

*SIDE EFFECTS OF THERAPEUTIC PUNISHMENT ON
ACADEMIC PERFORMANCE AND EYE CONTACT*

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The effects of therapeutic punishment delivered following inappropriate behavior on the academic responding and eye-to-face contact of 2 persons with developmental handicaps was examined using a counterbalanced alternating treatment design. Each subject was sequentially taught by two therapists each day. While one of the therapists taught the subject, the second therapist stood in close proximity directly behind the subject. During baseline, neither therapist delivered punishment following inappropriate behavior. During the treatment condition, one of the therapists delivered all punishment regardless of whether she was teaching or standing behind the subject. The therapist who delivered all punishment for 1 subject did not deliver any punishment for the other subject. During the last condition, the therapist delivering all punishment was reversed for 1 of the subjects. The results indicated that the task being taught was mastered by each subject only when the therapist delivering punishment was teaching. Data collected also indicated that each subject made more eye-to-face contact when the therapist delivering all punishment was teaching. Although neither therapist had to deliver punishers often, punishment had to be administered less often when the therapist teaching the subject was also the therapist delivering punishment.

DESCRIPTORS: punishment, academic performance, eye contact

Although the issues surrounding the nature and use of relatively restrictive punishment procedures have been debated (Bailey, 1988; Balsam & Bondy, 1983; Epstein, 1985; Yulevich & Axelrod, 1983), the necessity of these procedures in some clinical interventions is acknowledged by the vast majority of professionals and clinicians who provide treatment for severe behavior problems (Rimland, 1988; Skinner, 1988; Van Houten et al., 1988; Wacker et al., 1990; Yulevich & Axelrod, 1983). It has been argued that exposing an individual to a re-

strictive procedure is warranted only if it is necessary to produce safe and clinically significant improvements in behavior, and if the use of a less restrictive intervention would likely be less effective, significantly reduce participation in needed training programs, delay entry into more optimal social or living arrangements, or lead to the eventual use of even more restrictive procedures (Van Houten et al., 1988).

Like positive reinforcement, punishment has been shown to produce both positive and negative side effects (Balsam & Bondy, 1983; Newsom, Favell, & Rincover, 1983). One positive side effect of punishing undesirable behavior is an increase in learning or academic performance. For example, several researchers have reported an improvement in imitation learning when inappropriate behavior was punished (Bucher & Lovaas, 1968; Risley, 1968; Wahler & Nordquist, 1973). In another

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study, Koegel and Covert (1972) found that 2 autistic children did not acquire a discrimination until punishment was made contingent upon self-stimulatory behavior.

One explanation for the improvement in academic performance noted in these studies is that punishment directly suppressed behaviors competing with the task being taught (Koegel & Covert, 1972; Wahler, 1969). It is also possible that introduction of punishment increased the level of attending to the person delivering punishment, thereby increasing the level of compliance with his or her requests. Thus, the person delivering punishment may have become discriminative for the delivery of punishment and hence associated with a decrease in noncompliant behavior, such as looking away, that may have produced a reduction in academic performance.

Several studies have demonstrated negative covariation between inappropriate behavior and compliance (Parrish, Cataldo, Kolko, Neef, & Egel, 1986; Russo, Cataldo, & Cushing, 1981). It is possible that mediators associated with the application of punishment develop stimulus control over increased compliance. The purpose of the present experiment was to test this hypothesis by determining whether academic performance is better when a person who directly administers punishment teaches the client than when a person who never administers punishment teaches the client, even though punishment always follows inappropriate behavior in the presence of both persons.

METHOD

Subjects and Setting

The first participant was a 24-year-old male named Billy. Billy had been diagnosed as schizophrenic, with moderate retardation secondary to psychosis. He had spent 12 of the 22 months prior to the study in two different government psychiatric facilities. He was discharged from the last institution 1 day prior to the commencement of the baseline condition. Billy engaged in several forms of aggression, tantrums, inappropriate verbal behaviors, and self-stimulatory behaviors. Billy's

treatment took place at his family's home and at the behavioral unit in the treatment center. Billy lived with his parents and two older siblings in a suburban residential area of metropolitan Toronto. One-to-one contract workers were the primary care agents in the clinic. Parents, siblings, and the contract workers shared the primary care role in the home.

At Billy's previous placement, staff had unsuccessfully attempted to treat his aggressive behavior with the contingent use of a time-out room and contingent positive practice overcorrection, each with differential reinforcement of other behavior (DRO). These treatments were associated with only small reductions in aggressive behavior. In each case the treatments were evaluated with an AB design.

The second participant was a 15-year old female named Sarah. Sarah had been diagnosed as having Prader Willi Syndrome. She engaged in refusal to comply (overt noncompliance), food stealing, pica, aggression, and swearing. Her treatment took place in three settings: the family's home, her school, and the behavioral unit in the treatment center. Sarah lived with her mother and one older sibling in an apartment in metropolitan Toronto. She attended a school for the mentally retarded. Prior to beginning the study, response cost, time-out, and DRO had been tried with limited success.

