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GENERALITY AND SIDE EFFECTS OF OVERCORRECTION[1]

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The effects and side effects of overcorrection for self-stimulatory behaviors of two children in a specialized day-care program were evaluated. For one child, a "hand" overcorrection procedure involving arm and hand exercises was introduced contingent upon inappropriate hand movements and later contingent upon inappropriate foot movements. After "hand" overcorrection was withdrawn for inappropriate foot movements, a "foot" overcorrection procedure involving foot and leg exercises was introduced contingent upon inappropriate foot movements. For a second child, the "hand" overcorrection procedure was introduced contingent upon inappropriate hand movements during a free-play period, and later contingent upon inappropriate vocalizations at naptime. "Hand" overcorrection was withdrawn and then re-introduced sequentially for both behaviors. Several concurrent behaviors were measured to assess multiple effects of treatment. Results for both children indicated the "hand" overcorrection procedure suppressed inappropriate hand movements and inappropriate behaviors that were topographically dissimilar. In addition, inverse relationships were observed between the second child's inappropriate hand movements and appropriate toy usage during free play and between his inappropriate vocalizations and inappropriate foot movements during naptime. Results suggest that overcorrection procedures that are effective for one behavior can be used to reduce the frequency of topographically different behaviors. This finding is discussed in terms of its practical implications for therapists.

Punishment techniques that are practical and clinically useful must meet several criteria. First, they must produce strong, immediate, and lasting changes in inappropriate behavior. Second, they must be applicable across patients and across different inappropriate behaviors. Third, they must be convenient and acceptable to the person who is to carry out therapy. Overcorrection procedures encompass the above qualities, and have been found to be effective for a variety of applied problems (Azrin and Foxx, 1971; Foxx and Azrin, 1972, 1973; Webster and Azrin, 1973). They have been shown to work quickly and to produce effects that can be maintained for long periods with verbal warnings (Foxx and Azrin, 1973).

Two types of overcorrection have been described (Foxx and Azrin, 1973): (1) *restitutional overcorrection* requires the person to correct the consequences of his misbehavior by restoring the disrupted situation to a "better-than-normal" state. For example, a child who marks on the wall might be required not only to erase his marks but to wash the entire wall or room as well. (2) *positive practice overcorrection* requires the person to practise correct behaviors contingent upon episodes of misbehavior in the same topography. For example, the child who marks on the wall might be required to copy a set of patterns or forms using pencil and paper. Positive practice overcorrection can be used in combination with restitutional overcorrection,

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or independently with behaviors that produce no clear environmental disruption; *e.g.,* self-stimulation.

The usefulness of any punishment technique, including overcorrection, would be enhanced if it were shown to modify more than one inappropriate behavior and to produce beneficial side effects in concurrent untreated behaviors. These demonstrations would suggest that fewer treatment techniques need be learned by responsible parents and teachers.

The present study sought to determine whether positive practice overcorrection designed for one behavior would produce similar effects when contingent upon topographically different problem behaviors. Procedures for one child were designed to examine the effects of positive practice overcorrection contingent upon inappropriate hand movements, then inappropriate foot movements. For a second child, hand overcorrection was contingent upon inappropriate hand movements, then inappropriate vocalizations. Side effects of treatment for the second child were examined in two settings.

METHOD

Subjects and Setting

Cal was a 5-yr-old youth enrolled as an outpatient in the Children's Program, a community based, day-care treatment service of the University of Mississippi Medical Center (Medical World News, 1973). Attempts to obtain an I.Q. using the Peabody Picture Vocabulary Test (PPVT) were unsuccessful. Cal was diagnosed as schizophrenic. He was hyperactive and deficient in locomotor, verbal, and self-help skills. In particular, he engaged in stereotyped, repetitive vocal and motor behaviors that competed with his participation in day-care activities. Earlier systematic attempts to control these inappropriate behaviors with timeout and instructions to stop were unsuccessful.

Eli was an 8-yr-old also enrolled in the Children's Program in a different day-care center than Cal. Eli's PPVT I.Q. score was 76. He had also been diagnosed schizophrenic. He engaged in many self-stimulatory hand movements that appeared to interfere with his participation during educational activities. In addition, during naptme Eli often vocalized to himself, disrupting the other children's naps. Systematic attempts to control Eli's inappropriate behaviors with timeout or instructions to stop had not been effective.

