Effects of Punishment and Response-Independent Attention On Severe Problem Behavior and Appropriate Toy Play

Shannon S. Doughty[1,2]
Susannah G. Poe[1]
Cynthia M. Anderson[1]
West Virginia University[1] *and Parsons State Hospital and Training Center*[2]

Abstract

Problem behavior can interfere with learning, the development of appropriate skills, and socialization in persons with developmental disabilities. In severe cases, problem behavior could result in life-threatening injury. For one 21-month-old participant diagnosed with autism engaging in severe problem behavior for whom reinforcement-based interventions had failed, punishment was implemented. After the efficacy of punishment alone was evaluated, it was implemented concurrent with response-independent attention. Problem behavior was suppressed and appropriate toy play emerged as a function of these combined interventions. Thus, punishment in combination with response-independent attention was an effective intervention for severe, attention-maintained problem behavior.
Keywords: Noncontingent reinforcement, response-independent reinforcement, punishment, self-injury, property destruction, toy play, autism.

Self-injurious behavior (SIB), severe aggression, and property destruction are among the most challenging behaviors exhibited by individuals with developmental disabilities. Such behavior adversely impacts the individual's learning and independent functioning and interferes with more age-appropriate behavior, such as development of appropriate play and social skills in young children. If severe, challenging behavior can threaten the health and safety of the individual and/or the people who interact with the individual.

Reinforcement-based procedures such as functional communication training (Carr & Durand, 1985) generally are preferred in reducing problem behavior and increasing appropriate behavior for both ethical and practical reasons. It may not be possible or preferable, however, to maintain the delivery of a reinforcer on a response-dependent schedule. For example, a child might request a food that is not immediately available. *Noncontingent reinforcement* (NCR) is the response-independent delivery of a preferred stimulus (e.g., response-independent attention) according to, for example, a fixed-time (FT) schedule (e.g., Vollmer, Iwata, Zarcone, Smith, & Mazaleski, 1993). Such a schedule might be considered easier to implement, for parents, teachers, and/or staff, than a response-dependent schedule (e.g., Tucker, Sigafoos, & Bushell, 1998). At least two explanations have been put forth in the applied literature as to why NCR might be an effective intervention. One reason is because when the reinforcer is delivered response-independently instead of response-dependently, extinction effects might reduce the problem behavior. Another explanation indicates that NCR might serve as an establishing operation (Michael, 1982) insofar as the delivery of the stimulus noncontingently may decrease its value, thereby decreasing the occurrence of the problem behavior.

On the other hand, the term *positive punishment* refers to the presentation of a stimulus that, when delivered contingent on a response, *decreases* the future probability of that response. It generally is considered more ethical to use punishment when it is used in combination with reinforcement-based procedures so that not only behavior-decreasing mechanisms are in effect. Some investigators have claimed that punishment may not always be desirable because its long-term use *may* have negative side effects (Matson & DiLorenzo, 1984). Further, parents and

teachers often report difficulty in consistently implementing punishment procedures over time (Cooper, Heron, & Heward, 1987; Miltenberger, 1997). Finally, the use of intrusive punishment procedures often focuses attention on the individual and may be stigmatizing (Mayer, 1995). For these reasons, if punishment is necessary to suppress severe problem behavior immediately due to the risk to the health of the individual, it would be preferable to add procedures, such as NCR, after punishment reduces the severe problem behavior. When punishment is combined with NCR, preferred stimuli also are obtained and the punishment schedule might be faded, and the punisher may be made less severe or ultimately discontinued.

To our knowledge, only Rush, Crockett, and Hagopian (2001) have examined the combined effects of punishment and NCR. These authors added facial screen to an NCR program to decrease SIB and aggression in two participants. They found that when NCR was combined with punishment, it reduced problem behavior more completely than when NCR was used alone, and that the inclusion of punishment did not notably decrease positive "affect." The purpose of the present study was to systematically replicate Rush et al. The present study extended their results and included NCR (response-independent attention) when punishment was required immediately to reduce severe SIB quickly. Thus, it was assessed whether punishment effects could be enhanced and maintained, and if punishment could be implemented less frequently by the inclusion of response-independent attention. A secondary purpose was to determine if the decrease in problem behavior associated with punishment and response-independent attention effects also might influence appropriate toy play.

