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Overcorrection: A Review and Critical Analysis

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This paper reviews the overcorrection literature with a focus on the subject populations, dependent variables, procedural variations and research methodology reflected in overcorrection research. It analyzes overcorrection in terms of its punishment characteristics, and based on this, offers suggestions for the effective use of overcorrection. It raises issues regarding generalization and maintenance and the lack of data supporting claims for an educative value of overcorrection. We conclude that overcorrection can be an effective response suppressing procedure with greater social acceptability than other forms of punishment, but that the staff time involved in its use constitutes a possible drawback. We suggest the need for analytic research to identify overcorrection's critical components and minimal effective duration. Finally, we offer a suggestion for the use of more descriptive and precise terminology with respect to overcorrection procedures.

The need for effective behavior decelerating procedures that are within the limitations set forth by practical and legal constraints has been widely acknowledged by workers in applied settings. Care givers are forced to deal with disruptive, dangerous, destructive and other inappropriate behaviors which often interfere with teaching and the delivery of other services. Since the use of conventional punishment procedures is often restricted (Repp & Deitz, 1978), it is important to identify alternative response suppression procedures for use with inappropriate behaviors. Overcorrection (Foxx & Azrin, 1972, 1973a) is an alternative to traditional punishment procedures and has proven to be an innovative and effective means of reducing or eliminating a number of different behavior problems.

In 1972 Foxx and Azrin developed a procedure for eliminating the aggressive/disruptive behavior of retarded and brain damaged patients. This procedure, termed "restitution," required the patient to "restore the disturbed situation to a greatly improved state" (p. 15). For example, patients spent a period of time rearranging furniture that they disturbed or apologizing to victims they annoyed or frightened. Foxx and Azrin (1972) demonstrated the effectiveness of different forms of "restitution" by eliminating the long standing aggressive/disruptive behavior of three patients.

Foxx and Azrin (1973a) expanded this procedure by making the distinction between restitution and positive practice, stating that both are components of a procedure they called "overcorrection." The stated purpose of overcorrection was (1) "to overcorrect the environmental effects of an inappropriate act" (p. 2.) (restitution), and (2) "to require the disruptor intensively to practice overly correct forms of relevant behavior" (p. 2.) (positive practice). In this study, Foxx and Azrin treated the self-stimulatory behaviors of four retarded and autistic children using positive practice overcorrection. Subjects were required to make a series of head movements or arm movements for a specified period of time contingent on self-stimulation. This procedure totally eliminated the self-stimulatory behavior of each subject.

Starting with the Foxx and Azrin articles (1972, 1973a) a vast array of overcorrection procedures with varying similarity to the original procedure were developed to decelerate a wide range of behaviors. For the purpose of this review, the procedures which will be included under the term overcorrection include procedures that require the subject to engage in some behavior contingent on the occurrence of a different behavior to be decelerated (or in a few cases, contingent on the non-occurrence of behavior in situations where it should be occurring). This definition effectively excludes procedures such as negative practice, in

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which the behavior repeatedly performed in the negative practice procedure is virtually identical to the topography of the behavior to be decelerated and is not related in a response contingent fashion to the behavior to be decelerated.

Overcorrection procedures are consistent with a corollary of the Premack principle (Premack, 1965) which suggests that the frequency of a high probability behavior can be decreased when a low probability behavior is contingent on the occurrence of the high probability behavior. The overcorrection behaviors may be physically guided by the therapist or engaged in by the subject upon command. They may operate on the environment (i.e., restitutive activities) or consist merely of repetitive motor movements (i.e., positive practice movements). In most cases the occurrence of the overcorrection behaviors removes the opportunity for the inappropriate behavior to occur.

Previous reviews of the overcorrection literature (Harris & Ersner-Hershfield, 1978; Ollendick & Matson, 1978) have provided a restatement and summarization of the overcorrection studies. Other reviews (Axelrod, Brantner & Meddock, 1978; Marholin, Luiselli & Townsend, 1980; Murphy, 1978) have looked at overcorrection in a more analytic framework. To varying degrees, these reviews have addressed such issues as punishment, treatment effectiveness, generalization and maintenance, and the parameters of overcorrection. The authors all draw reasonable conclusions and make valuable suggestions. What follows is a brief review of the overcorrection literature focusing on the variations of overcorrection procedures across subject populations and behavior problems. An analysis of the literature is provided with specific emphasis on relating overcorrection to the basic principles of behavior which underlie its effectiveness. Methodological issues are raised as well as issues pertaining to the effective and efficient use of overcorrection and educational aspects of the procedure. This review updates previous reviews of this active research area and draws conclusions and makes suggestions which are consistent with and add to those of previous reviews.

REVIEW

Dependent Variables and Subject Populations:

Overcorrection procedures have been used to suppress a wide range of inappropriate behaviors in various subject populations. The literature is replete with replications demonstrating the generality of overcorrection procedures across dependent variables and subject populations. One area in which overcorrection procedures have been widely applied is in the suppression of inappropriate self-injurious and self-stimulatory behaviors in retarded and autistic individuals. In a large number of cases, the contingent application of overcorrection procedures effectively decelerated these behaviors. Table 1 summarizes the overcorrection literature and describes the subjects, dependent variables, type of overcorrection procedure, and the results reported in each experiment. Examination of Table 1 reveals the wide variety of subject populations and dependent variables to which overcorrection procedures have been applied. This range of applications demonstrates the wide generality of overcorrection as an effective response decelerating procedure.

While most overcorrection studies have focussed on the deceleration of undesirable behaviors, there are also cases in which overcorrection procedures have been made contingent on the nonoccurrence of a behavior in an effort to strengthen that behavior in situations where it should be occurring. Foxx (1977) used overcorrection procedures to increase the eye contact of retarded and autistic children. Similar applications (i.e., Foxx, 1976b; Barton & Osborne, 1978) are listed in Table 1.