Measurement

Cal was observed for 30 min during a 1-hr morning free-play period. In successive 10-sec intervals, a trained observer recorded the occurrence of either or both of the behaviors defined below. Intervals were cued by auditory stimuli presented on a tape recorder. The response categories were not mutually exclusive; *i.e.,* both could be recorded in the same interval. The two responses categories were as follows:

(1) *Inappropriate hand movements*—pounding objects with hands, producing a noise audible to the observer.

(2) *Inappropriate foot movements*—beating on the floor or another object with feet producing a noise audible to the observer.

Eli was observed during two periods of the day, free play and naptime. Free play was a one-half hour activity designed to promote appropriate social and independent play. It took place in a 12 by 8 ft (3.6 by 2.4 m) area containing toy appliances, dolls, beds, a tool kit, *etc.* Contingent upon requests, children were allowed to play with whatever they desired. Naptime was a 1-hr period after lunch when children slept or rested quietly on individual mats.

During free play and naptime, a trained observer recorded the occurrence of Eli's following response categories in successive 10-sec intervals, according to the same procedure described for Cal:

(1) *Inappropriate hand movements*—hand contacts with nose, mouth, or eyes; hands inside of pants; hand moving repetitively back and forth or up and down in air; tossing objects; clapping hands; rubbing or scratching face with

part of the hand; and rubbing index finger and thumb together in a circular motion.

(2) *Appropriate toy play* — manipulating a toy while visually attending to it, except rocking a doll, which was considered appropriate play regardless of whether Eli was looking at the doll.

(3) *Inappropriate vocalizations* — audible mumbling, groaning, singing, humming, or "talking to self"; not coughing or sneezing.

(4) *Inappropriate foot movements and positions*—stereotyped, repetitive jumping, hopping, or "gliding"; feet above body when lying with stomach flat on floor.

Observations for Cal during free play were made for 30 min each day (180 intervals). These records excluded treatment intervals. Treatments per session were recorded for Eli during treatment conditions. Eli's behavior was observed for 12 min (72 intervals) each naptime, observations beginning at the start of the period. Since the caregivers allowed different amounts of time for free play, the number of observation intervals for Eli during free play was variable (59 to 144, with a mean of 88 intervals per day). Again, no data were obtained for either child during treatment episodes.

Measurement reliability was assessed by a second trained observer on 10 occasions for Cal, and seven for Eli. For both children, reliability checks were distributed across conditions. Pearson product moment correlations were obtained between the number of intervals in which one observer recorded the response and the number of intervals recorded by the second observer. Correlation coefficients for Cal were: 0.99 for hand movements, and 0.78 for foot movements. Coefficients for Eli were: 0.99 for hand movements, 0.98 for appropriate toy play, 0.99 for vocalizations, and 0.98 for foot movements.[2]

Experimental Conditions

Baseline. During baseline conditions for each recorded behavior, no special contingencies were scheduled. However, caregivers regularly gave approval for appropriate behaviors and ignored nonparticipation and minor misbehaviors.

Hand overcorrection. The "hand" overcorrection procedure replicated Foxx and Azrin's (1973) intervention for inappropriate hand movements. Since these authors described the technique in detail, only a brief description is presented here. When either child engaged in inappropriate hand movements, vocalizations, or foot movements, the caregiver was cued by the observer to apply overcorrection. The caregiver preceded overcorrection with a verbal description of the misbehavior; *e.g.,* "You're jumping", "You're rubbing your face", *etc.* Then each of five instructions—"Put your hands at your sides" ". . . above your head" ". . . straight out in front" ". . . together" ". . . behind your back"—was repeated twice, in random order. If the child did not perform an instructed behavior within 2 sec, the caregiver physically prompted the behavior, using sufficient physical guidance to ensure that the instruction was carried out. Each instructed behavior was held for 15 sec. Thus, the total duration of each treatment episode was slightly more than 2.5 min, as opposed to 5 min in the Foxx and Azrin (1973) study. As previously mentioned, measures of target misbehaviors were suspended during treatment episodes.

Foot overcorrection. This form of positive practice overcorrection was specifically designed for Cal's inappropriate foot movements. Foot overcorrection consisted of seating Cal on a chair, and instructing him to lift his feet, straightening his legs parallel to the floor for

[2]Reliability was checked on Days 5, 7, 8, 22, 23, 38, 39, 40, 41, and 44 for Cal, and on Days 8, 9, 15, 26, 27, 34, and 41 for Eli. Percentage agreement was also calculated by dividing the number of agreements on occurrence by the total number of intervals in which either observer scored an occurrence. Nonoccurrence intervals were thus excluded from this analysis. For Cal, percentage agreements were 0.91 for hand movements and 0.73 for foot movements; respective values for Eli were 0.81, hand movements, and 0.73, appropriate toy play during free play; 0.81, vocalizations, and 0.75, foot movements during naptime.

