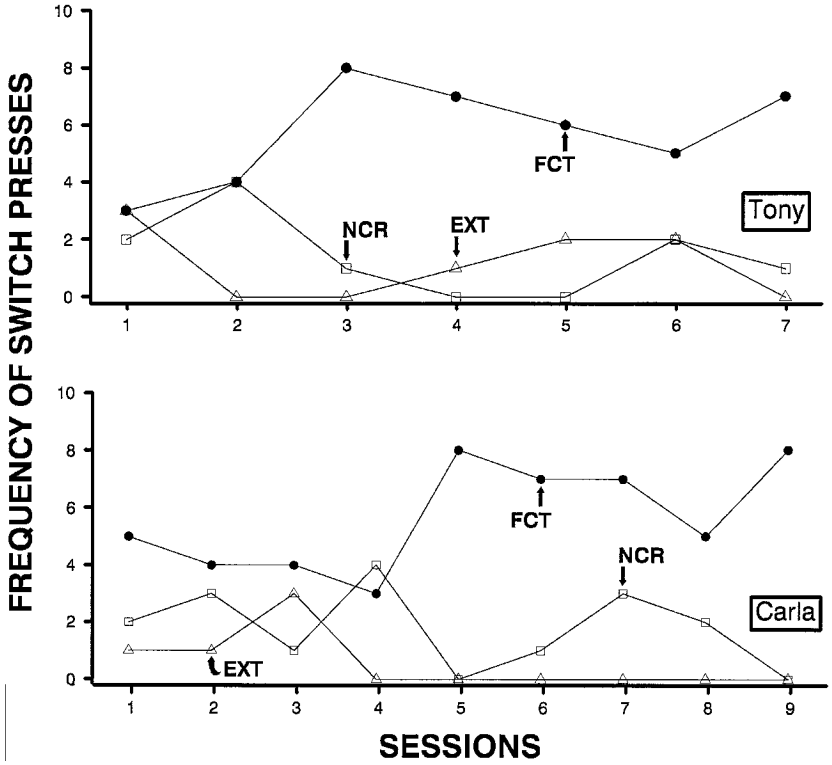

Figure 3. Frequency of switch presses during the evaluation of preference between FCT, NCR, and extinction (EXT) for Tony (top panel) and Carla (bottom panel).

responsible for the decreases observed with FCT.

In the Kahng et al. (1997) study, 2 of the participants displayed the communication response during NCR at rates higher than during baseline, which raised the question of whether these participants clearly discriminated the difference between FCT and NCR (i.e., response dependent vs. independent reinforcement). If the participants failed to discriminate that communication had no effect on reinforcement delivery during NCR, then they may have responded as if they had control over reinforcement when in fact they did not. Adventitious reinforcement has been demonstrated to occur during NCR when responding is followed by reinforcement (Vollmer, Ringdahl, Roane, & Marcus, 1997). In the current investigation, the communication response (handing a card to the therapist) was unavailable to Carla during NCR, which precluded the possibility of adventitious reinforcement of communication during this condition. With Tony, the communication response was a vocal statement ("play with me") and was available during NCR. However, the rates of this response were at near-zero levels during NCR, indicating that Tony discriminated that communication produced reinforcement only during FCT.

One potential limitation of Phase 2, relative to the issue of control over reinforcement, is that both treatment procedures (FCT and NCR) rapidly decreased destructive behavior to near zero. That is, a basal effect may have masked a potential beneficial factor (e.g., control over reinforcement) of one of the procedures (e.g., FCT) relative to the other. However, in the Kahng et al. (1997) investigation, FCT and NCR produced equivalent reductions in SIB, which

occurred more gradually (over multiple sessions), so that a basal effect could not account for the absence of a difference between the two treatments. Thus, in the Kahng et al. study and the current investigation, 5 individuals with destructive behavior were treated with both FCT and NCR, and in all cases the two treatments produced equivalent reductions in the problem behaviors.

A second potential limitation of both the Kahng et al. (1997) study and the current investigation is that FCT and NCR were compared during brief analogue sessions. It is possible that differences in the efficacy of the two treatments would be observed if FCT and NCR were compared in more natural settings over longer periods of time. For example, Kahng et al. suggested that FCT may be less susceptible to problems of treatment fidelity than NCR because the client can appropriately prompt caregivers to deliver reinforcement with the former treatment but not with the latter one. Future research should be directed toward determining whether the level of control afforded clients through response-contingent reinforcement during FCT is necessary for maintenance of treatment effects over time in natural settings.

The results of Phase 3 suggested that although control over reinforcement may not alter treatment efficacy, it may influence client preferences (i.e., clients may prefer to control when and if reinforcement is delivered). That is, both participants showed a clear preference for a procedure in which control over reinforcement was available (FCT) over one in which control over reinforcement was not available (NCR). Individuals may prefer response-dependent over response-independent reinforcement because it provides the individual with a mechanism for adjusting the rate of reinforcement in relation to momentary fluctuations in motivation that may result from satiation, deprivation, or other establishing operations. Neither participant displayed response rates sufficient to obtain all available reinforcement. That is, sometimes when a reinforcement interval ended, the participant immediately emitted the operative response (destructive behavior in baseline or communication during FCT) and reinitiated another reinforcement interval. However, at other times, there were extended periods between the end of one reinforcement interval and the next response. Thus, the rate of responding and reinforcement delivery varied both across and within sessions, presumably because of fluctuations in motivation. With FCT, the individual can request and obtain reinforcement when motivation is high and not request it when motivation is low. With NCR, reinforcement is delivered according to a time-based schedule independent of responding or momentary fluctuations in motivation. We hypothesized that these participants preferred FCT over NCR because the former treatment allowed them to receive attention at times when it was most valued. Given that this investigation involved only 2 participants, it remains unknown whether other individuals also would choose FCT over NCR.