All experimental sessions for both subjects were carried out by two trained behavior therapists in the behavioral unit at Surrey Place Centre, a treatment center serving people with developmental handicaps in metropolitan Toronto. Prior to beginning the experiment, the study was reviewed by a peer review and human rights committee at Surrey Place Centre which included a lawyer, a physician, and two psychologists. Parents provided informed consent.

Response Definitions

All experimental sessions were videotaped with the videocamera oriented toward the student. All behaviors were scored from the videotapes by research staff from the behavior management program.

Maladaptive behaviors. Billy exhibited two

forms of maladaptive behavior: (a) aggression and destructive behavior that consisted of hitting another person with a fist or an object, throwing objects towards another person, kicking or attempting to kick, and pushing and (b) inappropriate verbal behaviors that consisted of severe screaming or yelling (lasting longer than 5 s) and verbal abuse and/or swearing.

Sarah exhibited aggressive behavior that consisted of slapping, hair pulling, pinching, and kicking.

Escape. Both participants exhibited escape behavior that consisted of attempting to stand up or slide to the floor.

Academic responding. Billy was taught a receptive labeling task that involved presenting him with four different animal pictures (laid out flat) and asking him to choose one of the four pictures: "Give me the picture of the ____." The pictures were of a horse, cow, pig, and cat. For the response to be scored as correct, Billy had to select the right picture as well as give it to the therapist. When Billy responded correctly, he was given immediate social reinforcement, along with an edible, audiotapes, or book. The productive labeling task for Billy consisted of the therapist presenting items one at a time and asking him, "What is it?" Billy was expected to label the item correctly on the first response, and then he received the item as a reinforcer for the correct answer. The items used in this program were potato chips, candy, cookies, water, and listening to a portion of an audiotape for 20 to 30 s.

For Sarah, the program involved teaching her to comply with simple requests that promoted cooperation. Sarah was given one of three requests: "Give me the ____," or "Touch the ____," or "Put the ____ here." The items used were a sock, a brush, a ball, a toothbrush, and a wooden block. Each correct response was reinforced with praise and a selection of edible reinforcers or music. Billy's and Sarah's teaching sessions were generally 15 min in duration, but could last up to 30 min.

No response. If the student did not make a response within 5 s following the initial request, the trial was scored as no response.

Eye-to-face contact. Eye-to-face contact was defined as the student's eyes being open and oriented toward the therapist at the start of a trial for a minimum of 3 s.

Data Collection and Reliability

For all behaviors, interobserver agreement was calculated during three randomly selected sessions for each therapist during each condition.

Inappropriate behavior. All inappropriate behaviors were recorded by listing on a specialized observation sheet the exact time in the session when the behavior occurred. For both Billy and Sarah, interobserver agreement on the occurrence of behavior was calculated by dividing the number of times both observers agreed on the occurrence of a behavior by the number of times both observers agreed or disagreed on the occurrence of the behavior and multiplying by 100%. An agreement on the occurrence of the inappropriate behavior was scored when both observers agreed the behavior occurred within the same minute of elapsed time. A disagreement on an occurrence of a behavior occurred when one observer scored the behavior as occurring during a particular minute of elapsed time and the other observer did not. Interobserver agreement on the occurrence of inappropriate behavior averaged 97% for Billy (range, 94% to 100%) and 96% for Sarah (range, of 90% to 100%).

Corrective responding. Responses given during the academic program were recorded on a data sheet with a space to score each trial. Each session consisted of 25 trials for Billy and 20 trials for Sarah. Academic responses on each trial were scored as correct, incorrect, no response (within 5 s of asking the question), and emitting the correct or incorrect answer before the teacher introduced the question. If the student emitted anything other than the correct response, the trial was scored as incorrect when computing the percentage correct responses for each session.

Interobserver agreement on academic responding was calculated by dividing the number of items scored the same by the number of items scored the same plus the number of items scored differently and multiplying by 100%. Interobserver agreement

on correct responding averaged 96% for Billy and 97% for Sarah, with respective ranges of 90% to 100% and 96% to 100%. Interobserver agreement on the occurrence of no response averaged 91% for Billy and 89% for Sarah, with respective ranges of 86% to 100% and 84% to 94%.

Escape behavior. Each trial was scored for the presence of escape behavior. Interobserver agreement was obtained as described above, and averaged 90% for Billy and 93% for Sarah, with respective ranges of 82% to 100% and 86% to 100%.

Eye-to-face contact. Interobserver agreement was scored in the same manner for eye-to-face contact. Interobserver agreement on the occurrence of eye-to-face contact averaged 89% for Billy and 92% for Sarah, with respective ranges of 78% to 96% and 88% to 96%.

General Procedure

A functional teaching program was introduced for 3 to 5 hr per day. Functional teaching consisted of communication programs, prevocational programs, compliance and frustration training, basic living skills programs, and formal and informal conversational skills training. Experimental sessions were conducted as part of the functional teaching sessions for each subject.

