
THE TREATMENT OF DANGEROUS BEHAVIOR

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Individuals who display dangerous behavior towards others have historically been under-treated and under-researched. This paper discusses three published case studies wherein adult males were effectively treated for severe aggression towards others, the environment, and, in two cases, self-injury. All were diagnosed as having mental retardation and two also had a psychiatric diagnosis. All had experienced years of failed attempts to control their aggression through large pharmacological interventions and restricting their freedom of movement via restrictive environments. The use of comprehensive multifaceted behavioral programs involving punishment resulted in dramatic and long lasting reductions in aggression, the elimination or great reduction of drug use, and major lifestyle improvements. The conceptual, clinical, political, legal, philosophical, and ethical considerations that arose during the development and implementation of the programs are discussed as well as scientific issues related to achieving long term maintenance. An early published case study (Martin & Foxx, 1973) is discussed first because it illustrates how an informal functional analysis was used to design a very simple and effective non-punishment treatment program for a woman who displayed dangerous aggression. Copyright © 2003 John Wiley & Sons, Ltd.

INTRODUCTION

Although there is a rich behavioral literature on the treatment of self-destructive behavior, dangerous destructive behavior towards others has remained under-treated and under-researched (Foxx, Zukotynski, & Williams, 1994). The major reason why appears to relate to who is at risk. Self-destructive individuals only pose a danger to themselves whereas everyone, including the interventionist, is a potential victim when individuals aggress towards others (Foxx et al., 1994). Thus, although the clinical, political, philosophical, legal, and ethical issues related to destructive behavior towards others should be less complicated and more straightforward given that the issue of concern is the rights of others to be protected from danger, few advocate for the use of proven effective behavioral treatment (Foxx, 1996). Instead, the typical course of action is a highly restrictive environment or massive pharmacological intervention.

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Yet, it is clear that aggressive behavior can be treated successfully by comprehensive, behavioral programs (Foxx, 1991, 1996; NIH, 1991). Furthermore, comprehensive behavioral programs that include punishment have been demonstrated to be effective with both attention and escape/avoidance motivated aggressive behavior (Cataldo, 1991; Foxx, 1991), which is important given that advocates of positive-only programs have produced no comparable data when the target behaviors are escape/avoidance motivated.

This paper has several goals. The first is to provide several clear examples of effective behavioral interventions for individuals displaying dangerous behavior towards others. A second is to discuss these effective treatments within the current political and professional climate in developmental disabilities. A third is to demonstrate that less formal functional assessment will suffice for severe cases when a treatment program is comprehensive, multifaceted and targeted towards insuring maintenance of the treatment effects. The final goal is to discuss some of the issues related to long term maintenance of punishment effects.

Four of my previously published cases will be presented (Foxx, Bittle, & Faw, 1989; Foxx, Foxx, Jones, & Kiely, 1980; Foxx, McMorrow, Bittle, & Bechtel, 1986; Foxx et al., 1994; Martin & Foxx, 1973). In two cases (Foxx et al., 1980; Martin & Foxx, 1973) the individuals used aggression to gain access to attention and in two aggression gained escape (Foxx et al., 1986b; Foxx et al., 1994). Three individuals also displayed self-injury and aggression towards property.

Three cases were multifaceted treatment programs involving punishment (Foxx et al., 1980, 1986b, 1989, 1994) and will be discussed in detail. An earlier study (Martin & Foxx, 1973) will be discussed first, because it represents an early example of the treatment of aggression based on an informal functional analysis.

GAIL (1973)

Almost 30 years ago, Martin and Foxx (1973) demonstrated that aggressive attacks on residential staff by a 22-year-old woman with moderate mental retardation could be controlled by the victims' reactions to the attacks.

Gail had been institutionalized for five years. Her institutional admission resulted from an episode of extreme aggressive and destructive behavior directed at her parents, herself, and various household furniture. Gail was regarded as an intractable case because no intervention or within-institution transfer had been successful in diminishing her aggression.

Her most frequent form of aggression was attacks toward residential staff. To a much lesser extent she would attack other residents who could not defend themselves, thereby requiring intervention, i.e. attention by staff. Our functional analysis suggested

that Gail's attacks were being inadvertently socially reinforced by her victims (staff) when they responded to an attack or intervened to aid a resident under attack.

A social reinforcement interpretation of aggressive behavior suggested that aggressive responses can be reinforced by the victim's behavior. Some possible victim related 'social reinforcers for aggression' include signs of inflicted pain, injury and distress (e.g. Feshback, 1964), as well as lectures, concern or defensive responses. Simply put, the victim's 'reasonable' response to socially reinforced aggression insured future attack.

Socially reinforced aggressive behavior can be a major problem in situations where staffing is minimal, their primary responsibility is custodial and staff attention is problem oriented. Where there are few social reinforcers available, the attention associated with any intervention effort may be the aggressor's primary source of human interaction. For the attention-deprived individual, direct attacks on staff offer the most immediate and concentrated attention.