Method

Participant

Jacob was a 21-month-old boy at the start of the study. He previously had received a diagnosis of autism but appeared to be functioning in the average range of intelligence. He presented with severe SIB, aggression, and property destruction. Of greatest concern was Jacob's SIB, which often resulted in contusions, tissue damage, swelling, and bleeding. His problem behavior was reported to be worst when separated from his mother. Jacob took the anticonvulsant Carbamazepine throughout the duration of the study to control possible seizure activity. Prior to Jacob's referral to the authors for intervention, his mother had tried several interventions based on the recommendation of professionals including differential reinforcement (including functional communication training) and extinction. Unfortunately, these interventions were not successful, probably because Jacob's SIB occurred at such an intensity that it was impossible to ignore.

Design

The study used an ABABCD design in which A was baseline, B was punishment, C was the addition of response-independent attention and punishment-schedule fading, and D was generalization. This generalization consisted of a 6-month follow-up session and a follow-up meeting after 12 months.

Operational Definitions and Interobserver Agreement

Dependent measures were problem behavior and appropriate toy play. Problem behavior was taken as a frequency measure, and appropriate toy play was taken as a partial-interval measure. Self-injurious behavior was defined as head banging and throwing himself to the floor. Property destruction included throwing objects not designed for throwing, swiping tables, and overturning furniture. Aggression was scored exclusively as head butting another person. Appropriate toy play was defined as physical engagement with a stimulus (e.g., crayons, books) in the manner in which it is intended or is typical (i.e., age-appropriate toy play). Prior to initiating data collection, observers were trained to criterion of 80% or higher agreement on the occurrence or nonoccurrence of the behaviors. Because this case primarily was applied, not all sessions were videotaped and not all videotaped sessions were kept. For this reason, interobserver agreement during the study was estimated by calculating agreement in pre- and post-treatment video recordings by two observers collecting data independently, but simultaneously, and calculating agreement by dividing the number of agreements by the number of agreements plus disagreements. Agreement on toy play was calculated across six 10-min random samples of video from pre- and post-treatment. Because behavioral definitions remained constant, it is likely that these percentages closely mimicked agreement during the other sessions as well. Mean agreement for SIB, property destruction, and aggression was 98.9%, 99.9%, and 99.6%, respectively. Mean agreement for appropriate toy play was 98.2%.

Functional Analysis

A functional analysis similar to that described by Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994) was conducted. The purpose of the functional analysis was to determine the environmental variables maintaining Jacob's problem behavior. Four session types were alternated in a multi-element design, and each session lasted 10 min. These session types were demand, attention, tangible, and control. The demand condition helps to establish whether escape from demands serves as a reinforcer for problem behavior. The attention condition is to determine if problem behavior is reinforced by attention. The purpose of the tangible condition is to determine if preferred items and activities reinforce problem behavior. Finally, the control condition served as the experimental control for all other session types.

Evaluation of Punishment and Response-Independent Attention

Baseline. In baseline conditions, Jacob and the experimenter were alone in a room with age-appropriate toys, an adult-sized table and chairs, a child-sized table and chairs, and several high chairs. The experimenter read a book and did not interact with Jacob. Contingent on each occurrence of one of the target responses, Jacob's mother immediately entered the room and interacted with him "positively" (e.g., talking, soothing, hugging) for 20 s. At the end of the 20-s interval, she left the room and closed the door.

Punishment. In this condition, Jacob and the experimenter were alone in the room together. Similar to the previous condition, the experimenter did not interact with Jacob. However, contingent on each occurrence of problem behavior, instead of Jacob's mother entering the room and interacting with him, the experimenter placed Jacob in a 20-s basket-hold restraint without comment. At the end of the 20-s interval, the experimenter released Jacob and continued reading.

Reversal. The baseline and punishment conditions, respectively, were repeated with the same contingencies in effect as earlier.

Punishment and response-independent attention. This condition was conducted in the same manner as the punishment condition (i.e., the experimenter implemented a 20-s basket-hold restraint contingent on problem behavior) with one exception: response-independent attention was delivered. Initially, Jacob's mother entered the room every 2 min to deliver 20 s of "positive" attention regardless of his behavior. However, this schedule was leaned, and the treatment was generalized to a new environment to help achieve therapeutic effects. That is, the condition was conducted in an identical manner except Jacob's mother was in the room the entire time, and the experimenter never delivered the attention or punisher. His mother, like the experimenter, ignored Jacob until either (a) he engaged in the targeted problem behavior at which time she placed him in a 20-s basket-hold restraint or (b) 2 min had elapsed from the last (response-independent) interaction, at which point she delivered 3-5 s of positive attention. This schedule of attention delivery then was faded to a fixed-time (FT) 3.5-min schedule and finally to an FT 5-min schedule.