5 sec, then returning his feet to the floor for 5 sec. Physical prompts by the caregiver were used when necessary. This overcorrection procedure was continued for 2 min per treatment episode.

Experimental Design

The effects of hand overcorrection on Cal's inappropriate behaviors were evaluated in a multiple baseline design. Hand overcorrection was first applied to inappropriate hand movements, then to inappropriate foot movements. Subsequent interventions for inappropriate foot movements involved a return to baseline conditions, implementation of foot overcorrection, and a final return to baseline conditions.

For Eli, multiple baseline and withdrawal designs were used to evaluate the effects of hand overcorrection for inappropriate hand movements and for inappropriate foot movements. Concurrent measures of other behaviors during free play (appropriate toy play) and naptime (inappropriate foot movements) permitted assessment of treatment side effects.

RESULTS

Figure 1 shows the frequency of intervals in which Cal engaged in inappropriate hand and foot movements. When hand overcorrection was introduced for inappropriate hand movements, the frequency of occurrence of this behavior decreased (Figure 1, top graph). This effect was maintained throughout the experiment. The introduction of hand overcorrection for Cal's inappropriate foot movements (Figure 1, bottom graph) also reduced the frequency of this behavior, but not to zero. Withdrawal of the hand overcorrection increased the frequency of inappropriate foot movements. Introduction of the foot overcorrection then further decreased the frequency of inappropriate foot movements. A subsequent increment was observed during the final baseline condition.

Figure 2 presents percentages of occurrence for Eli's two target behaviors and for concurrent untreated behaviors that changed systematically.

Figure 2 (top) shows reductions in per cent occurrence of inappropriate hand movements during each "hand" overcorrection condition. Mean occurrence percentages for inappropriate hand movements were 58% during baseline and 3% during overcorrection conditions.

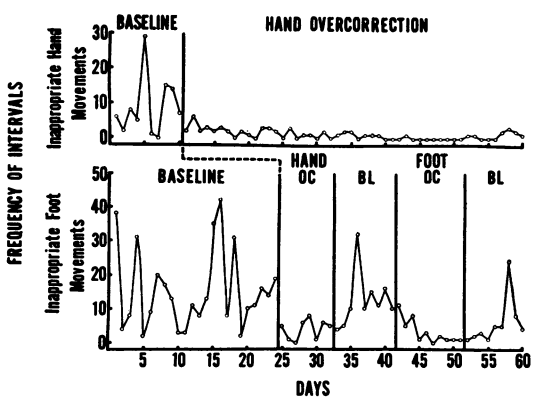

Fig. 1. Frequency of occurrences of Cal's inappropriate hand movements (top graph) and inappropriate foot movements (bottom graph) during baseline (BL), "hand" overcorrection (Hand OC), and "foot" overcorrection (Foot OC) conditions.

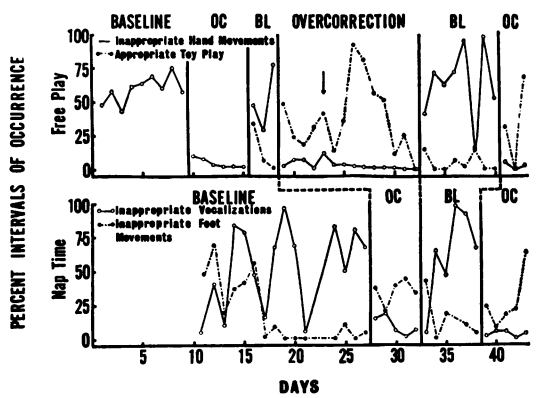

Fig. 2. Percentage occurrences of Eli's inappropriate hand movements during free play, (solid line, upper graph) and inappropriate vocalizations during naptime (solid line, bottom graph). For both behaviors, baseline (BL) conditions alternated with positive practice overcorrection in the topography of the inappropriate hand movements. Also presented are percentage occurrences of appropriate toy play during free play (dotted line, top graph), and inappropriate foot movements during naptime (dotted line, bottom graph). The arrow over Day 23 indicates a change in the teacher that implemented overcorrection.