With Gail, we sought to demonstrate that the reactions of an attacked staff member, i.e. the victim, could control her aggressive behavior. The experimental design was ABA with a social reinforcement condition in which the victim (this author) socially responded to each attack counterbalanced between two extinction conditions in which I ignored attacks. One to five 15 min sessions were scheduled daily in Gail's seclusion room. The room contained a toilet, a bed and bedding. A session began when I sat next to Gail on her bed. At the end of each session I left the room. I said nothing to Gail at the beginning or end of a session.

Withdrawal of Social Reinforcement by Victim (Sessions 1–95)

Social reinforcement was withheld and I attempted to ignore all instances of aggressive behavior. Self-aggressive acts and assaults on objects, e.g. the sheets of her bed, provided no threat. Aggression directed at me was also ignored as much as possible but my ability to do so depended on the type of attack. For example, slaps were relatively easy to ignore since they were directed usually at an arm or the upper surface of the thigh. Kicks and bites were more difficult to ignore and sometimes required an avoidance response. To do so, I attempted to avoid an attack (e.g. pull my hand from near Gail's mouth) as casually as possible so as to limit the reinforcing effect of the avoidance response. In session 51 my coauthor Martin substituted as the victim, and in session 52 a female staff member did so.

Social Reinforcement by Victim for Aggression (Sessions 96–140)

In this condition I responded to any aggression either by delivering a benevolent lecture, e.g. 'Gail, how can you behave that way?', and tenderly touching her arm, or

by firmly saying 'Gail! Stop it' or 'Don't you ever do that again', and firmly grasping her wrists. My vocal responses were derived from Gail's 'self-talk'. She spent a great deal of time talking to herself, with many admonishments to be good in order to avoid the consequences of losing love. I varied my two reactions randomly from session to session. In either case, I would interact for approximately 20 s and then turn away, silently and passively, to await the next attack.

Reintroduction of the Withdrawal of Social Reinforcement (Sessions 141–165)

The conditions during this period were identical to those of the first extinction condition. I attempted to ignore as much as possible any aggressive behavior. In session 151 another male substituted as the victim.

Results

Aggression Toward the Victim

In the initial social extinction condition, Gail's attacks on me declined steadily over time to a near zero level. During the social reinforcement condition, Gail's attacks toward me reached a point where they were seven times greater than at the beginning of the study. Indeed, the reinforcement condition was terminated at this point, because my attention had proved so dangerously effective. During the final extinction condition, Gail's aggression decreased to zero after five sessions and remained there during the remaining 20 sessions of the study.

During the first extinction condition, four types of victim directed aggressive responses were recorded: hits, bites, pinches, and kicks. Hitting was the most probable response, occurring twice as often as bites, four times as often as kicks, and 11 times as often as pinches. During the first extinction condition, pinching ceased occurring at session 27, kicking at session 38, biting at session 81, and hitting at session 89. During the reinforcement condition, only hitting and kicking recurred, the former three times as often as the latter. Gail did not begin kicking until the last five sessions of the reinforcement condition when her aggression was highest. During the final extinction condition, hitting occurred about twice as often as kicking and again was the last response to extinguish. The intensity of a specific aggressive response increased just before it ceased, as is characteristic of the extinction process. Gail's aggression produced bruises, abrasions and open wounds.

This study demonstrated that the social behavior of the victim can be crucial in maintaining or eliminating aggressive behavior. When the victim did not respond to attacks, aggression toward him ceased. When he reacted to attacks, they increased

regardless of whether the reaction had been harsh or understanding. Attacks on objects and self-aggression were also affected by the treatment procedures. When Gail's aggression toward the victim was ignored, self and object aggression remained static or decreased. When aggression toward the victim was reinforced, self and object aggression also increased. This suggested that the three types of aggressive behavior were in the same response class.

It is worth noting that the control of Gail's aggression was not a result of any special attributes of the victim, since no attacks to other potential victims, either male and female, occurred during the generalization probes in the extinction conditions. The location of the treatment also was not critical since no attacks occurred when I accompanied Gail out of the room following the second extinction condition.

MULTIFACETED PROGRAMS

Let me now return to the three multifaceted programs (Foxy et al., 1980, 1986b, 1994). Several strategies were followed in designing them.

First, because aggressive behaviors often are under multiple motivational and setting event control, interventions were not designed until (i) functional analyses identified the variables that controlled aggressive behaviors and (ii) antecedent and setting events were analyzed that identified whether the presence or absence of the behaviors was correlated with environmental events that repeated themselves predictably across time, activities or individuals.

Second, a systematic effort was made to ensure that the stimuli that would control positive behaviors were present prior to, during, and after the reduction of the aggressive behaviors.

Third, skills were taught or developed that involved behaviors that served the same function as the aggressive behaviors because they accessed the same reinforcers but did so more efficiently. In effect, communicative behaviors were taught that were functionally equivalent.

Fourth, we sought to render aggressive attention seeking and escape and avoidance behavior unnecessary by providing opportunities for choice making (Foxy, Faw, Taylor, Davis, & Fulia, 1993), eliminating situations such as frustration and boredom that produce aggressive behavior and making tasks and activities interesting, varied and reinforcing.