Both Billy and Sarah were taught using the knee-to-knee seating arrangement (Van Houten & Rolider, 1989b), which consisted of the client and the mediator seated on two chairs facing each other. The client's knees were between the knees of the mediator, and the client's hands were on top of the mediator's knees. A small table was placed to one side of the mediator to hold the teaching articles and reinforcers, and to facilitate writing on the scoring sheets. The client was expected to remain on the chair in this position until the entire teaching session was terminated by the mediator.

Each teaching trial consisted of the mediator asking a simple question and awaiting the response of the client. If the client emitted the correct response, he or she was immediately reinforced, the trial was scored as correct, and the mediator began a new trial. If the client emitted anything other than the correct response, the mediator said "No!"

prompted the correct response, and repeated the initial trial. The client was asked the question until the correct response was emitted. However, only the first response in each trial was scored as correct or incorrect.

For both Billy and Sarah, Therapist A and Therapist B taught the same programs, with a flip of the coin determining which therapist would teach first each day.

Experimental Design

An alternating treatments design counterbalanced across therapists was employed. During baseline, each child was sequentially taught by both therapists each day. A 30-min period separated these two daily sessions. Following the baseline condition, a treatment package was introduced that included the punishment of inappropriate behaviors. For Billy, Therapist A delivered punishment when she was teaching as well as when Therapist B was teaching. Thus, Therapist B delivered no punishment to Billy. For Sarah, Therapist B delivered punishment when she was teaching as well as when Therapist A was teaching. Thus, Therapist A delivered no punishment to Sarah during this condition. Finally during Sarah's last four teaching sessions the therapists reversed their roles and Therapist A delivered all punishment. Thus, in the final phase, Therapist B delivered no punishment to Sarah.

Baseline. During baseline, all mediators were instructed to follow their usual routines. No special contingencies were applied. The two therapists taught the selected teaching programs; however, no punishment was administered by either therapist. If an inappropriate behavior occurred during a teaching session, the behavior was blocked or ignored. If the behavior was very severe or dangerous, the staff briefly restrained the client by holding him or her and then trying to resume the task.

Functional teaching plus punishment. When an inappropriate behavior occurred during one of Billy's teaching sessions, only Therapist A immediately delivered the punishment. After the punishment had been delivered, the therapist who was originally teaching resumed teaching. If an inap-

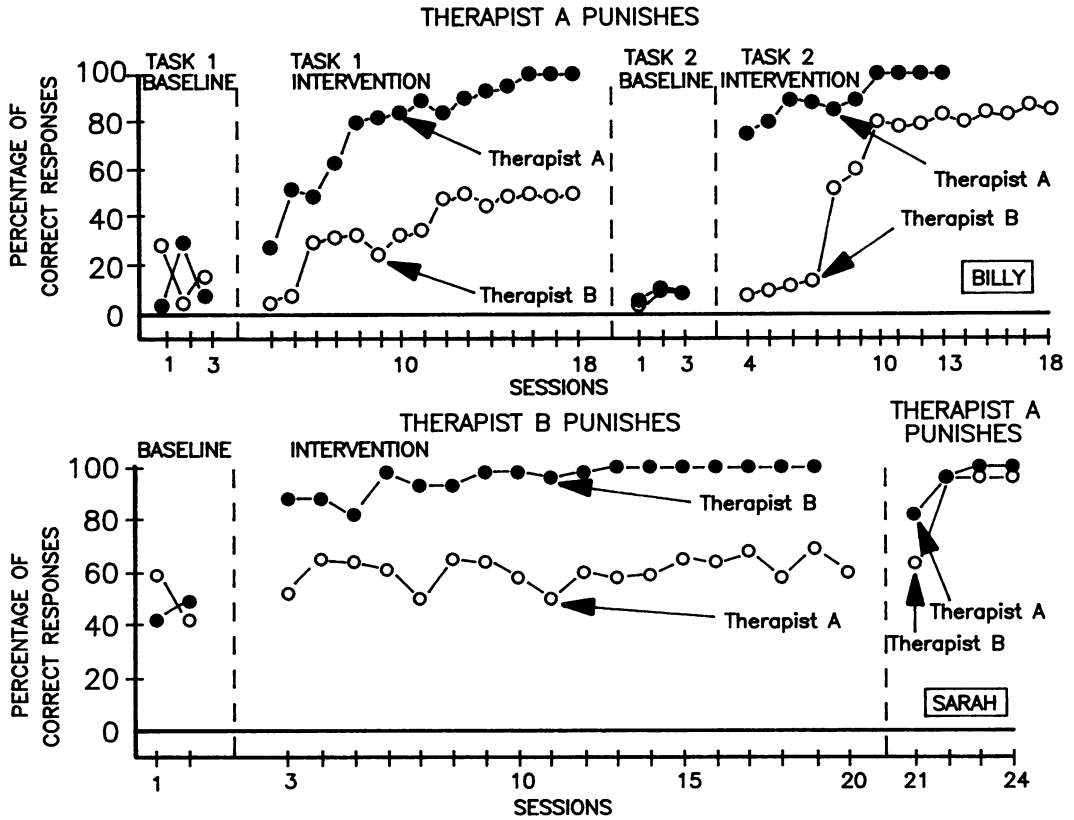


Figure 1. The percentage of correct responses Billy and Sarah provided for each of the therapists during each session of the experiment.