Generalization and follow-up. To increase generality, the intervention occurred in Jacob's home and still was conducted exclusively by Jacob's mother, with the experimenter only observing. The FT 2-min schedule was reinstated to increase the likelihood of success, but otherwise was conducted identical to the previous condition (i.e., the punishment with response-independent attention condition). Follow-up sessions were conducted 6 months following the end of the experiment proper and were identical to sessions at the end of the experiment proper. Finally, a 12-month follow-up meeting was conducted to obtain anecdotal evidence of treatment success.

Results

Functional Analysis

Because Jacob's behavior increased in severity when separated from his mother, she was trained to conduct the functional analysis. The functional analysis was terminated early at parental request and experimenter discretion due to the severe nature of Jacob's SIB. Thus, the results are indeterminate and not considered to portray accurately the environment-behavior relations in effect. It was noted that much of Jacob's problem behavior occurred when his mother was not close by (e.g., was in another room) and appeared to be maintained by her attention. Although this hypothesis was not able to be assessed via functional analysis for the safety of the participant, baseline behavior supported the hypothesis, and a treatment based on it was successful. In addition, low rates of problem behavior in the control condition, where maternal attention readily was available, reflect the validity of the conclusion.

Evaluation of Punishment and Response-Independent Attention

Baseline, treatment, generalization, and follow-up rates of problem behavior for Jacob appear in Figure 1.

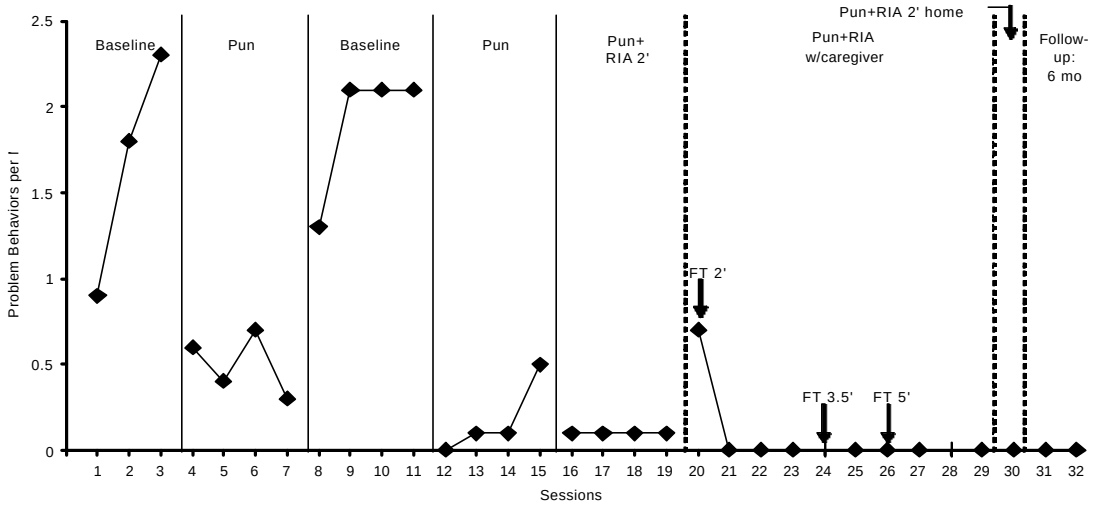

Figure 1. **Rate of problem behavior across sessions. "Pun" indicates conditions when contingent basket hold is present. "RIA" indicates conditions when response-independent attention was provided, and the numbers represent the schedule (in min) on which the attention was provided. The solid vertical lines indicate a change in condition, while the dotted vertical lines indicate minor procedural changes (indicated in the text) not affecting the contingencies.**

Baseline. Baseline rates depict primarily destructive, more than self-injurious, behavior. Thus, baseline conditions were completed safely. Rates of problem behavior were high and on an increasing trend in baseline (range=0.9 to 2.3), and high and stable during the return to baseline condition (range=1.3 to 2.1).

Punishment. Rates of problem behavior were suppressed in each condition when the contingent basket hold was implemented. In the second punishment condition, there was a slight increase in problem behavior in the fourth and final session. The experimenter hypothesized that, perhaps, the increase in problem behavior was due to the unavoidable attention delivered during the basket hold. Because Jacob was ignored other than when he engaged in problem behavior, it is possible that the attention from the basket hold was a reinforcer to some degree. Other types of "negative attention" (e.g., verbal attention) can reinforce problem behavior (e.g. Fisher, Ninness, Piazza, & Owen-DeSchryver, 1996); therefore, the "negative attention" might result in an increase in problem behavior over time. Due to the severity of Jacob's problem behavior, such risk was not warranted. Thus, response-independent attention delivery was implemented for two reasons: (1) *ethical*—punishment alone often is not a preferred method of treatment on its own and deserves much ethical consideration if it is to be used for *severe* behavior (Miltenburger, 1997), and (2) *applied*—punishment alone seemed to be losing its effectiveness at maintaining problem-behavior suppression.