Procedural Variations

The literature includes a number of procedural variations of overcorrection. These procedures differ with respect to the topography of the overcorrection behaviors and the duration of each ap-

TABLE I

SUMMARY OF OVERCORRECTION LITERATURE

AUTHORS	SUBJECTS	DEPENDENT VARIABLE	TYPE OF OVERCORRECTION[1]	RESULTS[2]
Adams, 1980	9 yr. old M.R. child	Hair pulling	10-20 min. pos. practice (arm movements)	No effect
Agosta, Close, Hops, & Rusch, 1980	37 mo. old developmentally delayed	Mouthing, biting	6 min. pos. practice (teeth-brushing, hand washing, motor task)	Large and immediate decrease to near zero
Azrin & Armstrong, 1973	22 M.R. adults	Self-feeding responses	Package IV with pos. practice (correct feeding responses)	Eating errors gradually decreased to zero
Azrin & Foxx, 1971	9 M.R. adults	Toileting accidents	Package IV with restitution (cleaning time)	# of accidents dropped quickly; reached zero gradually
Azrin, Gottlieb, Hughart, Wesolowski, & Rahn, 1975	11 M.R. adolescents & adults	Self-injurious behavior	Combination IV (required bed rest and hand movements)	Large, immediate decrease; reached zero gradually
Azrin, Kaplan, & Foxx, 1973	9 M.R. adults	Self-stimulation	Pos. practice (20 min.) using the body part involved in self-stimulation	Large, immediate decrease; to zero in 12 days
Azrin & Nunn, 1973	12 outpatient clients ages 5 to 64 yrs.	Nervous habits & tics	Habit reversal procedure	Large, immediate decrease; suppression at 5 mo. F.U.
Azrin, Nunn, & Frantz, 1980(a)	10 outpatient clients ages 12 to 62 yrs.	Nervous tics	Habit reversal	Large, immediate decrease; gradual suppression
Azrin, Nunn, & Frantz, 1980(b)	45 outpatient clients	Nail biting	Habit reversal	Immediate suppression
Azrin, Nunn, & Frantz, 1980(c)	19 outpatient clients	Hair pulling	Habit reversal	Immediate suppression
Azrin, Nunn, & Frantz-Renshaw, 1980 (d)	18 children	Thumbsucking	Habit reveral	Large, immediate decrease
Azrin & Powers, 1975	6 disruptive boys ages 7 to 11 yrs.	Disruptive behavior	5-10 min. pos. practice (asking permission)	Large decrease
Azrin, Sneed, & Foxx, 1973	12 M.R. adults	Bed wetting	Package IV with pos. practice (toilet approaches) & restitution (clean up)	Immediate decrease
Azrin & Wesolowski, 1975(a)	11 M.R. adults	Floor sprawling	12 min. pos. practice (appropriate sitting)	Gradual decrease to zero; suppression at 6 mo. F.U.
Azrin & Wesolowski, 1975(b)	1 M.R. adult	Vomiting	Self-correction and pos. practice (appropriate vomiting)	Complete suppression after 1 wk.; suppression at 1 yr. F.U.
Azrin & Wesolowski, 1974	34 M.R. adults	Stealing	Restitution (return stolen item plus one additional one)	Complete suppression after 4 days
Barton & Osborne, 1978	5 hearing impaired kindergarten students	Sharing toys	Pos. practice (sharing) with instructions, modeling & practice	Substantial increase in sharing; maintained at 15 wk. F.U.
Bornstein, Hamilton, & Quevillon, 1977	1 normal 9 yr. old boy	Out of seat	3 min. pos. practice (asking permission)	Gradual reduction
Carey & Bucher, 1981	8 M.R. adults	Inappropriate eating responses, non-task oriented responding	Pos. practice (10 eating trials or 10 puzzle trials); restitution (2 min. clean up)	Moderate to large decrease
Carroll, Sloop, Mutter, & Prince, 1978	6 M.R. adults	Clothes ripping	15 min. pos. practice (dressing) combined with 15 min. satiation & DRO	Decrease to zero for each subject in 1 wk.
Clements & Dewey, 1979	1 M.R. boy, 11 yrs. old	Self-injurious behavior; breaking objects	Pos. practice (10 min. washing eyes or hands) or restitution (repairing objects)	Decrease to zero for each DV; suppression at 6 mo. F.U.
Coleman, Whitman, & Johnson, 1979	1 M.R. adolescent	Self-stimulation	2 min. pos. practice (hand movements)	Large, immediate decrease
Conley & Wolery, 1980	2 blind subjects	Eye gouging	2 or 5 min. pos. practice (arm movements)	Decrease to zero after 2 days for each subject
Crowley & Armstrong, 1977	3 encopretic children, ages 5, 7, 12	Toileting accidents	Package IV with restitution (washing) and pos. practice (toilet approaches)	Gradual decrease to 1 or less accident per wk. for each subject
DeCataranzo & Baldwin, 1978	2 M.R. boys	Self-injurious behavior; head-hitting	Pos. practice (arm movements) and pos. practice plus DRO	Immediate decrease
De L. Horne & Wilkinson, 1980	20 outpatient adults	Fingernail length	Habit reversal	Steady, gradual increase