appropriate behavior occurred during one of Sarah's teaching sessions, only Therapist B administered the punishment. Following punishment, the original teacher once again resumed teaching. For Sarah, during the last four sessions, the therapists reversed roles and Therapist A delivered all punishment. In each case, the person who delivered the punishment was either seated knee-to-knee with the client or was standing next to the client and teacher. Therefore, whether or not the teacher delivered the punishment, the punishment was delivered immediately. Attempts to escape were not punished. Instead the client was given a firm instruction to sit down and was guided back into the chair if necessary.

During this condition, each time Billy engaged in a target behavior, he was reprimanded; a 20-s momentary movement restriction procedure was implemented three times (Rolider, Williams, Cum-

mings, & Van Houten, 1991) following each instance of aggression or severe tantrum behavior. Instances of swearing or verbal abuse were followed only by a verbal reprimand. Prior to initiating this condition, the team physician examined Billy to ensure that there were no medical conditions that would preclude the use of the momentary movement restriction procedure. The physician looked specifically for flexibility and any problems with the spine. No such conditions were ever found. Momentary movement restriction consisted of the following: When the behavior occurred while Billy was standing, he was immediately reprimanded ("No! You don't hit!") and escorted to the nearest armless straight-back chair. If the behavior occurred during teaching, the mediator delivering punishment quickly reprimanded the client for the behavior and then immediately stood up. Then the mediator (while standing) placed a hand on Billy's

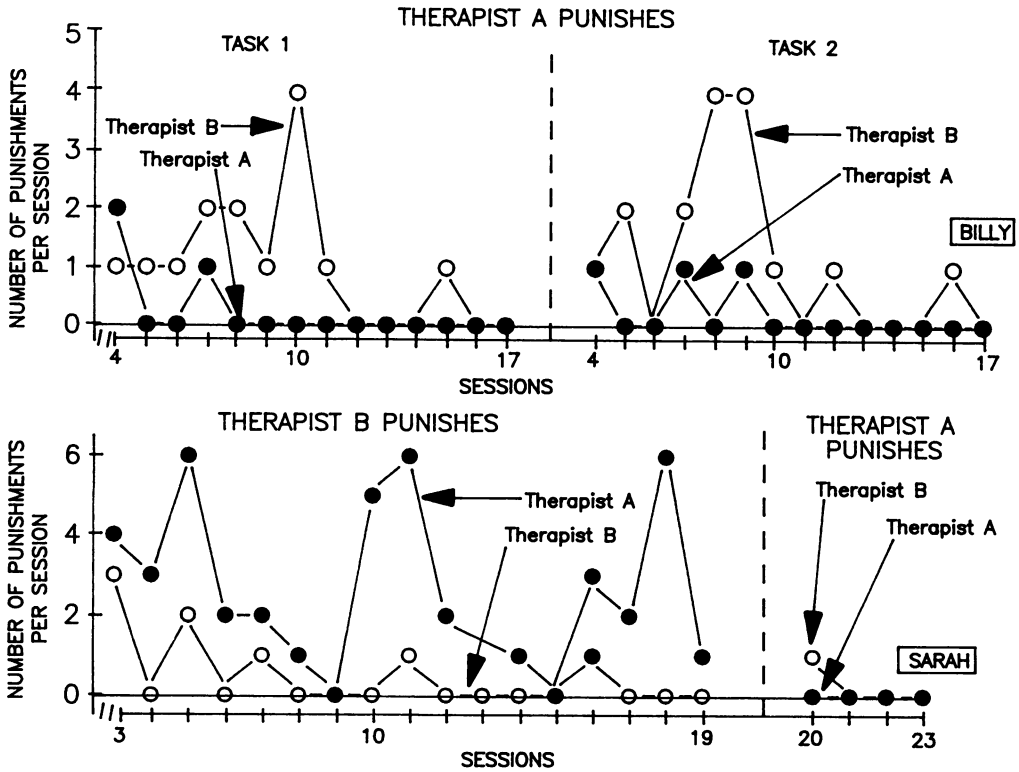


Figure 2. The number of punishments delivered to Billy and Sarah when each therapist was teaching during each session of the treatment conditions.

upper back (between the shoulder blades) and pushed the client forward down toward the knees, so that his chest rested on his own lap, one hand on top of the other at waist level. Billy's head was positioned down between the knees with the mediator's hands, with the base of the mediator's thumbs on the base of Billy's skull and the open fingers on top of and touching but not closed around the sides of his neck. Note that in carrying out this procedure the mediator always brought the head down towards the knees by pressing on the upper back, never by pressing on the head. Billy was not observed to struggle while the procedure was being applied. In addition, throughout the day when Billy was not in a one-to-one teaching session, a structured 5-min DRO was in effect. This DRO was extended to a 15-min interval.