Fifth, the least restrictive treatment model was followed (Foxy, 1982), while still ensuring that all treatment could be delivered consistently and safely. Windows of opportunity for replacing aggressive behaviors with appropriate behavior were created, since the crucial issue is not what treatment is being used, but rather what is being done when the individual is not displaying aggressive behavior. From this

perspective proactive, skill-building communication strategies become paramount, whereas crisis management and reactive strategies have no relevance.

The successful application of these strategies to dangerous forms of aggressive behaviors that were reinforced by positive or negative reinforcement is illustrated in the following three peer reviewed, previously published cases.

Paul (1980)

Foxx et al. (1980) successfully treated Paul, a 23-year-old, dually diagnosed, institutionalized man, for aggression, self-injury, and property destruction. All previous treatments, including drugs, prolonged restraint, and various behavioral procedures, had been ineffective. Our informal functional analyses revealed that Paul's aggression was primarily attention seeking.

Paul's Vineland SQ was 31.75 with an equivalent age assignment of 7 years, 4 months. Attempts to obtain accurate measures of his intellectual capabilities were unsuccessful because of his aggression and frequent hallucinatory-type verbalizations during testing. Paul's violent outbursts resulted in injury to himself and others, and extensive property damage. For example, prior to his institutionalization, Paul became violent during a family excursion and destroyed thousands of dollars worth of items in a souvenir shop. He lived on a special locked unit for aggressive males containing only male staff.

The standard methods of attempting to control Paul's aggression had been separate or combined use of strait jackets, a restraint chair located in a small closet-like isolation room, and daily dosages and PRN injections of Thorazine. None was effective in decreasing his aggression. For example, Paul destroyed several custom-made, heavily reinforced canvas strait jackets. On one occasion the unit was flooded when he ripped two water fountains from the wall. During his aggressive acts, he often injured staff. His two forms of self-injury consisted of biting his hands or banging his forehead violently against walls. The scar tissue on his head had thickened from repeated head-bangings to a point where it was extremely difficult to suture new wounds. The year before treatment, Paul's head and/or hands had been sutured 12 times and he had received up to 2000 mg of Thorazine daily. During the last five months of that year, he also received over 3300 mg of PRN Thorazine injections. Paul enjoyed the attention that his aggression provided, since he often demanded injections and suturing and would smile during their delivery. Paul's problematic behavior also included threatening others, screaming, and talking to walls or himself in the third person.

The general rationale of the treatment program was to create a highly reinforcing environment and use nonexclusionary timeout (Foxx & Shapiro, 1978). Thus, Paul's aggressive-destructive behavior produced a 24 hour period of social isolation during

which he remained in the reinforcing environment (a locked unit), but was restricted from all social interactions, scheduled reinforcing activities, and any naturally occurring reinforcing events (such as an unexpected visit from his parents). Thus the isolation was designed to consist of numerous timeout intervals, and each interval would vary in duration and unpleasantness as a function of the reinforcing events from which Paul was being excluded. Although the isolation included intervals in which timeout was not in effect, it kept Paul in a state of readiness to experience timeout whenever a reinforcement opportunity occurred, e.g. when others on the unit received reinforcement. During isolation, Paul wore a white hospital gown that served as a signal (discriminative stimulus) to everyone that he should not receive any attention. To guard against inadvertent attention, all employees were briefed and received written instructions, and a large 'reminder' sign was posted at the unit entrance.

Several factors influenced the selection of a 24 hour period of social isolation. First, because the unit had a stable daily routine, Paul's first opportunity for social interactions and activity participation following his isolation would occur in situations quite similar to those in which he had aggressed the day before. This pairing of release from isolation (negative reinforcement of nonaggression) with the opportunity to participate in potentially reinforcing events helped establish these events as conditioned reinforcers for nonaggressive behavior and reduced the likelihood that he would continue to aggress during them. Second, Paul's outbursts often involved certain situations, people, or times, e.g. attacking new employees. However, doing so would result in a forfeiture of reinforcement opportunities for a complete daily cycle. Third, because all three shifts would be involved, a cohesive and consistent staff effort resulted that made the program inescapable and increased the likelihood of generalization across shifts and situations. Finally, the program was easy to monitor because the isolation was scheduled to end at the same time it had begun the previous day.

Paul met several social and intellectual criteria that were essential to the program's success: (i) he had extensive receptive and expressive language skills, e.g. he could participate appropriately in complex conversations; (ii) he enjoyed praise, participating in group activities, and interacting with staff; and (iii) he was capable of mediating time spans, e.g. by talking about past and future events and working for delayed rewards. These criteria ensured that he was capable of understanding the relation between his aggression and social isolation, and that the isolation would constitute timeout.

The success of the program depended on the creation of a highly reinforcing environment. This was accomplished by establishing a token program, reinforcement room, and increasing the number of staff/client interactions and activities. The reinforcement room contained a television, record player, and a variety of games,

magazines, educational materials, and snacks (Foss, Bechtel, Bird, Livesay, & Bittle, 1986).

