

ASSESSMENT AND TREATMENT OF SOCIAL AVOIDANCE

JILL M. HARPER

MELMARK NEW ENGLAND

AND

BRIAN A. IWATA AND ERIN M. CAMP

UNIVERSITY OF FLORIDA

Problem behavior maintained by social-negative reinforcement often is evoked by a specific type of social interaction—the presentation of task demands. This study involved assessment and treatment of a more general form of social avoidance in which the establishing operation (EO) for problem behavior consisted of social interaction per se. Four subjects exhibited high rates of problem behavior during the play or demand conditions of a functional analysis (FA). A subsequent FA in which problem behavior produced escape from social interaction confirmed social avoidance for all subjects. A series of interventions aimed at attenuating aversive characteristics of social interaction then was implemented with 3 of the subjects. These interventions included vicarious reinforcement, conditioning of social interaction as a reinforcer, stimulus fading, and differential reinforcement (DRA) plus extinction (EXT). DRA plus EXT was the only condition in which decreases in problem behavior and increases in social interactions were observed reliably.

Key words: functional analysis, social avoidance, establishing operation, conditioning, fading, differential reinforcement, extinction

The experimental framework of functional analysis (FA) methodology (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994) provides an empirical basis for examining the influence of a wide range of variables on problem behavior. For example, negative reinforcement for problem behavior may involve a number of events (task demands, medical procedures, or noise) that could function as establishing operations (EOs) for escape (Hanley, Iwata, & McCord, 2003). This study focuses on the assessment (Study 1) and treatment (Study 2) of a particular source of negative reinforcement: escape from social interaction.¹ The analysis of social avoidance is important because social situations are ubiqui-

tous. Social interaction also is a key component of several domains of adaptive behavior, including complex verbal behavior (Ingersoll, Schreibman, & Stahmer, 2001; O'Connor, 1969). Finally, individuals who engage in social behavior have means of obtaining reinforcers that otherwise would be unavailable. For example, McGee, Almeida, Sulzer-Azaroff, and Feldman (1992) described the importance of social interaction as a basis for community integration, particularly as it pertains to employment.

Descriptive data from several studies have suggested the influence of social interaction as an EO for problem behavior. Taylor and Carr (1992a, 1992b) examined the relation between adult attention and problem behavior in groups of individuals who exhibit social avoidance, attention seeking, or no problem behavior (control). Taylor and Carr (1992a) observed that the social avoidance group rarely initiated social interactions and engaged in more problem behavior under conditions of high adult attention than did the other two groups. Taylor and Carr (1992b) subsequently examined the same

Address correspondence to Brian A. Iwata, Department of Psychology, University of Florida, Gainesville, Florida 32611 (e-mail: iwata@ufl.edu).
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¹Although the context in which this class of behavior typically is measured technically constitutes escape rather than avoidance, we will use the term *social avoidance* to refer to responses reinforced by either the prevention or termination of social interaction because the term is widely used in the broader psychological literature (Asendorpf, 1990).

subjects, who were placed in work dyads with undergraduate instructors, and observed that the instructors decreased their delivery of attention in response to the children's social avoidance. Although these studies were purely descriptive in nature (functional relations were not demonstrated), they provide some support for the hypothesis that the delivery of attention may serve as an EO for problem behavior in some individuals (Taylor & Carr, 1992a) and that its avoidance or removal may serve as negative reinforcement (Taylor & Carr, 1992b).

Another source of evidence for social avoidance as reinforcement of problem behavior may be derived from patterns of responding during an FA. For example, Iwata *et al.* (1994) noted that higher rates of problem behavior during conditions that involve the presence of a therapist (attention, demand, and play) than in conditions without therapist attention (alone or ignore) may be indicative of maintenance by social avoidance. Another pattern of responding indicative of social avoidance might involve high rates of problem behavior during the demand and play conditions relative to the ignore and attention conditions, because low rates of problem behavior in the attention condition result in low rates of attention. A third pattern of responding suggestive of social avoidance might involve high rates of problem behavior in the demand condition due to contingent termination of attention when demands are ceased and initially high but decreasing rates of problem behavior across sessions in the play condition due to extinction of social avoidance. Although such patterns would be consistent with a social avoidance function, conclusions would be tenuous in the absence of evidence that avoidance of or escape from social interaction *per se* served as negative reinforcement.

A more direct test of social avoidance would include a condition in which only the delivery and removal of attention served as the antecedent and consequent events, respectively, for problem behavior. A test of this type has been reported in a

small number of studies. Frea and Hughes (1997) included a condition in which social questions were presented on a fixed-time (FT) schedule, and a 30-s break was provided contingent on problem behavior. Results showed that the inappropriate behavior of one of their two subjects was maintained by escape from social demands. Vollmer *et al.* (1998) included a similar condition in which contingent removal of a therapist's attention and proximity was associated with increased aggression by one subject. Finally, Hagopian, Wilson, and Wilder (2001) implemented a modified FA for a boy with autism after high rates of aggression were observed during the play condition of his initial FA. The modified FA included an escape-from-attention condition, and results suggested that the subject's aggression was maintained by both escape from attention and access to tangible items.