For Sarah, during this condition, each time she engaged in aggressive behavior, a 30-s period of

contingent exercise was administered, consisting of a rapid succession of stand up, sit down, arms up, clap your hands, running on the spot, waist bends, and touch your toes, hold and give commands. Prior to the start of this condition Sarah was examined by the team physician to determine whether there existed any medical conditions precluding the use of the contingent exercise procedure. No such conditions were found. When Sarah was not in one-to-one teaching sessions, a 5-min DRO was in effect, which was gradually extended to 90 min.

Therapists in this study did not work with either client at other times. At other times, other special needs workers carried out the program. The program in effect at these times was the DRO schedule and punishment contingency described for each client. All persons who applied the punishment procedures had received 35 hr of training, consisting of lectures, role-playing, and viewing videotapes.

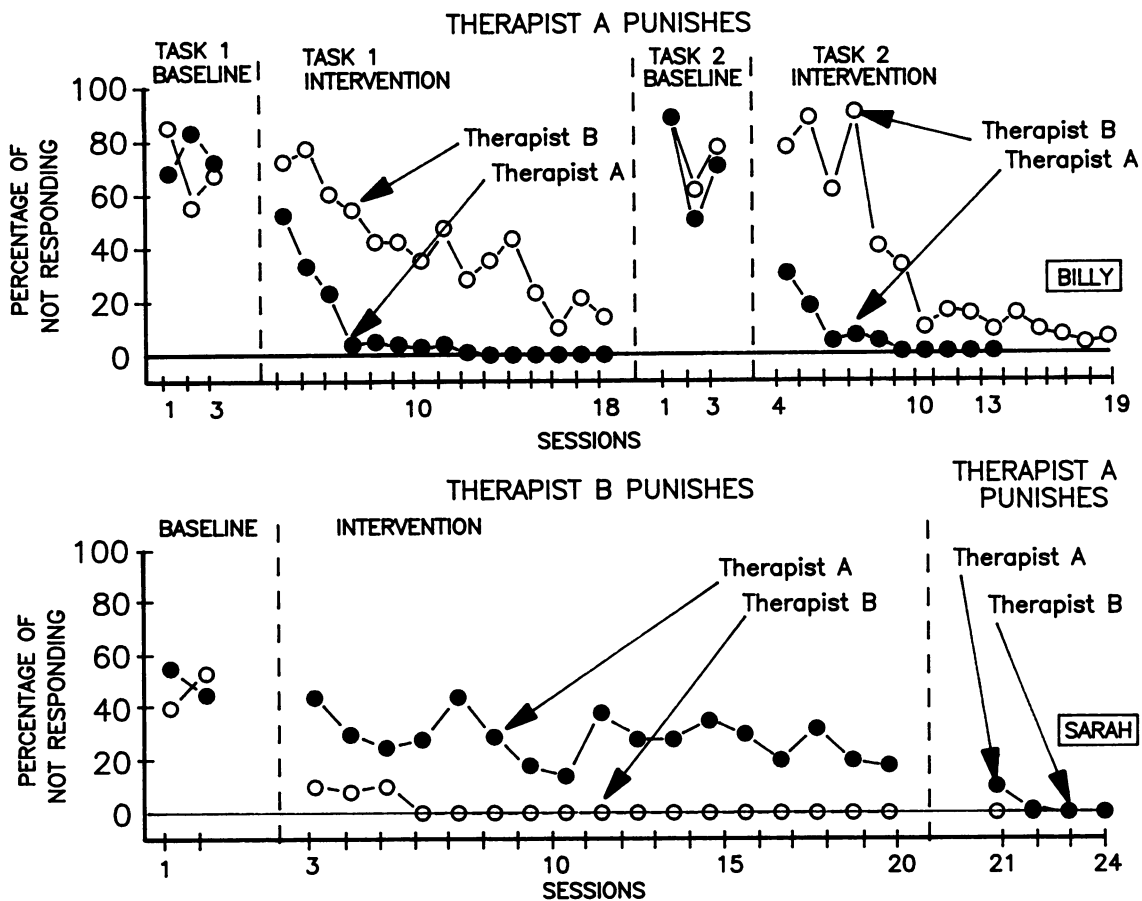


Figure 3. The percentage of trials in which Billy and Sarah did not respond for each therapist during each condition of the experiment.