It was critically important to protect Paul and others from his violent outbursts and prevent him from terminating the isolation and receiving attention by aggressing. To do so, a physical intervention procedure, relaxation training (Foss & Azrin, 1972) was implemented. Whenever Paul became aggressive, two or more staff physically restrained him and then instituted relaxation training. Paul was instructed in a neutral tone of voice to go and lie quietly on his bed. If he failed to comply, he was immediately escorted to the bed and instructed to lie down, and manually guided to a supine position. If he actively resisted, his extremities were held and the staff's manual restraint pressure was decreased as he ceased resisting. Manual restraint was applied as needed whenever he attempted to rise and terminated when he relaxed thereby negatively reinforcing compliance. Once Paul became quiet, he was told he was to lie quietly for 10 minutes, after which point a buzzer would sound. If he became agitated at anytime, the 10 minute period of relaxation training was recycled. After 10 minutes of calmness, the social isolation period began. Paul was told of the conditions surrounding the social isolation.

The program greatly decreased the percentage of days each month in which aggression occurred from a baseline of 90% to 4% one year later. Medical record comparisons in the year before and during the year long program revealed major reductions in (i) the times Paul was sutured following self-injury (from 12 to four), (ii) daily Thorazine dosages (from 2000 to 800 mg), and (iii) PRN Thorazine injections (from nine per month to one every other month).

There were several other gratifying developments. The restraint chair room was converted into a linen closet. Paul's hallucinatory-type verbalizations decreased markedly, although they had not been targeted for treatment. He no longer asked for PRNs or suturing. As he became less threatening, his appropriate interactions increased substantially. Paul's parents received weekly behavioral training and used this training with him during home visits. He participated in the Special Olympics and by year's end attended off-unit educational programs full time.

Although Paul was socially isolated for an extended period, the program was humane. Consider that Paul was given complete freedom to care for his bodily needs and received the same standards of care (i.e. nutritional, medical) as his unit mates. Nothing was withheld except social interactions and activities, and their denial was contingent on his aggressive behaviors. Thus the decision to receive or avoid social isolation was his and he was intellectually capable of making it, because of his history of responding to complex social contingencies and comprehension of time.

Individuals with severe and profound mental handicaps would not benefit from this program because they would be unable to comprehend the relation between their misbehavior and the resulting lengthy, isolation period. They also would be less

likely to have a sufficient number of social and activity reinforcers to permit many timeouts to occur during the isolation (Foxy & Livesay, 1984). In subsequent clinical applications, I have often been able to reduce the social isolation duration to between six and 12 hours and sometimes to three (see Jack below).

Jack (1986, 1989)

Foxy et al. (1989) described a strategy for systematically discontinuing aversive components in treatment programs in a 52-month follow-up report of a two-phase program for treating the severe, negatively reinforced aggression of Jack, a 20-year-old institutionalized, dually diagnosed, deaf male (Foxy et al., 1986b). Jack had resided in institutions since the age of seven. Jack's attacks on staff and other individuals included pulling out hair causing injuries to the scalp, pinching, and kicking. He also destroyed property. His behavior was so volatile that no one would get close to him. This, of course, limited his opportunities for appropriate social interactions and education. Most disturbing was that he would pull people's hair and eat it. To treat his aggression, custodial methods including psychotropic medications, restraints, and seclusion had been used. He was in cuffs and belts prior to our treatment and received large daily dosages of Thorazine or its equivalent.

Phase I lasted 28 months and included (i) contingent electric shock to punish aggression, (ii) a high density of positive reinforcement to construct a new motivational system for Jack, (iii) brief, intensive compliance training, (iv) transfer of programmatic responsibility from the researchers to direct care staff and Jack's parents, and (v) a relaxation procedure to interrupt the aggressive response chain. Phase II lasted for 32 months and featured (i) replacement of shock with decreasing durations of nonexclusionary time-out (Foxy & Shapiro, 1978) and (ii) a high density of naturally occurring reinforcers. Jack's aggression remained more than 90% reduced from baseline for 5 years. During this period he received no behavior control medication, walked independently to classes and activities, worked on grounds, participated in educational and recreational activities, made regular home visits (over 300 miles away), went on trips to the community with his parents and accompanied them on vacation.

These were important outcomes because prior to the program Jack had received high dosages of behavior control medication (e.g. 1600 mg of Thorazine per day) and had been wearing cuff and belt restraints continuously on the living unit. In the two years before the shock program, Jack received a total of 1 183 000 mg of Thorazine or its equivalent. A social validity questionnaire revealed that he has become more social and less dangerous.

In phase I the goal was to design a treatment regime and training model that would produce durable treatment effects and be maintained by direct-care staff and Jack's

parents. In phase II the goal was to discontinue shock and yet maintain the treatment effect through the use of a long term maintenance strategy.

Phase I

The training model was as follows. Several individuals who possessed extensive behavioral skills (the primary treatment personnel) worked with me during day long intensive-treatment sessions. After they had become proficient in program implementation and Jack's aggressive behavior had been greatly reduced, the living-unit psychologists were trained. They were then supervised while they implemented the program in the living unit and school. Then, preselected nonprofessionals received training at the living unit and the school. This training involved modeling, demonstrations, and didactic instruction. Finally, the primary treatment personnel remained responsible for Jack's treatment and monitored the program implementation on an ongoing daily basis. Jack's parents were trained to conduct the program during home visits. This model followed the recommendations of Carr and Lovaas (1983) and Foxx, Plaska, and Bittle (1986d).