Two purposes of the present studies were to examine a larger set of FA results suggesting that problem behavior was not limited to escape from task demands and to clarify initial patterns of responding by including a direct test for social avoidance *per se* (Study 1). A third purpose was to evaluate a series of treatments designed to replace social avoidance with appropriate forms of social interaction (Study 2).

A number of interventions have been developed that emphasize the modification of antecedent events either to establish social interaction as a reinforcer or to minimize the aversive characteristics of social interactions. One intervention is based on the concept of vicarious reinforcement, in which a subject's behavior changes as a result of observing the delivery of reinforcement to another person. For example, vicarious procedures based on either live (Strain & Timm, 1974) or videotaped (Nikopoulos & Keenan, 2004; O'Connor, 1969) peer modeling have been shown to improve the behavior of social isolates. A similar but more direct procedure involves stimulus conditioning, in which neutral or aversive events are paired with known reinforcers. After having an isolate preschooler hand out

candy to classmates (pairing procedure), Kirby and Toler (1970) observed an increase in the preschooler's social interactions during subsequent free-play periods. Finally, stimulus fading, the gradual modification of physical characteristics of antecedent events, has been used as treatment for escape or avoidance in several contexts such as meals (Freeman & Piazza, 1998), inoculations (Shabani & Fisher, 2006), and noisy conditions (McCord, Iwata, Galensky, Ellingson, & Thomson, 2001). One example of fading in the context of social interaction was described by Wulbert, Nyman, Snow, and Owen (1973), who successfully treated the selective mutism of one individual by fading in components of interaction with a novel person while fading out the presence of a familiar person.

The most effective method for eliminating escape-maintained behavior has involved the use of consequences. Differential reinforcement of alternative behavior (DRA) combined with extinction (EXT) was used in two of the previous studies in which an FA of social avoidance was conducted. Frea and Hughes (1997) taught their subject to terminate social interactions by saying, "excuse me" or "I don't know," while reinforcement for inappropriate escape behavior was withheld. Similarly, Hagopian et al. (2001) successfully decreased the social avoidance behavior of their subject by teaching the individual to say, "play by myself." One limitation of both studies was that subjects were taught to escape social interaction and, as a result, spent most of their time during treatment sessions engaged in nonsocial activity. Although socially appropriate escape certainly is more beneficial than inappropriate escape, perhaps a better clinical strategy would be to replace socially inappropriate escape with a more contextually relevant target, that is, appropriate behavior that either initiates or maintains social interaction. For example, escape from task demands may be replaced with appropriate escape behavior (Carr & Durand, 1985) or with compliance with the task at hand (Lalli et al., 1999).

In the present study, we first evaluated the effects of antecedent interventions described previously because, if effective, they might establish appropriate social interaction without having to extinguish problem behavior. When these interventions were found to be ineffective, we implemented treatment that focused directly on both appropriate and inappropriate behavior by combining DRA (reinforcement of social interaction) with EXT of escape.

STUDY 1: ASSESSMENT OF SOCIAL AVOIDANCE AS REINFORCEMENT FOR PROBLEM BEHAVIOR

Method

Subjects and setting. Four individuals who attended either a special education school or a vocational program for persons with intellectual disabilities participated. All subjects had been referred for assessment and treatment of aggression and were selected for participation because results of their initial FAs showed that their problem behavior occurred at high levels during the play or play and demand conditions (see below). Ann was a 24-year-old woman who had been diagnosed with autism. Her primary mode of communication was one-word utterances. Penny was a 48-year-old woman who had been diagnosed with moderate mental retardation, autism, and a seizure disorder. Her primary mode of communication was two- to three-word utterances. Will was a 52-year-old man who had been diagnosed with severe mental retardation and who communicated primarily through gestures. Eve was a 13-year-old girl who had been diagnosed with an intellectual disability and speech and language impairment. Her primary mode of communication consisted of gestures and informal signs. Informal assessments conducted prior to the beginning of the study showed that all subjects engaged in imitative behavior, although their performance was inconsistent.

Sessions were conducted in either an empty classroom at the school or a therapy room at the vocational program. Both rooms contained

tables, chairs, and any materials needed to conduct sessions. All sessions lasted 10 min. Two to five sessions were conducted daily, typically 3 to 5 days per week based on subject and therapist availability.

Response measurement and reliability. All subjects engaged in some form of aggression. Specific target responses were as follows. *Pushing* (Ann and Will): contact between the subject's open hand and any part of the therapist. *Kicking* (Will and Eve): contact between the subject's foot and any part of the therapist from a starting distance of 15 cm or greater. *Pulling hair* (Penny and Eve): the subject's fingers wrapped around the therapist's hair. *Hitting* (Eve): contact between the subject's hand (opened or closed) and any part of the therapist from a starting distance of 15 cm or greater. *Scratching* (Eve): contact between the subject's fingernails and the therapist's skin with a scraping movement. All attempted (missed) and actual instances of aggression were scored as a response.

Trained observers used handheld computers to record the occurrence of target responses, as well as consequences delivered by the therapist, during each session. Data collection was determined by the target response. Frequency measures were collected for discrete responses (Ann, Will, and Penny), and 10-s partial-interval data were collected for responses that were variable in duration (Eve). Either rate of response or percentage of intervals with the target served as the dependent variable.