One important aspect of the method used in Phase 3 is that the individuals receiving behavioral treatment had input into the treatment selection process. Bannerman, Sheldon, Sherman, and Harchik (1990) suggested that providing clients with opportunities to exercise choice is an important step in balancing habilitation with the client's right to choose. Faw, Davis, and Peck (1996) maintain that clients with developmental disabilities are often given choices regarding issues that have minimal effect on their overall quality of life. Therefore, Faw et al. developed a method to teach clients to select living arrangements based on their individual preferences. The method employed in the current investigation demonstrated that

clients can also choose among treatment procedures that are designed to reduce their destructive behavior. This method obviously was more effortful than simply asking individuals which treatment they preferred, but it may be a more accurate way to assess preference, especially for individuals with severely limited verbal skills (Parsons & Reid, 1990).

In the current investigation, a simple operant (switch pressing) with a low schedule requirement (FR 1) was selected in an attempt to shorten the initial acquisition phase during training (i.e., to rapidly teach the client the association between each switch press in the initial links and the contingencies operating in the terminal links; Piazza, Fisher, Hagopian, Bowman, & Toole, 1996). Our procedure differed from typical concurrent-chains procedures in that the schedule requirements in the initial links were low, multiple reinforcements were available in the terminal links, and the return to the initial links was independent of the participant's behavior (fixed-time interval of 2 min). However, as in a typical concurrent-chains schedule, the procedure separated the reinforcing effectiveness of the terminal links from the responding that occurred in the terminal links. Relative preference for the different treatment procedures was observed through responding in the initial links, which determined whether the clients obtained one terminal link (FCT) or the other (NCR). Therefore, the results of the current investigation suggest that this modification of the concurrent-chains procedure represents a viable method for empirically evaluating an individual's preference for different treatment procedures. It is possible that this procedure could be used to evaluate client preference for a number of different important life choices (e.g., career options, living arrangements, leisure environments).

This method may also facilitate identification of variables that affect client preference for treatments because responding in the initial links is a function of the variables that operate in the terminal links (i.e., something specific about the treatment procedure) given that the response requirements in the initial links are identical. Factors that might affect client preference for one treatment over another might include response effort or difficulty as well as reinforcement rate, delay, amount, and type (Mazur, 1994) that are associated with different treatment procedures. In a concurrent-operants paradigm, when each response is reinforced on a ratio schedule, as in the current investigation, individuals often display one response almost exclusively if it results in (a) a higher rate or amount of reinforcement (Catania, 1963), (b) more immediate reinforcement (Chung & Herrnstein, 1967), or (c) higher quality reinforcement (Miller, 1976). Similarly, when two responses produce the same consequence, an individual is likely to emit the one that is less effortful (Horner & Day, 1991). Each of these variables could be systematically varied using a concurrent-chains procedure to determine their influence on client preferences for various treatment options.

In the current investigation, rate and amount of reinforcement were equated in the FCT and NCR procedures by yoking the NCR reinforcement schedule to the FCT reinforcement schedule. We attempted to control the quality of reinforcement by having the same therapist conduct both the NCR and FCT contingencies within each session. Response effort was not equivalent for the FCT and NCR procedures. That is, FCT presumably is associated with a higher response effort than NCR, which is associated with no response effort. However, both clients selected the treatment procedure associated with the higher response effort, perhaps because control over the reinforcement schedule was more important than the small difference in response effort. Future research

might further assess this hypothesis by systematically manipulating the amount of effort required during FCT using procedures similar to those of Horner and Day (1991) and systematically manipulating reinforcement satiation and deprivation using procedures similar to those of Vollmer and Iwata (1993).

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STUDY QUESTIONS

1. List some of the potential advantages and disadvantages of both functional communication training (FCT) and noncontingent reinforcement (NCR) as treatments for behavior disorders.

2. Along what dimensions were FCT and NCR compared in the present study?

3. Briefly describe the procedures and results of the functional analyses. Why and how was Carla's functional analysis different from Tony's?

4. What were the contingencies in effect during the FCT and NCR comparison?

5. Summarize the results obtained during the FCT and NCR treatment comparison. In their discussion, the authors noted that a "basal effect" may have masked the potential benefit of one treatment over the other. How might the FCT training condition, conducted prior to the treatment comparison, have affected the FCT treatment data by producing such an effect?

6. How did the authors assess client preference for the two treatments, and what were the results of this assessment?

7. The authors suggested that "participants preferred FCT over NCR because the former treatment allowed them to receive attention at times when it was most valued" (p. 470). This interpretation is a sound one based on the assumption that establishing operations may fluctuate momentarily. Provide another interpretation of the preference data based on the assumption that NCR might contain an aversive element.

8. List some potential benefits of using a concurrent-chains procedure as a means of assessing client preference.

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