Several factors ensured that the treatment effects would not be situation specific, including the use of a graded training sequence (i.e. from intensive-compliance training to the regular school and living-unit routines and finally to vocational programming), different trainers (e.g. supervisory personnel, direct-care staff, workshop supervisor), and multiple treatment environments. Functional analyses were conducted on a minute-by-minute basis during the compliance training. This trial-by-trial, day-by-day information was then used to plan future treatment and maintenance efforts. In month 16, Jack was required to relax for 5 minutes whenever he became agitated (Foxx & Azrin, 1972). The relaxation procedure was implemented at or near the beginning of a potentially aggressive episode in order to interrupt aggressive responses at their weakest point in the response chain, create a physiological state incompatible with aggression, and add additional instructional control for calmness.

To encourage relaxation, the staff signed to Jack to sit or lie in a quiet area (e.g. on his bed). If he did not, he was immediately escorted to the area and instructed to relax. When he actively resisted, he was placed in boxing gloves for 30 minutes (see below for the rationale). The relaxation period then resumed. The procedure was repeated if he attempted to leave the area during the 5 minutes. Over time Jack complied with requests to relax and would often leave confrontational situations and seek a quiet area.

The use of shock may have enhanced the reinforcing properties of other stimuli. For instance, social stimuli (e.g. physical contact, praise, interaction, conversation) had little reinforcing effect on Jack's behavior prior to the shock program. Yet, these

stimuli appeared to acquire considerable reinforcing value as treatment progressed because they may have become conditioned reinforcers when they were paired with the avoidance of shock (see Bucher & Lovaas, 1968). Similarly, negative social stimuli (e.g. negative attention) were probably weakened because they were paired with shock.

Phase II

The shock contingency was discontinued after month 28 because aggression had been reduced long enough for Jack to learn a variety of alternative appropriate behaviors. Nonexclusionary timeout (Foxy & Shapiro, 1978) was then used to maintain the therapeutic effect.

Because most individuals and Jack's parents could not physically manage his aggression, the nonexclusionary timeout/social isolation consisted of Jack wearing boxing gloves. The gloves prevented him from signing (timeout), hair-pulling, and becoming physically unmanageable, yet allowed him to remain in a positively reinforcing environment. During timeout, Jack remained wherever he had aggressed, but he was restricted from all social interactions and scheduled naturally occurring reinforcing events. The overall timeout period was designed to consist of multiple timeout intervals and each varied in duration and effectiveness according to the ongoing reinforcing event at that time (see Paul's program). The gloves also served as a discriminative stimulus that Jack was not to receive attention. Jack was told (signed to) that because of his aggression he would be denied social contact for three hours. He was instructed to avoid others. He was free to move about at will, except when he approached someone or a group activity. In such cases he was either instructed with signs to leave the area or the other(s) walked away. When timeout ended, Jack was returned to regular programming and prompted to complete any task(s) interrupted by his aggression. If his aggression had occurred during an instructional session, he was returned to the situation and given the instruction. Hence, he never escaped a situation by aggressing.

The timeout duration was reduced to one hour during month 41, and to 15 minutes by month 44. Timeout was effective because Jack's living unit had numerous reinforcing activities, a token program, and a reinforcement room that contained a television, a variety of games, educational materials, and snacks (Foxy et al., 1986a). Thus we were able to shift from type I to type II punishment. One factor that may have ensured the enduring effectiveness of the program was Jack's level of functioning. Foxy and Livesay (1984) reported that higher functioning individuals treated with overcorrection procedures showed longer and better treatment effects than lower functioning individuals. Such individuals have well developed expressive language, which permits them more opportunities to obtain reinforcers and positive

interactions with others. Thus, Jack's programming focused on teaching him new ways of interacting and increasing his positive interactions with other. Jack's case achieved the most desirable long term clinical outcome in a program that included contingent shock because a significant behavioral reduction was maintained in the natural environment with shock discontinued (see Foxx, 1991).

Joe (1994)

Foxx et al. (1994) treated Joe, a 36-year-old institutionalized severely retarded man, for aggression, self-injury, and property destruction. His most common and dangerous form of aggression was biting, which was extremely dangerous because of its intensity and unpredictability. Joe's victims had permanent scarring and physical damage to their fingers and arms (e.g. loss of the end of a finger). His self-biting produced severe lacerations to his limbs.

During 22 years of institutionalization (ages 11 to 32) numerous unsuccessful medical, custodial, and behavioral treatments had been attempted. Similar failures occurred in several group homes, including one that was designed specifically for Joe. In the 28 months prior to the study, Joe aggressed toward himself 12 495 times or 14.7 times per day, toward the environment 3567 times or 4.2 times per day, and toward others 649 times or 0.8 times per day. What is noteworthy about these figures is that Joe's aggression was escape motivated, yet the environment was deliberately designed to produce virtually no demands.