An independent observer collected data during a mean of 57% of sessions across subjects (range, 36% to 78%). Reliability for frequency measures (Ann, Will, and Penny) was calculated by dividing each session into consecutive 10-s intervals, dividing the smaller number of responses by the larger number of responses in each interval, and averaging the fractions across all intervals. Mean agreement across subjects for frequency measures of aggression was 97% (range, 88% to 100%). Reliability for partial-interval data (Eve) was calculated by dividing the number of intervals in

which both observers agreed on the occurrence or nonoccurrence of the target behavior by the total number of intervals. Mean agreement for interval measures of aggression was 97% (range, 90% to 100%).

Preference assessments. Prior to the FAs, a paired-stimulus preference assessment (Fisher et al., 1992) was conducted with nine leisure items. Subjects sampled all items prior to the assessment. On each assessment trial, the therapist presented a pair of items to the subject, instructed the subject to pick his or her favorite item, and allowed the subject to engage with the selected item for 30 s. Trials continued until all possible pairs had been presented. Moderately preferred items (selected on 50% to 75% of trials) were included in the attention condition of the initial FA and in all conditions of the modified FA. Highly preferred items (selected on at least 80% of trials) were included in the play condition.

Trained observers collected data on the subject's selection during each trial. An independent observer collected data on a minimum of 30% of trials across all assessments. Reliability was calculated by comparing observers' records on a trial-by-trial basis. Agreement scores were 100% across all assessments.

Initial functional analysis. An FA was conducted based on procedures described by Iwata et al. (1982/1994). Ignore, attention, play, and demand conditions (in that sequence) were conducted in a multielement design. During the ignore condition, the subject and the therapist were in the room with no materials present. The therapist did not interact with the subject throughout the session. During the attention condition, the subject and therapist were in the room that contained moderately preferred items. At the beginning of the session, the therapist said, "I have some work to do," turned away from the subject, and read a book. The therapist delivered approximately 5 s of attention in the form of physical contact and a statement of concern contingent on the target response. All other behaviors were ignored. During the play (control)

condition, the subject and therapist were in the room that contained the subject's highly preferred leisure item. The therapist delivered approximately 5 s of attention in the form of pleasant comments ("I like your toy truck") and physical contact on an FT 30-s schedule and responded to any appropriate social initiation by the subject. No consequences were delivered for the target response. During the demand condition, the subject and therapist were seated at a table that contained various instructional materials. The therapist delivered prompts to complete work tasks in a three-step hierarchy (verbal, gestural, physical) with no more than 5 s between each prompt and delivered praise for compliance following verbal and gestural prompts. Any instance of the target response resulted in a 30-s break from the task (materials and attention were removed).

Modified functional analysis. Based on these subjects' patterns of responding during their initial FAs, which were suggestive of a social avoidance function, we subsequently conducted a modified FA comprised of one test and one control condition alternated in a multielement design. During the social demand (test) condition, the subject and therapist were in a room that contained moderately preferred items. The therapist remained within 0.75 m of the subject and delivered attention in the form of statements about the subject (e.g., actions or clothing) paired with physical contact every 5 s. The therapist terminated attention and moved at least 1.5 m away from subject for 30 s contingent on aggression. All other behavior was ignored. The ignore with toys (control) condition was similar to the social demand condition; however, the therapist remained at a distance of at least 3 m and did not deliver attention throughout the session. Toys were included to serve as a control for their presence in the test condition.

Results

Figure 1 shows results for each subject's initial and modified FA. Two patterns of responding were observed in the initial FA. Ann and Penny

exhibited higher rates of aggression only during the play condition. Ann's responding occurred from the outset of her FA, whereas Penny's responding emerged across several exposures to the play condition. Will and Eve exhibited higher levels of aggression in the play and demand conditions. Will initially engaged in higher rates of aggression during the demand condition than in the play condition; the opposite pattern was observed for Eve. After several sessions, however, both subjects' aggression occurred about equally in the demand and play conditions. Thus, results of all subjects' initial FAs suggested that aggression was sensitive to escape from attention, although inference based on responding during the play condition was tenuous because that condition contained no contingency for aggression.

During the modified FAs, Ann and Penny engaged in aggression only during the social demand condition, and Will and Eve exhibited higher levels of aggression during the social demand condition than during the ignore condition. These data verified that all subjects' problem behavior was maintained by escape from social interaction per se.

STUDY 2: TREATMENT OF PROBLEM BEHAVIOR MAINTAINED BY SOCIAL AVOIDANCE

Method

Subjects and setting. Three of the four subjects (Ann, Will, and Eve) from Study 1 participated. Penny began but was unable to complete treatment due to an illness unrelated to her participation in the study.

Sessions were conducted in the same classroom or therapy room as used in Study 1. All treatment sessions lasted 5 min. Two to five sessions were conducted daily, typically 3 to 4 days per week.