AUTHORS	SUBJECTS	DEPENDENT VARIABLE	TYPE OF OVERCORRECTION	RESULTS
Delparto, Aleh, Bambusch, & Barclay, 1977	3 college students	Fingernail biting	Habit reversal	Decrease reported (no data)
Denny, 1980	3 M.R. children	Stereotypic behavior: hand movements, mouthing	60 sec. pos. practice (forced wheelchair mobility)	Large, immediate decrease; suppression at 5 and 7 wk. F.U.
Doleys & Arnold, 1975	1 M.R. child	Toileting accidents	Package IV with restitution	Gradual decrease; suppression after 2 wks.
Doleys, Wells, Hobbs, Roberts, & Cartelli, 1976	4 M.R. children	Non-compliance	40 sec. pos. practice (play activities)	Very little to moderate decrease
Doke & Epstein, 1975	2 behavior disordered preschoolers	Thumbsucking; disruptive behaviors	2 min. brushing teeth with antiseptic solution	Large immediate decrease; suppression
Drabman, Cordua y Cruz, Ross, & Lynd, 1979	3 M.R. children	Drooling	50 wipes of the mouth with a tissue	Moderate to large decrease
Duker & Seys, 1977	19 yr. old M.R. woman	Vomiting	20 min. restitution (cleaning up)	Moderate, variable decreases
Epstein, Doke, Sajwaj, Sorrell, & Rimmer, 1974	2 autistic children	Self-stimulatory hand and foot movements	2-2.5 min. pos. practice (hand or foot movements)	Moderate to large decreases
Fischer & Neys, 1978	11 yr. old boy	Swearing	10 min. pos. practice (window washing)	Large, immediate decrease
Foxx, 1977	3 M.R. children	Eye contact	Pos. practice (hand movements)	Moderate to large increases
Foxx, 1976(a)	2 M.R. women	Public disrobing	30 min. restitution (dressing) and pos. practice (grooming others)	Immediate decrease; suppression at 8 wk. F.U.
Foxx, 1976(b)	1 M.R. female	Attendance at a grooming class	2 hrs. pos. practice (grooming the residents)	Large, immediate increase to 100% attendance
Foxx & Azrin, 1973(a)	4 M.R. children	Self-stimulatory behaviors	2.5 min. pos. practice (tooth brushing, head movements)	Moderate to large decreases
Fox & Azrin, 1973(b)	34 children	Toileting accidents	Package IV with 10 min. pos. practice (toilet approaches)	Large immediate decrease; gradual to quick suppression
Foxx & Azrin, 1972	3 M.R. adults	Aggressive-disruptive behavior	30 min. restitution (clean-up, apologize, restore the environment)	Large, immediate decrease
Foxx & Martin, 1975	3 M.R. adults	Coprophagy & pica	30 min. restitution (clean-up) and teeth brushing with antiseptic	Immediate decreases
Freeman, Graham & Ritvo, 1975	6 yr. old behavior problem child	Nail picking	Physical restraint (hands held at child's side for 60 sec.)	Large decrease; suppression
Freeman, Moss, Somerset, & Ritvo, 1977	2 yr. old autistic child	Thumbsucking	30 sec. physical restraint	Large, immediate decrease; suppression at 1 mo.
Freeman & Pribble, 1974	5 yr. old autistic child	Toileting accidents	15 min. restitution (clean up)	Immediate decrease; suppression at 5 mos.
Harris & Romanczyk, 1976	8 yr. old M.R. child	Head banging	10 min. pos. practice (arm and head movements)	Large, immediate decrease
Harris & Wolchik, 1979	4 autistic children	Self-stimulatory hand movements	10 sec. pos. practice (hand movements)	Large decreases for 2 subjects; moderate decreases for 2 subjects
Higgs, Burns, & Meunier, 1980	9 yr. old M.R. boy	Self-stimulatory speech	10 sec. pos. practice (hand movements)	Moderate, gradual decrease
Kelly & Drabman, 1977(a)	3 yr. old blind boy	Eye poking	10 min. pos. practice (arm movements)	Large, gradual decrease
Kelly & Drabman, 1977(b)	10 yr. old M.R.	Head hitting	Pos. practice (head movements)	Large, gradual decrease
Klinge, Thrasher, & Meyers, 1975	1 adult psychiatric patient	Aggressive, disruptive behavior	Contingent bed rest, 1 hr.	Large decrease
Luce, Delquardi, & Hall, 1980	2 M.R. children	Excessive vocal and aggressive responses	Contingent exercise (stand-up, sit down, 10 times)	Large, immediate decrease
Luce & Hall, in press	3 M.R. children	Inappropriate vocal responses	Contintent exercise (20 sec. run or stand up, sit down, 5 times)	Large, immediate decrease
Luiselli, Helfen, Pemberton, & Reisman, 1977	8 yr. old M.R. boy	Public masturbation	1 min. pos. practice (arm movements)	Gradual decrease to zero; suppression at 3 mo. F.U.
Luiselli, Pemberton, & Helfen, 1978	10 yr. old M.R. boy	Self-stimulatory behaviors	1 min. pos. practice (arm movements)	Large, immediate decrease

AUTHORS	SUBJECTS	DEPENDENT VARIABLE	TYPE OF OVERCORRECTION	RESULTS
Marholin & Townsend, 1978	10 yr. old autistic child	Stereotypic hand movements	3-5 min. physical restraint	Large, immediate decrease
Martin, Weller, & Matson, 1977	1 M.R. adult	Object transferring	5 min. pos. practice	Large, immediate decrease
Matson, 1977	16 yr. old autistic boy	Toileting accidents	2 min. pos. practice (time on toilet) and 10 min. restitution (clean up)	Immediate decrease
Matson, Horne, Ollendick, & Ollendick, 1979	20 children, ages 3 to 12 yrs.	Aggressive, disruptive behaviors	Pos. practice or restitution (not specified)	Moderate, gradual decrease
Matson, Ollendick, & Martin, 1979	8 subjects from previous studies	Self-stimulation	Pos. practice (e.g., hand movements)	2 subjects maintained decreases after F.U.
Matson & Stephens, 1977	62 yr. old psychiatric patient	Throwing objects	5 min. restitution (apology and clean up)	Large decrease; suppression at 11 wk. F.U.
Matson, Stephens, & Smith, 1978	1 M.R. adult	Pica and hair pulling	Teethbrushing with hot sauce (for pica); hairbrushing (for hair pulling)	Immediate decrease for both behaviors
Measel & Alfieri, 1976	Study 1: 14 yr. old M.R. boy Study 2: 16 yr. old M.R. boy	Head slapping Head banging	10 min. pos. practice (head movements) Pos. practice (head movements)	Immediate decrease; suppression Opposite effect: increase
Ohlsen, 1978	2 15 yr. old blind students	Body rocking	Vigorous exercise	Decrease
Ollendick & Matson, 1976	2 children, ages 2 and 2.5 yrs.	Aggressive, disruptive behaviors	Restitution (apologizing) and pos. practice (arm movements)	Moderate, variable decreases; increased overcorrection time more effective
Ollendick, Matson, & Martin, 1978	Study 1: 2 M.R. adults Study 2: 2 M.R. adults	Self-stimulatory behaviors Head movements, laughing	5 min. pos. practice (head movements) 5 min. pos. practice (head movements)	Moderate to large decreases Moderate, variable decreases
Roberts, Iwata, McSween, & Desmond, 1979	3 M.R. adults	Self-stimulatory behaviors	1-2 min. pos. practice (clapping, finger movements, facial movements)	Large, immediate decreases
Rollings, Baumeister, & Baumeister, 1977	2. M.R. adults	Head nods, body rocking, self hits	5 min. pos. practice (head movements, body positions)	No effect for one subject; moderate decrease for the 2nd
Rusch, Close, Hops, & Agosta, 1977	1 M.R. adult	Searching behavior	Pos. practice (hand washing)	No data, but decrease reported
Shapiro, 1979	5 yr. old M.R. child	Paper tearing	2 min. restitution (clean up) and 5 min. pos. practice (turning pages)	Large, immediate decrease; suppression at 18 mo. F.U.
Shapiro, Barrett, & Ollendick, 1980	3 M.R. children	Stereotypic mouthing	30 sec. pos. practice (task manipulation) compared with 30 sec. physical restraint	Moderate to large decrease for both procedures
Smeets, Elson, & Clement, 1975	10 yr. old deaf M.R. child	Nasal discharge	30 sec. nose rubbing with antiseptic	Moderate decrease; suppression at 1 mo.
Sumner, Mueser, Hsu, & Morales, 1974	7 chronic psychiatric patients	Aggressive, disruptive behavior	30 min. restitution (apologizing)	Large, gradual decrease
Webster & Azrin, 1973	8 M.R. adults	Agitative, disruptive behavior	2 hr. bed rest	Large decreases
Wells, Forehand, & Hickey, 1977(a)	2 M.R. children	Mouthing and object manipulation	2.5 min. pos. practice (appropriate toy play)	Variable, moderate decreases
Wells, Forehand, Hickey, & Green, 1977 (b)	2 E.M.I., M.R. children	Self-stimulatory behaviors	2.5 min. pos. practice (appropriate toy play)	Large, immediate decrease; suppression
Zehr & Theobold, 1978	8 M.R. adults	Self-injurious responses	5 min. pos. practice (manually guided arm & hand movements)	Large, immediate decrease