RESULTS

The percentages of correct responses during each session for Billy and Sarah are presented in Figure 1. Billy performed better on both tasks when Therapist A, who administered all punishment, was doing the teaching. It should be noted that even after Billy reached 100% correct performance for Therapist A, he was still performing far below this level for Therapist B. In Sarah's case, Therapist B administered all punishment. Sarah exhibited near-perfect performance for Therapist B, indicating the task had already been learned even though she had only achieved the 50% level in the baseline condition. Even after Sarah performed at the 100% level for Therapist B (the mediator who delivered

punishment), she still showed little change in performance for Therapist A. Upon reversal of roles (i.e., Therapist A provided all punishment), Sarah quickly reached 100% within four sessions for Therapist A.

The frequency of inappropriate behaviors when Therapist A versus Therapist B taught is presented in Figure 2. The data indicate that punishment needed to be administered less often when the therapist administering the punishment was also doing the teaching. For example, in Billy's case, on Task 1 Therapist A needed to deliver punishment on only three occasions while she was teaching, whereas she needed to deliver punishment on 14 occasions when Therapist B was teaching. Likewise on Task 2, Therapist A needed to deliver punishment on

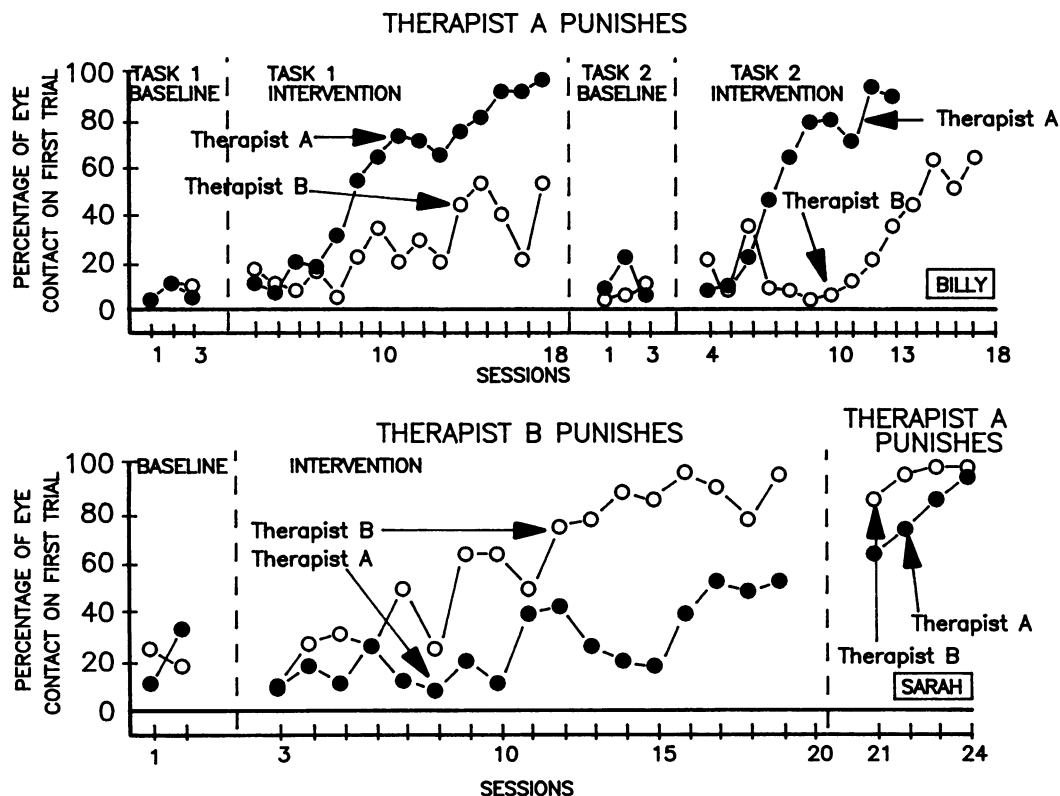


Figure 4. The percentage of trials in which Billy and Sarah provided eye-to-face contact for at least 3 s with each of the therapists during each session of the experiment.

only three occasions while she was teaching, whereas she needed to deliver punishment on 16 occasions when Therapist B was teaching. In Sarah's case, the mediator delivering punishment (Therapist B) needed to deliver punishment on eight occasions when she was teaching and on 44 occasions when Therapist A was teaching.

It should also be noted that the therapist who delivered the punishment needed to deliver punishment only during the first few sessions. In Billy's case specifically, all punishment was delivered during the first four sessions of Task 1 and during the first six sessions of Task 2. The overall level of punishment was not frequent when the therapist who administered the punishment was also the teacher.

The percentage of trials in which each subject did not respond is presented in Figure 3. Failure to respond accounted for most of Billy's and Sarah's poor performance on the academic tasks.

The percentage of eye contact at the start of each trial is presented in Figure 4. During the baseline condition, Billy and Sarah rarely made eye contact with either therapist. Following the introduction of treatment, Billy showed an increase in the percentage of trials in which he made eye contact with both therapists, with the largest change occurring for Therapist A who delivered punishment for maladaptive behavior. Sarah showed similar results, with Therapist B receiving the most eye contact when she delivered all of the punishment and Therapist A receiving a substantial increase in eye-to-face contact when she began to deliver punishment for maladaptive behavior.