Response measurement and reliability. The dependent measures in this study were aggression, as defined in the previous study, and

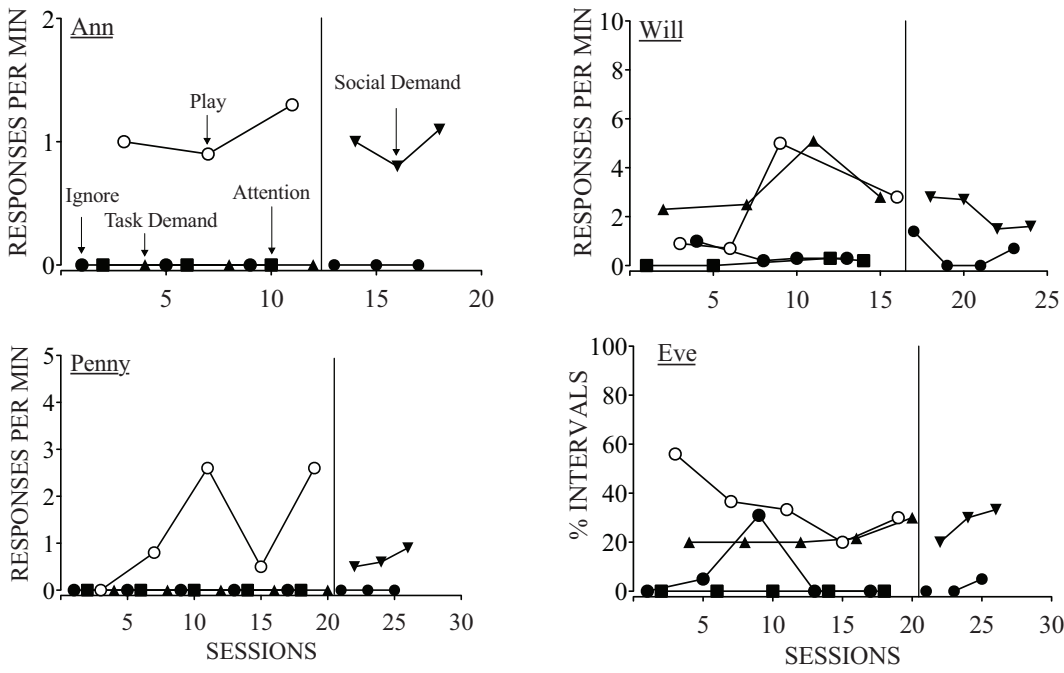


Figure 1. Responses per minute (Ann, Penny, and Will) or percentage of intervals (Eve) of aggression during the initial and modified functional analyses.

independent, appropriate social initiations (interactions). Interactions were defined individually based on informal observation and reports about each subject’s primary mode of communication. Ann’s appropriate interaction was a vocal request, saying the word “eat” or “M&M.” Will’s appropriate interaction was a tap on the therapist’s upper arm or shoulder. Eve’s appropriate interaction was a modified sign for “eat” (tapping the tips of her fingers on her lips).

Trained observers used handheld computers to record data on aggression and appropriate interaction, which were summarized as rate (Ann and Will) or percentage of 10-s intervals (Eve). An independent observer collected data on a mean of 52% of sessions across subjects and during all conditions of the study. Reliability was calculated in the same manner as in Study 1. Mean agreement for frequency measures of

aggression and appropriate interactions (Ann and Will) was 99% (range, 87% to 100%) and 98% (range, 83% to 100%), respectively. Mean agreement for percentage interval measures of aggression and appropriate interactions (Eve) was 98% (range, 75% to 100%) and 98% (range, 80% to 100%), respectively.

Preference assessment. A paired-stimulus preference assessment (Fisher et al., 1992) or a response-restriction analysis (Hanley, Iwata, Lindberg, & Conners, 2003) was conducted to identify highly preferred edible items to be used in subsequent conditions. The response-restriction analysis was used as needed to minimize interactions that may have occasioned aggression. All sessions of the response-restriction analysis lasted 5 min. The subject was seated at a table with seven edible items. Data were collected on the order of selection and consumption for each

item across sessions. Items consumed first across two sessions or across two of three sessions were removed from the array. Sessions continued until either a clear preference emerged or no preference was identified across three sessions. Data were summarized as percentage of consumption across sessions. Items with 80% or greater selection and consumption were included in subsequent treatment conditions.

During both assessments, trained observers recorded subjects' selection during each trial. An independent observer collected data on a minimum of 30% of trials across all assessments. Reliability was calculated by comparing observers' records on a trial-by-trial basis. Agreement scores were 100% across all assessments.

Treatment analysis. A multiple baseline design across subjects was used to evaluate the effects of the treatment. Following baseline, interventions that consisted of (a) vicarious reinforcement, (b) conditioning of social interactions, (c) stimulus fading, and (d) DRA plus EXT were implemented sequentially during treatment sessions. Their generalized effects were examined during baseline probes, which continued throughout treatment.

Baseline. Baseline was identical to the social demand condition of the FA except that, contingent on an appropriate interaction emitted by the subject (see definitions), the therapist delivered a small edible item and verbal praise.

Baseline probes. Single probes identical to baseline were conducted following every third treatment session (e.g., the first baseline probe was conducted immediately following the third vicarious reinforcement session), except as noted below during the fading condition. These probes were used to evaluate the generalized effects of each treatment on problem behavior and social interaction under baseline conditions.