[1]The types of overcorrection are categorized as restitution, pos. practice and habit reversal. Procedures which do not eaily fit these categories are described (i.e., contingent bed rest, physical restraint, etc.). Combination IV refers to two or more overcorrection procedures used together. Package IV refers to an intervention with many components, only one of which is overcorrection.

[2]Suppression refers to a zero level of occurrence of the target behavior. Decrease refers to any drop in the level of occurrence of a target behavior. F.U. refers to follow-up and is reported only if such data are presented in the article.

plication. One common feature of each overcorrection procedure, however, is the contingent relation between the occurrence of the problem behavior and the overcorrection behavior(s) which follow(s). Two broad categories of overcorrection exist in the literature: positive practice and restitution. While not identified as "overcorrection," habit reversal procedures are quite similar to overcorrection procedures and are also briefly reviewed.

Positive Practice. The most common positive practice procedure is a form of gross motor movements physically guided by the therapist. This forced movements procedure was termed "functional movements training" by Foxx and Azrin (1973a). Since convincing demonstrations of increases in "functional movements" (i.e., movements which are "functional" in the sense of contacting existing reinforcement contingencies) have yet to be reported, we will refer to this procedure as a "forced movements procedure." Its components include instructions by the therapist for the subject to hold a particular body part (i.e., arms, head, or legs) in certain spatial positions, graduated guidance providing the minimal amount of physical force necessary to insure that the subject engages in the movements, and repetitions of the movements for a predetermined period of time. As an example, one subject in Foxx and Azrin's (1973a) study was instructed to sequentially place his hands for 15 seconds in each of five positions: above his head, straight out, into his pockets, together, and behind his back. The sequence of positions was repeated for a total duration of five minutes. This five minutes of forced movements training was applied contingent on each occurrence of self-stimulatory hand clapping. With few exceptions (Adams, 1980; Foxx, 1977; Matson, Horne, Ollendick, & Ollendick, 1979), the forced movements procedure described above has been used exclusively to suppress self-stimulatory and self-injurious behaviors.

While most forced movements procedures are topographically similar to the target behavior, i.e., forced arm movements contingent on self-stimulation involving arm movements, some studies have demonstrated the effectiveness of overcorrection movements topographically different from the target behaviors (e.g., Epstein, Doke, Sajwaj, Sorrell & Rimmer, 1974; Roberts, Iwata, McSween, & Desmond, 1979). In either case, a decrease in the self-stimulation corresponded with the introduction of the response contingent overcorrection manipulations. This suggests that topographic similarity between the response to be decelerated and the overcorrection movements may not be as crucial for the observed effects as the contingent relation between self-stimulation and forced gross motor movements of any topography.

A number of other forced movements procedures (positive practice) have been reported; including forced toy play (Wells, Forehand, Hickey & Green, 1977) and "task manipulation" (Shapiro, Barrett & Ollendick, 1980). Table 1 indicates the different types of positive practice manipulations reported in the overcorrection literature.

The literature reports various durations of the forced movements procedures. They range from 10 seconds (Harris & Wolchik, 1979) up to 20 minutes (Azrin, Kapaln & Foxx, 1973) and include a number of different durations between these two extremes. The only study providing data which allow a direct comparison of the effectiveness of different durations of positive practice movements is Foxx (1977). He found 5 minutes of "functional movements training" to be more effective than 2 minutes in increasing levels of eye contact among his subjects. The majority of recent studies have utilized forced movements procedures with durations of 5 minutes or less (e.g., Coleman, Whitman & Johnson, 1979; Conley & Wolery, 1980; Harris & Wolchik, 1979; Higgs, Burns & Meunier, 1980; Matson, et al., 1979; Roberts, et al., 1979; Shapiro, et al., 1980).

Some studies report positive practice procedures in which the overcorrection behavior could be functional for the subject (i.e., the behaviors would contact

naturally occurring reinforcers in the subject's environment). These procedures include 5 minutes of practice in the correct manner of asking permission (Azrin & Powers, 1975), 12 minutes of practice in appropriate sitting positions (Azrin & Wesolowski, 1975a), 10 minutes of window washing (Fisher & Nehs, 1978), 30 minutes of dressing and redressing practice (Foxx, 1976a) and 60 seconds of wheelchair mobility exercises (Denny, 1980). In each of these studies the contingent application of positive practice effectively decelerated the problem behavior. It is unfortunate, however, that the authors report no data on the rates of these overcorrection behaviors to determine if the positive practice actually resulted in an increase in functional behavior which was maintained after termination of the positive practice procedure.