Because the average trial duration from the beginning of an instruction to the completion of the response was 14 s (range, 8 to 32 s), the percentage of trials in which each client made eye-to-face and eye-to-instructional-material contact for at least 8 s was also scored (Figure 5). During the baseline

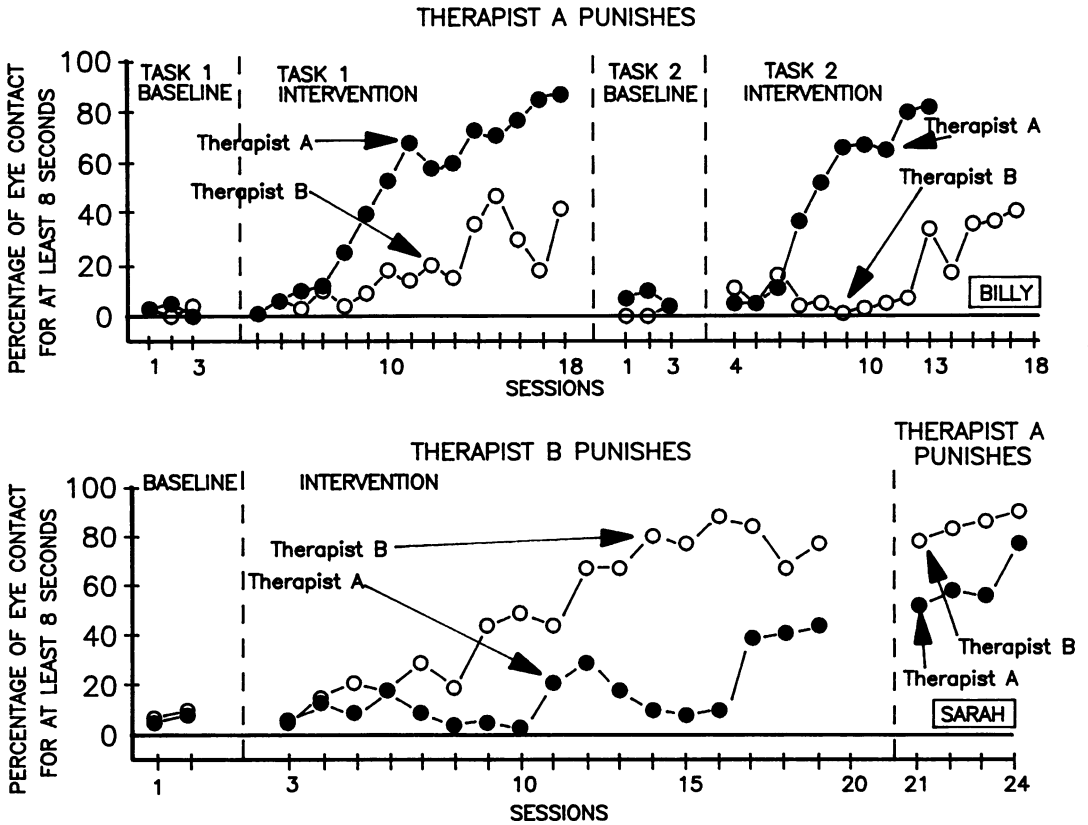


Figure 5. The percentage of trials in which Billy and Sarah provided eye-to-face or eye-to-instructional-material contact for at least 8 s with each therapist during each session of the experiment.

condition, Billy and Sarah rarely made appropriate eye contact for at least 8 s. Following the introduction of the treatment condition, there was a steady increase in the percentage of appropriate eye contact for the therapist delivering all punishment and a much slower increase for the therapist who did not deliver punishment.

The percentage of times each subject attempted to escape the teaching situation when each therapist was teaching is presented in Figure 6. During the baseline condition, both Billy and Sarah frequently attempted to escape the teaching session while either therapist was teaching. The frequency of escape attempts showed a steady decline in the presence of both therapists following the introduction of punishment for inappropriate behavior, with the largest declines associated with the therapist delivering all punishment.

DISCUSSION

The results of this experiment indicated that the academic performance of both subjects was better for the therapist who delivered punishment than for the therapist who did not deliver punishment. These results cannot be explained by suggesting that punishment produced a reduction in competing behavior because all competing behavior declined to zero or near-zero levels after punishment was first introduced.