Punishment and response-independent attention. Problem behavior nearly was suppressed completely with the introduction of the FT 2-min attention delivery. There was an initial increase in problem behavior when this schedule commenced, followed by a subsequent (and permanent) decrease to zero across all schedules of attention delivery (see Figure 1).

Generalization and follow up. Problem behavior was suppressed to zero and remained at zero both in the home and at a 6-month follow-up session (i.e., punishment no longer was implemented). At the 12-month follow-up, Jacob's mother reported that she no longer implemented the basket hold at all, but had faded it to basket hold in a chair and then timeout in a chair. Timeout was not observed, however, as problem behavior did not occur. Jacob's mother reported that he no longer engaged in SIB, and rarely engaged in any destructive behavior that exceeded that of a typical child.

Appropriate toy play. Accompanying the decrease in problem behavior, there was an increase in appropriate toy play. During baseline, Jacob never interacted appropriately with the toys. Any toys that he picked up were thrown or dropped. Although interobserver agreement on percent of intervals spent engaging in appropriate toy play never was collected during sessions, three random, independent observations of 10-min segments of videotapes of pre-treatment observation in the clinic confirmed no appropriate toy play (*M*=0%). In a random sample of approximately five 10-min segments after treatment, appropriate toy play was more frequent (*M*= 19.8, range 7-25).

Discussion

Punishment quickly reduced severe problem behavior, possibly preventing further injury, but problem behavior began to increase again before the implementation of response-independent attention. The combination of response-independent attention and contingent basket hold successfully reduced problem behavior to zero. Furthermore, appropriate toy play emerged by the end of the study. Therefore, the implementation of this combination of treatments resulted in more age-appropriate behavior both in terms of problem behavior and toy play. Despite the side effects of punishment that often are considered prior to the implementation of an intrusive punishment procedure, it is important to note that *appropriate* toy play was established.

According to his mother, Jacob continued to display positive "emotional" behaviors (e.g., smiling, hugging, laughing, playing) with his mother and the experimenter after the basket hold intervention. This report suggests that there were no observable lasting negative effects on the relationship with the people delivering the punisher (cf. Sidman, 1989). Furthermore, at the 12-month follow-up session, Jacob no longer engaged in SIB or aggression, and was refused admission to an autistic-support preschool (with the recommendation that he only be among children with autism as "an autism mentor," not a student requiring services). It is not being suggested that this intervention eliminated the participant's autism or autistic-like behaviors. Instead, these anecdotes are described to emphasize further that after this combination of treatments including punishment, two findings were observed. First, the intervention reduced behavior that contributed to the diagnosis and increased behavior that often is underdeveloped in children with the diagnosis of autism. Second, the intervention did not have lasting, negative effects on Jacob, despite the use of punishment (cf. Matson & DiLorenzo, 1984).

When punishment initially was implemented, not only was the basket hold included, but Jacob's mother no longer entered the room. The intervention used, therefore, actually consisted of extinction *and* punishment. The relevant variable, however, was punishment as extinction alone had not been successful. It was not practical to employ punishment alone (i.e., having

Jacob in a basket hold by the experimenter while his mother came in and comforted him). In addition, the important questions regarding the clinical efficacy and side effects of punishment were not compromised by the inclusion of extinction.

There were limitations to this study. First, it was conducted only with one participant. Second, the functional analysis could not be completed safely. Third, measurements of toy play only were measured before and after intervention. Finally, interobserver agreement of actual (or treatment) sessions could not be conducted. As such, the findings must be explored further. However, this study served an applied function, raises an interesting and important question about the effects of response-independent attention and punishment on appropriate and inappropriate behavior, and serves as an impetus for future directions in early intervention research.

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Correspondence should be addressed to:
Shannon S. Doughty
Parsons State Hospital and Training Center
2601 Gabriel
PO Box 738
Parsons, KS, 67357
e-mail: sshdoughty@yahoo.com
fax: (620) 421-1499

Cynthia M. Anderson, Ph.D.
Assistant Professor, School Psychology Program
University of Oregon
Educational & Community Supports
1235 University of Oregon
Eugene, OR 97403-1235
Phone: (541) 346-2671
Email: canders@uoregon.edu

Susannah G. Poe, Ed.D.
Clinical Psychologist
Department of Pediatrics
Klingberg Neurodevelopmental Center
Robert C. Byrd Health Sciences Center
West Virginia University Hospitals
Morgantown, WV 26505
Phone: (304) 293-7331
Email: spoe@hsc.wvu.edu