A number of authors have used physical restraint procedures to decelerate inappropriate behavior and called the procedures overcorrection (Freeman, Graham, & Ritvo, 1975; Freeman, Moss, Somerset & Ritvo, 1977; Marholin & Townsend, 1978). These and other physical restraint procedures do not require the active engagement in a sequence of behaviors, and thus do not fit the definition of overcorrection set forth earlier. However, it is interesting to note that the one study directly comparing physical restraint and positive practice via a multi-element design (Shapiro, et al., 1980) found the two procedures equally effective in decelerating self-stimulatory behavior.

Restitution. Following the success achieved by Foxx and Azrin (1972) in eliminating the aggressive/disruptive behavior of subjects through the use of restitution, other authors have employed various restitution procedures with a number of inappropriate behaviors. Azrin and Wesolowski (1974) reduced theft among retardates by requiring the subject to return the stolen item plus an additional item. Other authors required subjects to clean up parts of the environment which were adversely affected by their inappropriate behavior. See Table 1 for the applications of restitutional overcorrection.

Other overcorrection applications in the literature consist of a combination of restitution and positive practice (e.g., Azrin & Wesolowski, 1975b; Clements & Dewey, 1979; Ollendick & Matson, 1976; Shapiro, 1979), or overcorrection procedures which are part of multicomponent training package (e.g., Azrin & Armstrong, 1973; Azrin & Foxx, 1971; Azrin, Sneed & Foxx, 1973b; Carroll, Sloop, Mutter & Prince, 1978; Crowley & Armstrong, 1977; Doleys & Arnold, 1975; Foxx & Azrin, 1973b). Each of these studies involved a "treatment package" and no attempts were made to separate the effects of the restitution procedures from other components of the larger "treatment package." Only one study, Matson, et al., (1979), has directly compared the effects of positive practice and restitution on 2 groups of aggressive/disruptive children. Their results indicate restitution was more effective in reducing the inappropriate behaviors than was positive practice.

Habit reversal. "Habit reversal" is a treatment procedure which fits the definition of overcorrection because it requires the emission of behavior contingent on the occurrence of inappropriate behavior. Azrin and Nunn developed this procedure in 1973 and a number of studies have utilized it in the treatment of a variety of problem behaviors (see Table 1). Habit-reversal requires the subject to emit an incompatible response contingent on the occurrence of the inappropriate behavior or the "urge" to engage in the inappropriate behavior. In the case of nailbiting, the competing response might consist of grasping an object or clenching a fist. There are, however, other potentially effective behavior change components which are often used in conjunction with the contingent response requirements in the habit-reversal procedure. Such components as social reinforcement or instructions in fingernail care for nail biters make it difficult to attribute response suppression solely to the response requirements of the procedure.

Each use of a habit-reversal procedure

resulted in a rapid decrease in the occurrence of inappropriate behaviors to which it was applied. In three separate studies (Azrin, Nunn & Frantz, 1980a; 1980b; 1980c), habit-reversal was compared with negative practice across groups and proved a more effective response decelator in each case. All habit-reversal studies have reported group data, and all have used an AB design comparing the effects of the procedure against a baseline.

Finally, some authors have applied procedures which they labeled as "overcorrection," but which are more accurately characterized by the introduction of aversive stimuli without the requirement that subjects engage in behaviors as is typically required in overcorrection procedures. For example, Doke and Epstein (1975) brushed subjects' teeth with oral antiseptic for 2 minutes contingent on each occurrence of thumbsucking. A number of other authors used tooth brushing with antiseptic solution as a response decelerating procedure (e.g., Agosta, Close, Hops & Rusch, 1980; Foxx & Martin, 1975) and one study used contingent tooth brushing with a 10% solution of hot sauce (Matson, Stephens & Smith, 1978). Drabman, Cordua y Cruz, Ross, and Lynd (1979) wiped the subjects' mouth with a tissue 50 times for each time interval during which drooling was observed. Smeets, Elson and Clement (1975) held a subject's nose, then rubbed it with an odorous antiseptic contingent on nasal discharges by the subject. Each of these procedures proved effective in decreasing the levels of behavior.

SUMMARY OF OVERCORRECTION LITERATURE

A review of the overcorrection literature reveals generally consistent effects across a wide range of dependent variables and subject populations. The reliability of the behavioral effects of overcorrection needs to be interpreted somewhat cautiously since many studies neglected to use experimental designs which allowed for the replication of experimental effects within the study. Nevertheless, the number of replications across studies is impressive and lends support to contentions that overcorrection produces reliable behavioral effects.

This literature is also replete with a number of procedural variations whose consistency with the original definition of overcorrection is questionable. Originally conceptualized as a procedure which would function to correct the environmental consequences of the inappropriate behavior and provide practice in correct forms of relevant behavior, many subsequent applications of overcorrection have been inconsistent with this conceptualization (i.e., most positive practice procedures do not involve "relevant" or functional behavior). Regardless of what the authors call their procedures and whether or not they are consistent with the original usage of the term "overcorrection," the literature has demonstrated the effectiveness of the many procedures labelled as "overcorrection."

ANALYSIS OF OVERCORRECTION

Research Strategies and Methods

The analytic and interpretive statements which can be made about a body of experimental research are largely dependent on the nature of experimental questions addressed in the literature and the quality of the research methods used to answer experimental questions. Unfortunately, much of the overcorrection research consists of demonstrations of treatment effects with different subjects and different problem behaviors. While this type of research is important in the early stages of a developing body of research, a complete understanding of the multi-component procedures subsumed under "overcorrection" will not be realized until component and parametric analyses are conducted. Attaining a thorough understanding of overcorrection procedures is important for a variety of scientific, pragmatic, and public relations reasons. Identification of the basic behavioral principles responsible for the behavioral effects of overcorrection is important in ". . . making a body of technology into a discipline rather than a collection of tricks" (Baer, Wolf, & Risley, 1968, p. 96). The identification of the minimal conditions required for

response deceleration (e.g., duration of overcorrection movements) has obvious implications for the efficient use of staff and client time. Finally, a complete understanding of the conditions essential to the effects of overcorrection will contribute to the reliability with which treatment effects can be reproduced in field settings and thus bolster public relations. Suggestions for future research directions are offered in a later section.