The "hand" overcorrection technique produced similar effects on inappropriate vocalizations (Figure 2, bottom graph). The per cent occurrence for inappropriate vocalizations increased during the second baseline phase, then decreased again when overcorrection was re-instated. Mean per cent occurrences across conditions were 56% for baseline and 5% for overcorrection. Also, the mean number of treatments required to control inappropriate vocalizations decreased from a mean of 6.2 per day during the first overcorrection phase to 1.4 during the second overcorrection phase. The number of treatments used to control inappropriate hand movements was consistently low (range = 0 to 6).

Side effects were observed for Eli's appropriate toy usage during free play and inappropriate foot movements during naptime. As shown in the top graph in Figure 2, the per cent occurrence of appropriate toy play varied inversely with the per cent occurrence of inappropriate hand movements. That is, when Eli engaged often in self-stimulatory hand movements, he spent less time engaged in appropriate toy play. An inverse relationship was also observed between the per cent occurrence of Eli's inappropriate vocalizations and inappropriate foot movements (Figure 2, bottom graph). High percentages of inappropriate vocalizations were associated with low percentages of inappropriate foot movements, and low percentages of inappropriate vocalizations were associated with high percentages of inappropriate foot movements.

DISCUSSION

The effects of hand overcorrection on inappropriate hand movements and foot overcorrection on inappropriate foot movements are consistent with overcorrection effects reported by Azrin and Foxx (1971), Foxx and Azrin (1972, 1973), and Webster and Azrin (1973). The treatment time in the present study was shorter than that reported by Foxx and Azrin (1973), with no apparent differences in effectiveness. In addition, the caregiver who treated Eli changed midway through treatment (see arrow in Figure 2), with no change in effects.

Each interruption of treatment was associated with increased per cent occurrence of the problem behavior. This effect emphasizes the need for more research on methods for maintaining treatment effects. Foxx and Azrin (1973) have already shown that contingent overcorrection *threats* can maintain reduced levels of misbehavior.

The results further indicate that an overcorrection procedure found effective for one response class can be used to weaken a topographically different problem behavior. The application of a single treatment to various problem behaviors could save considerable time, both in managing multiple disorders and in training therapists. In addition, the finding that one procedure can be used to treat a number of different problems may increase the appeal of techniques like overcorrection. However, more research is needed before specific overcorrection procedures can be recommended for any and all misbehaviors. Another important research question pertains to the effect of overcorrection in modifying a response in a different topography *before* it has been used for a response in the same topography.

Overcorrection procedures in the present study combined a number of factors, which singly, or in combination, may be responsible for behavior change (Foxx and Azrin, 1973). These operations include: (1) telling the child he behaved inappropriately; (2) stopping the child's ongoing activity; (3) providing systematic verbal instructions; (4) forcing practice of desired forms of the behavior; and (5) returning the child to his ongoing activity. The main effects of these procedures may be attributed to feedback (Point 1); timeout (Point 2); developing compliance (Point 3); punishing noncompliance (Point 4), or negatively reinforcing appropriate behavior (Point 5). However, timeout (Point 2) and instructions to stop the

behavior (Point 3) had been used previously as standard classroom control procedures for both children, producing no change. In addition, the side effects observed in the present study, both desirable and undesirable, were not related to the behaviors practised during overcorrection episodes. Hence, it would be difficult to attribute the treatment effects to the development of "positive practice" behaviors (Point 4) that physically competed with the problem behaviors. Therefore, future studies should be performed to identify the critical components of overcorrection.

Of particular interest were the multiple effects of overcorrection for Eli (Figure 2). Only a few studies provide quantitative indices of treatment side effects. Bucher and Lovaas (1968) reported several desirable side effects of punishment, whereas Sajwaj, Twardosz, and Burke (1972) reported both desirable and undesirable side effects of an extinction procedure. For Eli, appropriate play increased when inappropriate self-stimulation decreased. However, during naptime an undesirable side effect was observed. A second category of behavior, inappropriate foot movements, increased when inappropriate vocalizations were suppressed. This appearance of a desirable side effect in one period of the day and an undesirable side effect in another may be due either to the availability of more appropriate behaviors during free play than naptime, or to differing contingencies in the two periods. For example, during free play, caregivers are likely to attend to alternative behaviors that are appropriate. However, during naptive, caregivers are more likely to attend to undesirable behaviors that interfere with napping and to ignore appropriate quiet napping behavior.

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