Phase I

A formal functional analysis of antecedent stimuli (e.g. familiar tasks), consequences for appropriate behavior (e.g. continuous encouragement and edible reinforcement), and consequences for aggression (e.g. loud and soft verbal reprimands) revealed that Joe's aggression was primarily escape motivated. The treatment was conducted in a special living unit at a state residential facility.

Our functional analysis clearly revealed that the vast majority of Joe's aggression was triggered by interactional or educational instructions and negatively reinforced by the postponement or termination of these events. This eliminated using positive reinforcement alone as a treatment strategy. There were several reasons why. One, using it alone at the beginning of treatment would be extremely dangerous because there was no way of inhibiting Joe's aggression. Two, positive reinforcement was noncompetitive with the powerful negative reinforcement that he had a long history of obtaining. Consider that merely approaching Joe or saying his name could lead to an attack. Three, the effective use of differential reinforcement programs with an extremely aggressive individual does not simply involve dispensing positive

reinforcers but also the skillful integration of a variety of strategies and behavioral techniques. Yet, the technology to train such subtle skills does not appear to be readily available (Foxx, 1985a, 1985b, 1996, 2001). Hence, we did not believe that it was possible to adequately train everyone responsible for Joe's treatment to conduct the elaborate and lengthy differential reinforcement programs that some have stated will reduce severe aggression (e.g. LaVigna & Donnellan, 1986) but that have failed in empirical (Paisey, Whitney, Hislop, & Wainczak, 1991) and critical evaluations (Foxx, in press). Four, it did not appear to be feasible to implement such programs on a 24-hour basis. Given these factors, we sought to develop Joe's responsiveness to such positive approaches over time while simultaneously bringing his destructive behavior under control. Because Joe's aggression was primarily negatively reinforced he reacted to any programming attempt as if it represented a demand. Thus, even positive programming efforts increased the likelihood that aggression would escalate and intensify. As a result, a type I punisher was needed to control his aggression.

In order to implement the overall skill building/communication strategy it was first necessary to find an event that would act as an effective type I punisher for aggressive behavior. Accordingly, the purpose of phase I was to evaluate several procedures hierarchically sequenced according to their aversiveness. The sequence was baseline, DRI, and then DRI combined with an aversive noise, water misting, and contingent electric shock. Because Joe's aggression was primarily negatively reinforced, the evaluations included task demand situations and compliance training (see Foxx et al., 1986b).

Approval to use shock was obtained from Joe's parents and all appropriate parties after they had reviewed a detailed informed consent document (Foxx et al., 1986d) that addressed pertinent ethical, legal, and clinical concerns. Because Joe was part of a Federal lawsuit, the overall program and document were also reviewed by the court's expert consultant, the consultant's experts, and the plaintiff's attorney. Joe's parents witnessed the hierarchical assessment and first three days of shock use.

Contingent shock was viewed as a necessary, but not sufficient, part of the overall treatment effort. Consider that its use to suppress destructive behavior made desirable responses more probable and hence created a window of opportunity for replacing destructive behaviors with new ones. This process was facilitated by arranging for all preexisting and new appropriate behaviors to involve little response effort and result in the same reinforcers as destructive behaviors (e.g. escape). As discussed by Carr, Robinson, and Palumbo (1990), the question is not whether aversive treatments are justified because nonaversive treatments have failed or whether they work at all but rather what is done when an individual is not misbehaving. The use of shock permitted us to avoid crisis management and reactive approaches and opt instead for proactive, skill building communication strategies by creating a situation whereby

therapists could safely employ these strategies with an extremely dangerous individual.

The hierarchical assessment of reductive procedures revealed that contingent shock was most effective in suppressing aggression. It reduced total aggression by 92% of baseline. Furthermore, Joe's compliance increased substantially in the shock condition. Session duration averaged 34.3 min in the shock condition versus 8.1 min in the baseline (a 423% increase). Joe's outbursts and self-abusive episodes also became shorter and occurred less often over the 19 shock sessions in three days and no destructive behavior occurred during the final eight-hour assessment day. Although Joe attempted to bite several individuals, I was the only casualty when he bit me on the calf on day one of the shock contingency. Joe's on-task performance improved, as did his overall demeanor. Given these outcomes there was unanimous agreement by the treatment team and Joe's parents to incorporate the shock contingency into his program.

Phase II

Program Transfer, Extension, and Maintenance Program Planning. The overall program plan followed Foxx et al. (1986b) and was designed to avoid or minimize problems associated with the use of shock (Foxx, McMorrow, Rendlemen, & Bittle, 1986; Foxx, McHenry, & Bremer, 1996; Foxx, Bremer, Shultz, Valdez, & Johndrow, 1996; Newsom, Favell, & Rincover, 1983), produce durable treatment effects (Foxx et al., 1989), never intermittently reinforce aggression, and enhance generalization across therapists and settings (Foxx, 1990).