In addition to the relative lack of analytic research, a complete understanding of overcorrection is hindered by a number of methodological weaknesses common to many of the studies. Much of the early research on overcorrection relied on AB designs or designs which involved comparison of group means. The weaknesses of such experimental tactics (e.g., failure to experimentally demonstrate the reliability of treatment effects; aggregate data which are not representative of individual behavioral processes) and the tenuous nature of conclusions based on these experimental designs are now widely recognized (Hersen & Barlow, 1979; Johnston & Pennypacker, 1980; Sidman, 1960). While long-term outcome studies involving the comparison of large groups may be necessary in the progression of clinical research on a particular topic (Agras & Berkowitz, 1980), such large scale clinical trials are premature until the therapeutic procedures have been clearly defined and refined. Intensive, single organism designs such as multiple-baseline, reversal, or multielement designs seem most appropriate for the identification of the conditions necessary for the effective use of overcorrection procedures and the design of maximally effective overcorrection procedures for specific problems and clients.

Another common methodological problem is the use of the overcorrection procedure simultaneously with other behavior change procedures, thus limiting the conclusions that can be drawn about the effectiveness of the overcorrection procedure alone. In a number of studies overcorrection has been part of a multicomponent treatment package (Azrin & Armstrong, 1973; Azrin, Gottlieb, Hughart, Wesolowski & Rahn, 1975; Crowley & Armstrong, 1977; Doleys & Arnold, 1975) or the overcorrection procedure has been used in conjunction with one other procedure such as DRO (Azrin et al., 1973a; Luiselli, Helfen, Pemberton, & Reisman, 1977; Luiselli, Pemberton & Helfen, 1978; Measel & Alfieri, 1976).

Finally, a number of overcorrection studies (e.g., Adams, 1980; Azrin & Powers, 1975; Foxx & Azrin, 1973a, study 1; Foxx & Martin, 1975, study 2; Luiselli et al., 1977, 1978; Matson & Stephens, 1977; Measel & Alfieri, 1976) implemented the overcorrection experimental phase immediately upon termination of another procedure without an intervening baseline phase. When two or more interventions are sequentially imposed on the same baseline, the behavioral effects of later interventions may be partially determined by their sequential arrangement with prior interventions. The probability of sequence effects may be reduced, though probably not eliminated, by the separation of sequential interventions with baseline phases in which the original baseline response levels are reproduced. However, researchers should design experiments to avoid sequence effects, empirically document the occurrence and magnitude of sequence effects, or they should acknowledge the interpretation problems associated with sequence effects in their experiments.

Punishment characteristics. Despite initial claims to the contrary (Foxx & Azrin, 1972), overcorrection is most parsimoniously classified as a punishment procedure. Azrin and Holz (1966) define punishment as ". . . a reduction in the future probability of a specific response as a result of the immediate delivery of a stimulus for that response (p. 381)." An obvious consistency in the previously reviewed literature is the effectiveness of overcorrection procedures in reducing the future probability of a response. While overcorrection does not involve the response dependent presentation of relatively simple and specific stimuli (e.g., electric shock) often used in punishment

studies, the functional and procedural similarities with punishment are sufficient to classify overcorrection as a punishment procedure. However, the complexity of most overcorrection procedures make it difficult to rule out the operation of other behavioral processes (e.g., differential reinforcement of incompatible behavior). Classification of overcorrection as a punishment procedure suggests that it might be useful to examine the overcorrection literature with respect to the generally acknowledged characteristics of punishment (for reviews see Azrin & Holz, 1966; Johnston, 1972).

One characteristic effect of a punishment procedure, such as the administration of "painful" stimuli, is the rapid and large decrease in the behavior which immediately preceeds the stimulus. In a number of overcorrection studies, the results are similar to those observed with such punishment procedures in that rapid and large decreases in the inappropriate behaviors are obtained with total suppression occurring in many instances (Agosta et al., 1980; Azrin et al., 1973a; Azrin & Powers, 1975; Azrin & Wesolowski, 1974; Coleman et al., 1979; DeCataranzo & Baldwin, 1978; Denny, 1980; Doke & Epstein, 1975; Foxx, 1976a; Foxx & Azrin, 1972; Foxx & Azrin, 1973a; Foxx & Martin, 1975; Freeman et al., 1975; Freeman et al., 1977; Harris & Romanczyk, 1976; Harris & Wolchik, 1979; Marholin & Townsend, 1978; Martin, Weller & Matson, 1977; Matson & Stevens, 1977; Measel & Alfieri, 1976, study 1; Shapiro, 1979; Wells, Forehand, & Hickey, 1977a). The remaining overcorrection literature is characterized by numerous studies showing either large but slower decreases in behavior or decreases which were immediate but small.

There were a few studies where overcorrection did not have a decelerative effect on behavior (i.e., Adams, 1980; Doleys, Wells, Hobbs, Roberts & Cartelli, 1976; Measel & Alfieri, 1976; Ollendick & Matson, 1976). These studies report a total of nine subjects for whom overcorrection procedures were ineffective in decelerating behavior. Considering the fact that publication policies often preclude the appearance of "negative" findings, there are probably other unreported cases where overcorrection was ineffective as a response decelerator. The factors responsible for these anomalous findings are unclear and would seem to merit further investigation in an effort to identify limitations on the effectiveness of overcorrection procedures.

The question of intensity (i.e., the amount of force exerted by the therapist or the speed at which forced movements are exerted) or duration of the overcorrection procedure is of importance because the intensity and duration of a punishing stimulus are closely related to its response suppressing effects (Azrin & Holz, 1966). Unfortunately, the issue of intensity of the overcorrection procedures is not addressed in the literature. There are no direct measures of intensity and no parametric comparisons of different intensities.

A similar state of affairs pertains to the duration of overcorrection procedures. While the literature reports durations ranging from 10 seconds to 2 hours, definitive statements about the optimal duration of overcorrection cannot be made because parametric studies comparing various durations have not been reported. Despite the lack of parametric studies, a trend towards the use of shorter durations of overcorrection is obvious in recent publications (e.g., Harris & Wolchik, 1979; Luce, Delquadri & Hall, 1980; Luce & Hall, in press). The use of the minimal duration of overcorrection necessary to obtain complete response suppression is to be encouraged not only because of the obvious gains in treatment efficiency, but also because of reports that organisms habituate to extended periods of low intensity punishment thus reducing the response suppressing effects of the punishment procedure (Azrin & Holz, 1966).