Vicarious reinforcement. The subject, therapist, and a confederate (second therapist) were in the room. The subject was seated at a table approximately 0.75 m in front of the therapist and confederate, and moderately preferred leisure items were on the table. The therapist and

confederate interacted with the items and engaged in friendly conversation (e.g., "It is a nice day out today."). The therapist delivered praise (e.g., "Thank you for talking with me.") paired with a small amount of the subject's preferred edible item for social interactions initiated by the confederate on an FT 30-s schedule. The therapist did not initiate interaction with the subject but delivered praise and an edible item for any appropriate interaction initiated by the subject. Problem behavior was ignored.

Conditioning of social interaction. The subject was in a room that contained low-preference leisure items. The therapist entered the room with highly preferred leisure and edible items, presented the leisure items to the subject, and said, "I have brought you some fun toys." The therapist remained approximately 0.75 m from the subject throughout the session. The therapist placed an edible item on a plate next to the subject on a variable-time 15-s schedule and delivered verbal and physical attention to the subject on an FT 30-s schedule. That is, the therapist leaned toward the subject every 15 s with an extended arm to deliver an edible item and paired verbal and physical attention with every other delivery of an edible item. Problem behavior resulted in a break: The therapist turned away from the subject for 30 s, after which the therapist resumed the schedule beginning with the delivery of an edible item alone. This procedure illustrated a noncontingent approach to pairing (the edible item and social interaction were delivered independent of any response), which has been found to be less effective than a contingent pairing procedure (Dozier, Iwata, Thomason-Sassi, Worsdell, & Wilson, 2012). However, unlike subjects in the Dozier et al. (2012) study, for whom social interaction was a neutral event, our subjects actively engaged in escape from social interaction. Therefore, we believed that the noncontingent procedure placed fewer requirements on subject behavior and would be less likely to occasion aggression.

Stimulus fading. Each component of interaction (proximity, verbal attention, and physical attention) was introduced systematically across sessions. The subject had access to moderately preferred leisure items throughout the session. Each session was divided into consecutive 30-s intervals. Problem behavior resulted in a 30-s break from proximity and attention. A baseline probe was conducted following a 90% reduction in aggression from baseline levels across three consecutive sessions, at which time the next fading step was introduced. The previous fading step was reintroduced if problem behavior occurred at or above baseline levels for three consecutive sessions.

Verbal attention fading. The therapist remained 3 m from the subject throughout the session (initial proximity) and did not deliver physical attention at any point during the session. Five to 10 s of verbal attention was faded into each 30-s interval in an exponential fashion (1, 2, 4, 8 intervals). The intervals in which attention was delivered were alternated between the beginning and the end of the session, such that across the first two fading steps, attention was delivered during only the first interval and then the first and the last intervals.

Distance fading. The therapist initially stood 3 m from the subject throughout the session and delivered 5 to 10 s of verbal attention once per 30-s interval (terminal verbal). Proximity of the therapist was reduced by half of the distance (1.5 m, 0.75 m, 0.35 m) across fading steps.

Physical attention fading. The therapist remained next to the subject throughout the session (terminal proximity) and delivered 5 to 10 s of verbal attention during each 30-s interval (terminal verbal). Five to 10 s of physical attention was faded into the session using the procedures outlined in the verbal fading condition.

DRA plus EXT. Subjects were prompted to emit their target appropriate social responses (see previous definitions) during training sessions.

The therapist stood at the closest proximity that resulted in zero instances of problem behavior during the preceding proximity fading condition. If the subject did not engage in appropriate interaction within 10 s of the start of the session, the therapist delivered a vocal prompt (Ann) paired with a gesture prompt (Will and Eve) to engage in an appropriate interaction. If the subject did not emit an appropriate interaction within 5 s of the initial prompt, the therapist provided an additional vocal prompt (Ann) or physically prompted the subject to emit the response (Will and Eve). Praise and a small edible item were delivered following all prompted and independent appropriate interactions unless problem behavior occurred during the prompting procedure. If problem behavior occurred at anytime during training, the therapist remained close to the subject (EXT) and delivered the next scheduled prompt.

Results

Figure 2 shows results obtained during training sessions conducted during each treatment condition. All subjects showed near-zero levels of aggression during training sessions in all treatment conditions. During vicarious reinforcement sessions, Ann and Will never engaged in aggression; Eve engaged in relatively few instances during all but two sessions. During stimulus conditioning sessions, Ann engaged in aggression during only one session, Will engaged in low rates of aggression during most training sessions and none during his last two sessions, and Eve engaged in no aggression during 13 of 18 training sessions. During the three fading conditions, Ann engaged in aggression during six of 33 sessions; Will and Eve engaged in low but variable levels of aggression throughout training. The third fading phase (physical attention) was not implemented with Will and Eve because repeated increases in aggression were observed during the previous (distance) phase whenever the therapist reached the target distance (0.35 m) for initiating the fading of physical attention. In the final