Positive Programming Strategies and Procedures. Because phase I demonstrated that shock would control aggression, it was possible in phase II to implement our positive programming strategies of increasing Joe's skills, communication skills, menu of potential reinforcers, self-control and patience, and choice making opportunities, and teaching him behaviors that served the same function as his aggression. Joe was paid tokens for displaying on-task behaviors, independent living, and social skills, and taught to exchange them for preferred activities and events. Over time, Joe participated in a variety of off-unit activities including workshop, occupational, speech, and music therapy classes, swimming, gym classes, social activities, horseback riding, walking on a nature trail, and visiting the canteen.

Results

A comparison of the first treatment month with the month prior to treatment revealed significant decreases in all forms of aggression: overall aggression

decreased from 35 to 2.5 responses per day (a 93% reduction); aggression toward self from 24 to 1.6 responses per day (a 93% reduction); aggression to others from 2.7 to 0.5 responses per day (an 81% reduction); and aggression to the environment from 8.3 to 0.3 responses per day (a 96% reduction). In treatment month one, contingent shock was applied 60 times but only on 16 of 30 days (53%). In the pre-treatment month, Joe injured himself 2.6 times per day (an injury report and first aid were required each time) whereas only three injuries occurred during month one (a 96% reduction).

The program was in effect for 54 months. The mean daily occurrence of all three types of aggression remained significantly below the pre-treatment month and that the trend continued to be downward. Consider that total aggression averaged 2.1, 1.1, 0.9 and 0.4, respectively, per day during the last 4 years of treatment. No aggression towards others or the environment occurred in months 42 to 54. An important measure of programmatic success was the number of shock free days, which increased across the years from 77% in the first year to 90% by the fourth full year.

A detailed analysis of Joe's aggression by time of day, day, setting and antecedent events in the early stages of treatment revealed some interesting findings. Because the vast majority of Joe's aggression was escape motivated, it was not surprising that aggression occurred the least on weekends. Fifty percent of Joe's aggression occurred in a six-hour period between 8 a.m. and 2 p.m. Because this trend was apparent early in treatment, Joe's daily programmatic schedule was rearranged so that his less preferred tasks and activities were presented in the afternoon. For example, Joe was enrolled in morning gym classes in the middle of month 3. In the next four months, 19.5% of his aggression was displayed during this one-hour class (range 11–23%). After this class was rescheduled to afternoons (month 7), Joe only aggressed in gym class in four of the 11 remaining months and his aggression only averaged 4.3%.

Although aggression occurred in 17 different settings, 68.5% occurred in the six settings that contained the most demands. Nineteen antecedent events were identified as setting the occasion for aggression. The highest percentages of aggression were associated with instructions to perform high demand tasks.

Prior to treatment, Joe's severe aggression required the intervention of three or more staff members. After treatment, only one staff member typically was needed to conduct a structured program with Joe or treat his aggression. During the pretreatment month, emergency restraint was implemented on ten occasions for a total of six hours and 31 minutes, whereas it was not used during treatment. The intensity of aggressive behavior decreased markedly over time. Medical treatment for others has not been needed since I was bitten on treatment day one.

Joe's successful treatment was especially gratifying because his aggression (i) was particularly dangerous and physically damaging, (ii) had been chronic and very

resistant to a variety of treatments, (iii) had prevented his participation in social and habilitative activities, and (iv) had resulted in the routine use of emergency physical restraint by four to five large men. Joe's aggression was maintained at low levels (i.e. more than 99% reduced from baseline) even though ever increasing demands were placed on him to participate in new activities and environments with new therapists. The majority of his day was spent away from the unit, attending recreational activities and classes, running errands, and visiting the canteen. He received no behavior control medication and made regular home visits and trips to the community with his family.

Conclusion

The long term success achieved in these three cases appears to have been due to numerous factors. One, aggression never produced escape from educational and vocational demands. Two, a history of appropriate responding for positive reinforcement especially with complex social contingencies was established. Hence, as the individual's behavior became increasingly appropriate over time, the density of naturally occurring positive reinforcement correspondingly increased. Three, the complexity and relevance of the tasks that were given were increased. Four, a systematic effort was made to increase self-control and patience. Five, a long-standing problem for Jack and Joe, activity avoidance via aggression, was virtually eliminated by ascertaining and responding to the communicative function of this behavior. Six, the individuals' choice-making opportunities were greatly increased (Foxx et al., 1993). Seven, the stimuli controlling nonproblematic behavior were present throughout the treatment. Eight, the individuals' parents participated in every treatment decision and phase. They served as a valuable resource regarding their child's learning history, reinforcer preferences, and communication skills. Nine, the individuals were taught to request responses that were functionally equivalent to their destructive behaviors but more efficient in generating and securing reinforcers. Ten, the individuals selected to provide the most salient forms of social reinforcement were those who shared a mutual affection with the clients. Eleven, the individuals' destructive and escape and avoidance behaviors were made irrelevant by reducing or eliminating their boredom and frustration and by varying tasks and actively encouraging choice making. Twelve, the maintenance of response suppression was considered by actively programming for maintenance (Foxx, 1990, 1989; Foxx & Dufrense, 1984; Foxx et al., 1989), keeping the treatment and maintenance programs similar (Foxx & Livesay, 1984), and ensuring change agent and programmatic accountability (Foxx et al., 1986b).