In making suggestions for the effective use of punishment, Azrin and Holz (1966, p. 427) point out that punishment should not be differentially associated with the delivery of reinforcement and should signal a period of extinction. These

recommendations have important implications for the nature of the overcorrection activities (i.e., forced movements or restitution activities) used as consequences for inappropriate behavior. It is quite probable that the response suppressing effects of overcorrection procedures would be compromised if overcorrection activities resulted in either naturally occurring or socially arranged reinforcement for those activities. This suggests that overcorrection activities which have relatively low reinforcement value (with respect to the response to be suppressed) would be the most effective punishers. Some overcorrection activities could actually function as reinforcement if the forced activities had higher relative reinforcement value than the behaviors to be suppressed. Unfortunately the nature of the overcorrection activities has yet to be subjected to experimental scrutiny and it is not always possible to predict whether a specific overcorrection procedure will act to increase or decrease the behavior it follows for a specific subject. It seems likely that between subject differences in current repertoires or historical factors might render overcorrection procedures containing certain features (e.g., physical contact, strenuous physical movements) more effective punishers than other procedures without these features.

Azrin and Holz (1966) have also emphasized that the effectiveness of punishment will be enhanced by the provision of an alternative, incompatible response which produces reinforcement, preferably in the same stimulus class as the reinforcement maintaining the punished response. While most of the activities required in overcorrection procedures are incompatible with the undesirable behavior, few of the activities are socially desirable ones which produce the same class of reinforcing stimulus changes as the undesirable behavior. As previously discussed, it is unclear whether the forced occurrence of reinforcing overcorrection activities will increase or decrease the undesirable behavior as part of the overcorrection activities. This seems especially important in procedures which provide reinforcement for the incompatible behavior since the opportunity to emit a reinforced incompatible behavior is made contingent on the prior occurrence of the undesirable behavior and may serve to increase rather than decrease the undesirable behavior.

Another similarity between the overcorrection literature and the punishment literature relates to the situational specificity of the behavioral effects. For those studies reporting data on generalization, the majority reported effects to be limited to the setting where the overcorrection was applied (Doke & Epstein, 1975; Foxx & Azrin, 1973a—reported anecdotally; Harris & Romanczyk, 1976; Marholin & Townsend, 1978; Harris & Wolchik, 1979; Rollings, Baumeister & Baumeister, 1977), specific to the experimenter applying the overcorrection procedures (Coleman et al., 1979; Foxx, 1977), or specific to the behavior on which the overcorrection was made contingent (Epstein et al., 1974; Wells et al., 1977a). Two studies, however, did report some generalization of treatment effects outside the treatment session. Kelly and Drabman (1977a) reported a decrease in eye poking of a visually impaired child outside the overcorrection setting. Martin et al. (1977) also reported anecdotal evidence suggesting a decrease in self-stimulation outside the treatment setting.

In many respects, questions about the generalization and maintenance of overcorrection effects are misleading and should be rephrased as questions of the generality of controlling variables (Johnston, 1979). Overcorrection effects can occur in situations where the original behavior change contingencies are not operative for one of the following reasons: (1) reinforcement for incompatible behavior and/or punishment for the undesirable behavior characterize the non-training environment; (2) a discrimination of the absence of overcorrection contingencies has not developed (though with occasional emission of the undesirable behavior in the non-training environment, stimulus control will develop); (3) the undesirable behavior was completely suppressed so that the absence of overcorrection contingencies in the non-training environment is not contacted

because the behavior is never emitted. The principles of stimulus control and their implications for generalization and maintenance of behavior change underscore the importance of previous suggestions for selecting and training adaptive behaviors which are incompatible with the undesirable behaviors (see Goldiamond, 1974 for discussion of this and related issues).

Phenomena frequently occurring with the use of punishment include undesired behavioral side effects, such as escape responses, emotional reactions, and elicited or operant aggression; although the prevalence of these side effects with humans in clinical settings is open to question (Lichstein & Schreibman, 1976). A number of authors have reported the occurrence of such side effects with the use of overcorrection procedures (although many authors do not report either the occurrence or nonoccurrence of side effects, so it is difficult to get an estimate of their prevalence). Among those authors reporting the occurrence of side effects, Foxx and Azrin (1973a) noted emotional behaviors such as crying when 20 minutes of a forced movements overcorrection procedure was applied. In three different studies by Foxx, subjects exhibited escape (Foxx, 1976a), combative behavior (Foxx, 1976b), or emotional and escape behaviors (Foxx, 1977) as a result of overcorrection applications. Matson and Stevens (1977) observed aggressive hitting and kicking behaviors. Rollings et al., (1977) observed self-punching, scratching, and screaming. Wells et al., (1977b) reported aggressive and escape behaviors when overcorrection was applied. These studies suggest that overcorrection and punishment have similar behavioral side effects.

Subjects in several overcorrection studies developed conditioned avoidance responses to verbal commands or threats associated with the overcorrection procedures. Because the overcorrection was preceded by a command, the subject learned to avoid graduated guidance by engaging in the movements upon command without physical force from the experimenter (Foxx, 1977; Foxx & Azrin, 1973a). Subjects in studies by Doke and Epstein (1975) and Foxx (1976b) learned to avoid the overcorrection by responding to verbal threats which preceded the overcorrection applications.

Thus the literature reveals effects of overcorrection to be highly similar to those characteristically associated with punishment. With few exceptions overcorrection procedures have functioned to decelerate the behaviors on which they were contingently applied. In many cases the results showed large and immediate decreases in undesired behaviors with occasional side effects including emotional, aggressive, and escape responses. Additionally, the absence of generalized suppressive effects on behaviors outside the intervention setting is analogous to the situation specificity of the effects of the punishment. Behaviors resembling conditioned avoidance responses to the aversive stimulation (overcorrection) were also reported in a few cases.

Educative Function

Given the similarities between overcorrection and punishment, it seems reasonable to analyze the data for differences in the effects of the two procedures. More specifically, we will look at the claim by Foxx and Azrin (1972, 1973a) that overcorrection has educative value. To claim educative value, one must first identify an increase in relevant or appropriate behavior and secondly demonstrate that the observed increase in appropriate behavior is directly related to the overcorrection procedure. For example, in situations where only a limited number of responses are possible, say responses A, B, and C, any decrease in the occurrence of response A will generally result in an increase in response B or response C or both (Catania, 1966). However, it would be inappropriate to claim educative value for a procedure which decreased response A since the increases in response B or C would not be a direct result of the procedure and could have been produced by any operation which reduces response A.