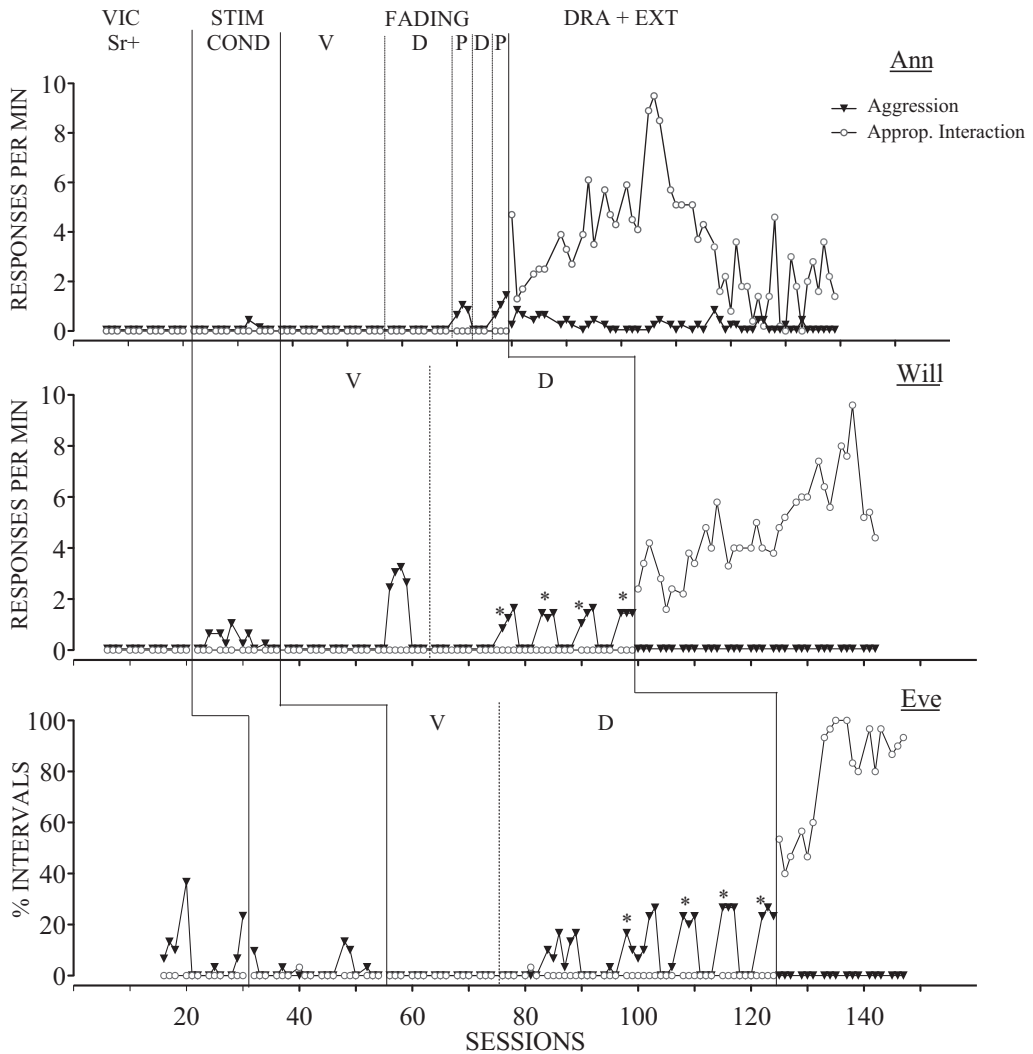


Figure 2. Responses per minute (Ann and Will) or percentage of intervals (Eve) of aggression and appropriate interaction during training sessions across treatment conditions. The fading condition included verbal (V), distance (D), and physical contact (P); asterisks represent 0.35-m therapist proximity during distance fading. VIC Sr⁺ = vicarious reinforcement; STIM COND = stimulus conditioning.

treatment condition (DRA plus EXT), Ann engaged in near-zero rates of aggression during most of her training sessions, and Will and Eve never engaged in aggression. Subjects either never (Ann and Will) or rarely (Eve) exhibited any appropriate interactions throughout all sessions in the vicarious reinforcement, stimulus conditioning, and fading conditions. By contrast, they

engaged in moderate to high rates of interaction during DRA plus EXT sessions.

Our primary interest was the extent to which effects observed during treatment sessions generalized to baseline probes. Figure 3 shows results during baseline sessions prior to treatment and during baseline (generalization) probes following every third training session throughout treatment.

All three subjects showed stable levels of aggression during baseline and little or no change in aggression during probe sessions throughout the vicarious reinforcement, stimulus conditioning, and fading conditions. Thus, reductions in aggression observed during training sessions in these conditions showed no evidence of generalization to baseline probes, and, as was the case during training sessions, subjects engaged in little or no appropriate social interactions. When DRA plus EXT training was implemented, Will and Eve showed immediate reductions in aggression during baseline probes; their aggression either quickly (Eve) or eventually (Will) decreased to zero and stayed there for the remainder of the study. By contrast, Ann's aggression remained variable during baseline probes in the DRA plus EXT condition; therefore, EXT was added to her baseline probes (noted by asterisk), after which her aggression decreased and eventually was eliminated completely. Finally, all three subjects showed immediate increases in appropriate social interactions during baseline probes in the DRA plus EXT condition.