These three programs are a step in the development of maintenance strategies for treatment programs in a manner that meets both the individual's right to effective

treatment (Van Houten et al., 1988) and right to the least restrictive treatment. These rights are met when an individual's treatment is viewed as an evolving process in which clinicians remain committed to achieving the best therapeutic effect over the long term while continually evaluating how much, if any, intrusiveness is necessary. Such a long term approach allowed the time to construct new learning histories for difficult clients that offered them the opportunity to display new as well as dormant appropriate forms of behavior. In this way their full integration into all forms of habilitative programming and an increased range of lifestyle activity can be a realizable goal.

One of the major criticisms of contingent shock treatment procedures is their failure to produce long term suppression (Favell et al., 1982); yet, high intensity shock with infrahumans produces complete suppression (Azrin & Holz, 1966; Johnston, 1972). The issue of maintenance of effect often is confounded by questions concerning stimulus generalization. Maintenance of effect is defined as the change in behavior after a procedure has been terminated rather than the transfer of effect to extra-therapy/treatment settings. Even with this definition, a question of stimulus control arises and this question is essential to understanding why the shock effect may not be maintained in applied research but is in basic research with animals. For animals, maintenance of effect is assessed by repeatedly placing the animal in the chamber where shock had previously been delivered. Clearly, stimulus control is operating. In clinical applications utilizing electric shock, however, the typical procedure is to conduct relatively brief treatment sessions in a restricted setting. Yet, doing so may be creating a multiple schedule. Consider that in setting A, i.e. the treatment setting, a self-injurious or aggressive response produces shock whereas in setting B (i.e. the client's regular environment) the response does not produce shock and may in fact produce reinforcement. On a rather molar level, a two-ply multiple schedule (i.e. punishment versus reinforcement) is created. This is the same type of arrangement that is used in discrimination training paradigms to increase responding in the presence of one stimulus condition and eliminate responding in the presence of another. The stimulus control exerted by the 'treatment setting' certainly is powerful but the stimulus control exerted in the client's regular environment is equally powerful. In other words, the aggressive behavior continues to occur in those environments that shaped and maintained it prior to treatment. To some degree, then, the clinical question of maintenance of effect relates to the degree of generalization from the treatment setting to the clients' regular environment. As a result, we should not expect the maintenance of any clinical gains from the treatment setting to occur in the regular environment unless substantial modifications have been made (Bucher & Lovaas, 1968; Foxx, 1996, 2001). Thus, the question of maintenance of effect pertains only to the duration of clinically achieved effects within the actual treatment setting and the issue of maintenance of effects becomes, in essence, a question of the

maintenance of stimulus control. In the three studies just discussed, no maintenance problems were encountered because all treatments were either conducted in the client's regular environment from the beginning of treatment, i.e. Paul, or quickly moved there once initial success was achieved in the treatment environment, i.e. Jack and Joe.

Promoting the long term maintenance of therapeutic change has been and remains the most difficult challenge for behavior analysis. A particularly difficult group to treat and achieve long term maintenance success with appears to be individuals who have a long history of dangerous aggression for negative reinforcement. If maintenance is to be successful, it is imperative that they be taught to be more responsive to positive reinforcement. Yet as discussed previously, using positive reinforcement alone at the beginning of treatment would not only be dangerous but also noncompetitive with the powerful negative reinforcement that is available. Furthermore, it does not appear to be currently feasible to implement such programs on a 24-hour basis. This may be why those purporting to use positive approaches alone have had to resort to 'emergency' uses of contingent restraint but *'not as a programmed consequence'* (Lucyshyn, Olson, & Horner, 1999) or missed acknowledging the relation between the introduction of large amounts of Thorazine and reductions in behavior (Berkman & Meyer, 1988; Linscheid & Landau, 1993). A perhaps more honest and superior model is where the clinician must develop individuals' responsiveness to positive approaches over time after first bringing their aggression to safe levels with appropriate reductive and positive procedures.

To advance the treatment of individuals with developmental disabilities who display aggression toward others, lengthy follow-ups must be conducted and disseminated so that maintenance and generalization strategies can be analyzed and evaluated (Foxx et al., 1989). Changing journal publication standards may help ensure this process, e.g. by requiring a minimum follow-up period (e.g. a year or more) before an article can be considered for publication (Foxx, 1985b).

The maintenance of treatment success with dangerous behavior depends on such factors as active programming of a maintenance procedure (Foxx, 1996), the similarity of the treatment and maintenance programs (Foxx & Livesay, 1984), change agent and programmatic accountability (Foxx et al., 1986d), and whether artificial or natural reinforcers are used (Foxx, 1982). These factors were considered in the three cases. The treatment and maintenance programs were similar, kept as uncomplicated as possible, and the maintenance programs were developed before the treatment program ended. The overall density of naturally occurring reinforcement was frequently raised and evaluated. Accountability was ensured by having the senior author retain ultimate programmatic responsibility. Perhaps the most critical factor in the successful treatment of these individuals was providing treatment throughout all of their waking hours (Foxx, 1991, 1996).

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