An alternative explanation for these results is related to the inverse relationship reported to exist between inappropriate behavior and compliance (Parrish et al., 1986). The aspect of these results suggesting that the increase in the percentage of correct responding may be related to the participant's increased level of compliance was the im-

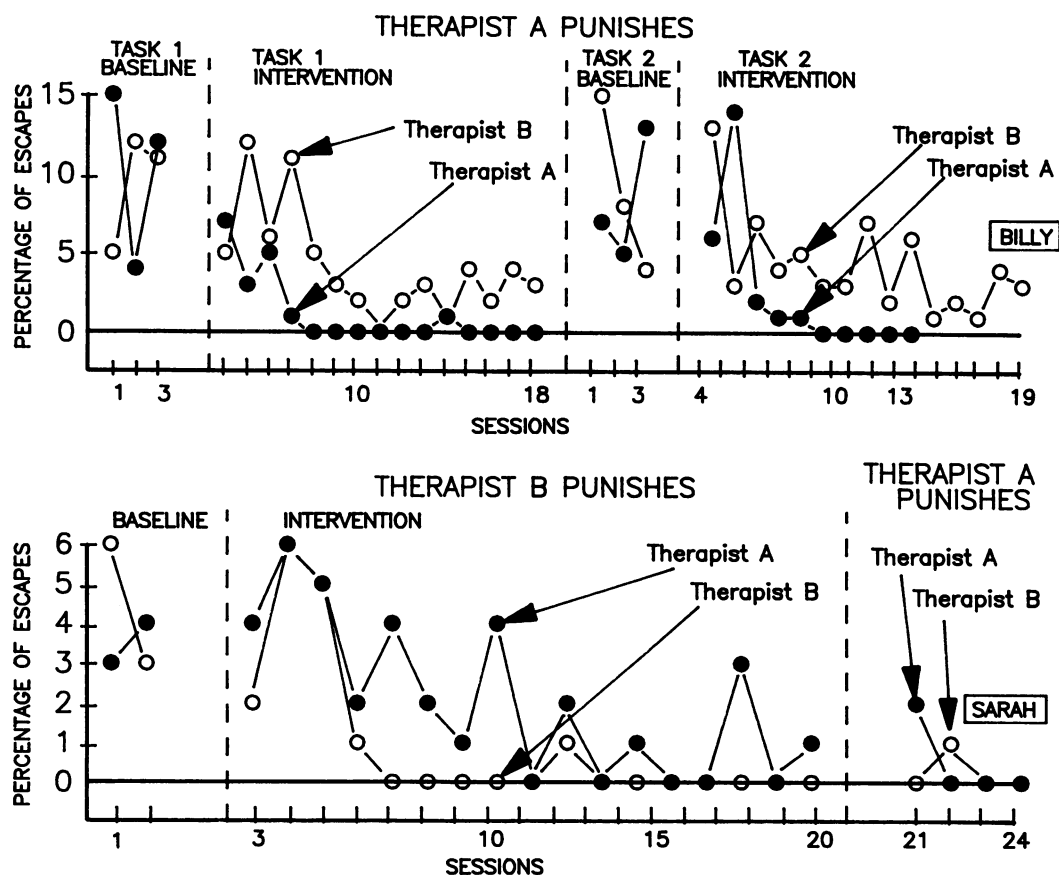


Figure 6. The number of trials in which Billy and Sarah attempted to escape the teaching situation for each therapist during each session of the experiment.

mediate increase in performance shown by Sarah following the first application of punishment. The data on the percentage of trials in which the subject made eye contact with the therapist and the percentage of trials in which the therapist made no response further support this hypothesis. Eye contact has been shown to be related to the level of compliance on a task (Hamlet, Axelrod, & Kuerschner, 1984). It is quite possible that the level of eye contact is also an indicator of the likelihood of compliance on a given trial, with the subject being more likely to respond if he or she first makes eye contact with the teacher.

The data on the percentage of trials in which the subject did not respond provide more clear evidence of the relationship between noncompliance and academic performance, because this percentage rapidly declined following the introduction of punishment.

It is possible that the increase in compliance associated with the application of punishment is specific to the person delivering the punishment. Hence, when Therapist A delivered all punishment, performance was better in her presence; when Therapist B delivered all punishment, performance was better in her presence. This finding cannot be the result of differences in how immediately punishment was delivered in the two conditions, because it was typically easier and faster for the person who was standing to apply the consequence than it was for the person who was seated.

It is also interesting to note that both clients appeared to be more calm when the therapist delivering punishment was also teaching. It was also noted that both clients smiled more often when the therapist who delivered all punishment was teaching.

Although it is important that researchers and

clinicians have a better understanding of both the direct effects and side effects of reinforcement and punishment procedures employed in their work, it is also important to note that the decision regarding whether to use restrictive punishment procedures as part of a treatment plan requires the consideration of relatively complex issues. One cannot justify the use of a restrictive procedure merely because it has been shown to produce positive side effects.

Finally, the nature of the side effects obtained may depend on the presence or absence of a number of other factors. For example, Van Houten and Rolider (1989a) presented data that indicated the side effects of punishment were in part dependent on the direct effects of punishment. When the punishment produced a partial reduction in the primary maladaptive behavior, there were more negative and fewer positive side effects produced. When the punishment produced complete or near-complete suppression of the primary behavior, there were fewer negative and more positive side effects reported. It is likely that other yet to be identified factors also influence the direct effects and side effects of many behavioral procedures in common use.

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