GENERAL DISCUSSION

Results of Study 1 provided a direct test of escape from social interaction *per se* as a source of negative reinforcement for problem behavior. Results of Study 2 showed elimination of social avoidance following intervention that combined prompts and reinforcement for initiation of appropriate social interactions with extinction for escape behavior. Collectively, these results provide a notable extension to previous studies on the FA of social avoidance (Frea & Hughes, 1997; Hagopian *et al.*, 2001; Vollmer *et al.*, 1998) in that (a) assessment involved multiple subjects whose problem behavior was maintained solely by social avoidance; (b) subjects were taught not to escape from social interaction but to initiate it; and (c) effects obtained during training sessions generalized to baseline conditions for two of three subjects.

Subjects' initial FAs (Study 1) showed two different patterns or responding not often seen in FA data: Will and Eve engaged in aggression not only in the demand condition but also in the play (control) condition; Ann and Penny engaged in aggression only in the play condition. Both of these patterns suggested that some aspect of the play condition occasioned problem behavior; however, conclusions about behavioral function were tenuous because aggression produced no social consequences. The social demand condition in subjects' second FA provided a simple and direct test by manipulating both the EO (dense delivery of attention) and the consequence (removal of attention) for social avoidance. Data from the two FAs indicated that all four subjects engaged in social avoidance; however, Ann and Penny never engaged in aggression when task demands were presented in their initial FAs, which was surprising. Perhaps their histories were such that aggression was an effective escape response in most social contexts but was not tolerated by teachers in work contexts. That is, therapists and teachers may have been less likely to persist when attempts at friendly social interaction produce aggression than when aggression occurred during instructional periods.

Given the simplicity and brevity of subjects' second FAs, it is possible that such a test could comprise an initial FA if preliminary information suggests that problem behavior functions as social avoidance. However, a single test of this function would not rule out the possibility that problem behavior has other functions as well. Thus, this social avoidance test is recommended as a supplementary assessment when initial FA results produce either of the anomalous patterns shown by our subjects.

In Study 2, we evaluated several antecedent interventions designed to minimize aversive aspects of social interaction while not requiring any type of social response from the subject. During vicarious reinforcement, no interaction was directed toward the subject; the therapist

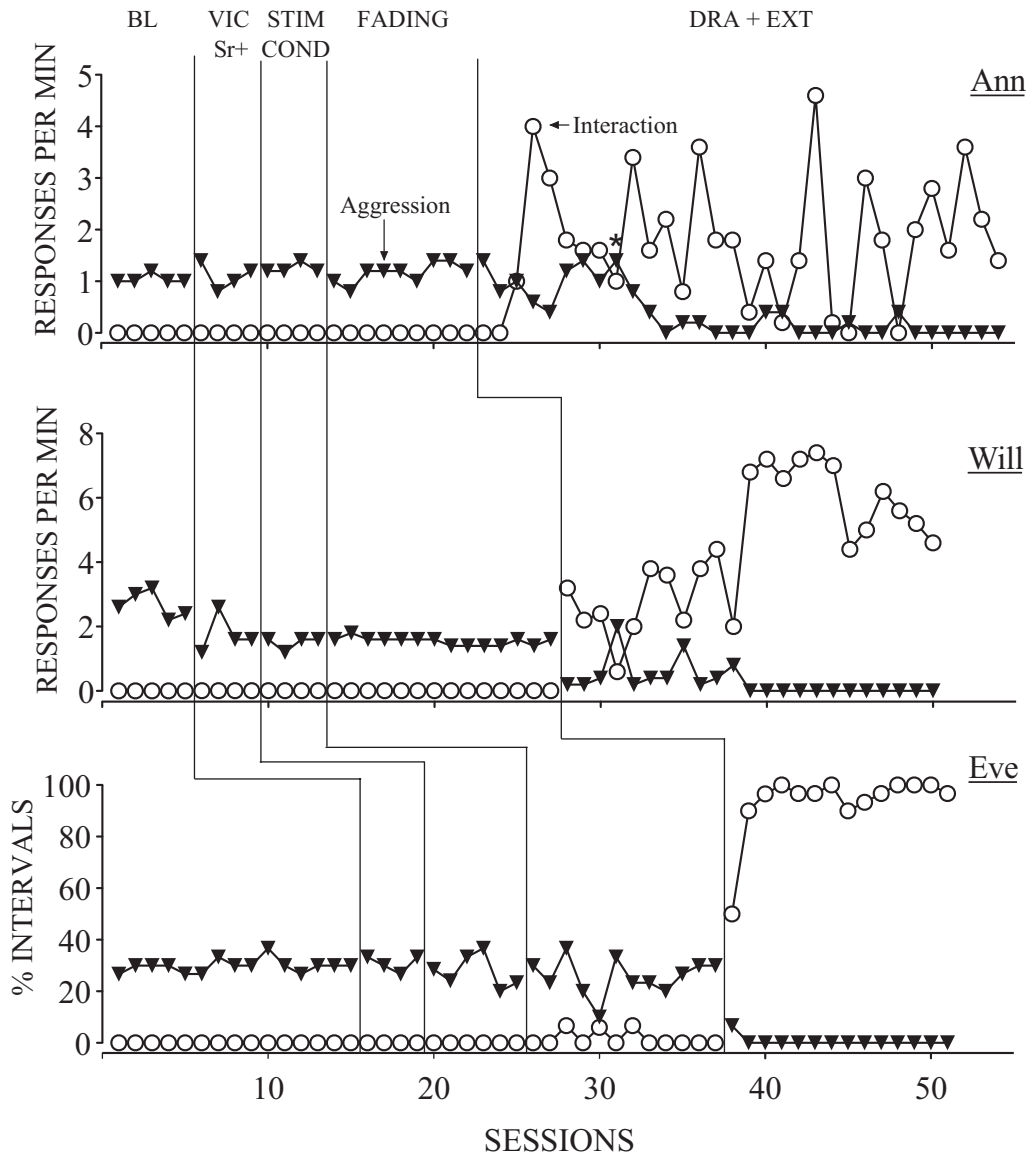


Figure 3. Responses per minute (Ann and Will) or percentage of intervals (Eve) of aggression and appropriate social interaction during baseline sessions and during baseline probes following every third training session across treatment conditions. Extinction of aggression was added during baseline probes conducted with Ann beginning with Session 31 (marked above with an asterisk). VIC Sr⁺ = vicarious reinforcement; STIM COND = stimulus conditioning.

simply conversed with and delivered reinforcers to the confederate. During conditioning sessions, the therapist freely delivered preferred edible items to the subject every 15 s and paired every other delivery with social interaction. Finally,

fading involved gradual exposure to different aspects of social interaction (verbal interaction, proximity, and physical interaction).

Given these antecedent modifications, aggression decreased as expected during training

sessions in each of the treatment conditions. These effects, however, showed no generalization to ongoing baseline probes. Several factors may have been responsible for the lack of improvement observed during the probes. First, vicarious reinforcement seems to be most effective for occasioning behavior that already is established in one's repertoire but that occurs at a low rate. In the present study, our subjects engaged not only in a low rate of appropriate social interaction but also in a high rate of problem behavior in the presence of social interaction. Thus, they were not just socially unresponsive but actively avoided social contact; that is, social interaction was aversive rather than simply not reinforcing. An additional factor that may have limited the effectiveness of vicarious reinforcement was that our subjects' imitative repertoires were inconsistent, which was not surprising given that they were socially unresponsive in general.

In an attempt to establish new histories for our subjects, we then paired social interaction with preferred edible items during conditioning sessions. Perhaps the number of pairing trials (240 to 360) was insufficient for our subjects and longer exposures (500 trials or more) would have produced better results. It should be noted, however, that subjects rarely initiated any social interaction during conditioning sessions, suggesting that the procedure's effects were limited. Finally, fading also was ineffective in producing generalized improvement in behavior; however, subjects' behavior during training sessions was instructive. For example, Ann's aggression was not observed until physical attention was introduced, whereas both Will and Eve engaged in aggression when therapist proximity was faded to 0.35 m. Thus, the procedure might be helpful in future studies to identify which aspects of social interaction serve as establishing operations.

The most obvious limitation of the antecedent interventions used in this study was the absence of extinction for problem behavior, although data taken during training sessions indicated that all of the antecedent interventions were associated with

low levels of aggression. Thus, perhaps a more significant limitation was the fact that none of the antecedent interventions required subjects to engage in social interaction with the therapist. Prompts to engage in social interaction could have been included in any of the antecedent conditions, which, combined with extinction, may have produced better results than those obtained in this study.

DRA plus EXT was successful in decreasing aggression and increasing socially appropriate interactions for all subjects. Although the most prominent feature of the DRA plus EXT condition was the modification of consequences for appropriate and inappropriate behavior, two additional components may have influenced behavior. First, because training sessions contained explicit prompts for subjects to initiate interaction, it is possible that prompts *per se* may have contributed to the treatment effect. Another possibility is that pairing edible reinforcement with a social response made by the subject (rather than one made by the therapist during conditioning sessions) was a more effective way of decreasing the aversive characteristics of social interaction. Either or both of these influences may have contributed to the generalized improvement seen in Will's and Eve's behavior during their ongoing baseline probes. It is unlikely, however, that these processes influenced Ann's behavior because she continued to engage in aggression during her baseline probes even though her appropriate interactions increased, which necessitated the addition of extinction during her probes. It should be noted that aggression continued to occur sporadically during DRA plus EXT training sessions; thus, perhaps continuation of training until aggression was eliminated completely may have produced generalization to her baseline probes. Ann's data therefore raise questions about whether low versus zero rates of problem behavior in a treatment context are sufficient as a basis for making predictions about success in nontreatment contexts.

Our results demonstrated how DRA combined with EXT can produce both reductions in problem behavior and increases in social interaction. Given the ubiquitous nature of social situations, the ability to engage in socially appropriate escape behavior, such as that established by Frea and Hughes (1997) and Hagopian et al. (2001), is of critical importance. Nevertheless, some interactions (e.g., self-care routines) are unavoidable, and others (responding to social questions and making requests) clearly enhance the quality of one's life. Thus, an ideal treatment program for individuals who exhibit social avoidance might focus on a repertoire of social interaction that includes approach as well as avoidance responses.

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