Several studies reported data on appropriate behavior as well as the

behaviors they decelerated through overcorrection procedures. While these studies did document a co-variation between the decrease in inappropriate behaviors and an increase in appropriate behaviors, the case for a direct educative effect of overcorrection was not strong. Typically a behavior, such as appropriate toy play, would be shown to increase when a topographically dissimilar forced movements procedure was applied to self-stimulation involving the hands (Coleman et al., 1979; Epstein et al., 1974; Koegel, Firestone, Kramme, & Dunlap, 1974; Martin et al., 1979—anecdotal). Although toy play increased, it was not directly trained in the overcorrection procedure. This increase might best be construed as an interaction between concurrent behaviors, both of which produce similar consequences, when the reinforcement value of one is altered by the addition of a response suppression procedure (see Catania, 1966 or deVilliers, 1977, for a review of experimental literature on concurrent schedules of reinforcement).

Other studies have applied overcorrection procedures which effectively decelerated inappropriate behaviors, and the authors have anecdotally reported increases in appropriate behavior of the same topography as the overcorrection behaviors (Azrin & Powers, 1975; Azrin & Wesolowski, 1975b; Foxx & Martin, 1975; Matson & Stevens, 1977). However, none of these studies presented data documenting the increase in appropriate behavior; thus claims concerning the educative value of overcorrection must be made cautiously.

Four studies did collect data on the rates of appropriate and inappropriate behaviors to document the decelerative and possible educative effects of overcorrection. In each study the form of the overcorrection was the same form as the appropriate behavior being recorded. In two cases (Roberts et al., 1979; Shapiro et al., 1980), no changes were reported in the rates of appropriate behaviors as a result of overcorrection manipulations requiring the subjects to engage in those behaviors. Wells et al., (1977a,b), however, reported variable increases in appropriate toy play resulting from overcorrection involving forced toy play. One subject in the Wells et al. (1977a) study showed moderate and variable increases in toy play while the second subject showed none. In a second study using the same subjects, the subject who previously showed an increase in toy play again showed an increase when forced toy play was applied as overcorrection. For the subject who previously showed no increase in toy play, there was again no increase as a result of the overcorrection procedure.

In other studies where an increase in appropriate behavior was documented, two report appropriate behaviors which functioned to avoid the overcorrection procedure (Foxx, 1976b; Foxx, 1977). Another study reported increases in appropriate behavior resulting from an overcorrection-like procedure which resembled typical social skills training (Barton & Osborne, 1978). In light of the general paucity of data on educative effects and the inconsistencies of those data, claims for an educative function of overcorrection cannot now be supported.

If, as previously discussed, overcorrection activities are selected for their "educative value," we should recognize that such behaviors will be maintained only to the extent that reinforcement, either socially arranged or occurring as a natural response product, occurs. Whether overcorrection activities which produce reinforcement can be used to suppress preceding undesirable behaviors has yet to be determined. Researchers and practitioners who attempt to use "reinforcing" or educative overcorrection activities should be especially careful to monitor the effects of these procedures on the undesirable behavior. They should also be aware that physically forcing a person through a behavior sequence may be aversive even if that sequence of behaviors culminates in reinforcement. Whether the aversiveness of the physical guidance offsets the effects of reinforcement, thereby reducing the future tendency to emit desirable or educative overcorrection activities, should be carefully evaluated. It would be quite unfortunate if avoidance responses or conditioned emotional

responses began to occur with certain highly desirable or educative activities (e.g., exercise, relaxing, etc.) as a result of their use in an overcorrection procedure.

CONCLUSIONS

This review of overcorrection procedures reveals a wide range of procedural variations subsumed under the rubric of "overcorrection." One characteristic common to all effective applications of overcorrection, however, has been its decelerative effect on behavior. This is analogous to the punishment literature in which the characteristic which unifies a broad diversity of specific punishment procedures is their decelerative effect on behavior. The fact that overcorrection has been repeatedly demonstrated as an effective behavior decelerator merits its inclusion in the behavioral armamentarium. In the absence of additional support for any educative value, practitioners should not rely on overcorrection to teach or increase appropriate behaviors. A better tactic would be to select a proven procedure for the strengthening of appropriate behavior and use it concommitantly with a decelerative procedure, such as overcorrection, for inappropriate behavior.

One advantage of overcorrection is that the terminology used to talk about the procedures, as well as the procedures themselves, have greater social acceptability relative to other forms of punishment. For example, Foxx and Azrin (1972) referred to the various forms of restitution as "oral hygiene training," "household orderliness training," and the like. Foxx and Azin (1973a) called their procedure "functional movements training." Regardless of the terminology, however, overcorrection is a far more socially acceptable form of punishment than the delivery of painful stimulation such as electric shock. In light of recent restrictions and guidelines controlling the use of punishing stimuli (Repp & Deitz, 1978), overcorrection is an effective and seemingly acceptable procedure for the deceleration of inappropriate behavior.

We point out the similarity between overcorrection and punishment and the lack of documented educative value for overcorrection with mixed emotions. On one hand, we feel great sympathy for the beleaguered practitioner who relies heavily on overcorrection as an effective behavior decelerator which is relatively free of the legal and administrative problems of traditional forms of punishment. We would certainly not be in support of the indiscriminate regulation of overcorrection just because it is properly classified as a punishment procedure. On the other hand, we feel that it is important to correctly identify the behavioral processes at work in overcorrection so that the punishment literature might be consulted in attempting to maximize the effectiveness of overcorrection interventions. Furthermore, careful consideration of potential misuses of overcorrection should not be overlooked by incorrectly identifying the procedure as an educative rather than a decelerative procedure. We should give careful consideration to the design and implementation of procedures to make sure that people are not being physically guided through potentially dangerous behavior for unacceptable durations of time. Finally, to the degree that response elimination in the absence of increases in appropriate behavior is deemed undesirable, we must design programs which will complement the response deceleration effects of overcorrection by training new and adaptive behaviors.

There seem to be at least two drawbacks to the use of overcorrection: the amount of staff time required to apply the overcorrection procedure, and the aversiveness of applying the procedure. The time required for a staff person to administer overcorrection following a single occurrence of an undesired behavior has ranged from 10 seconds (Harris & Wolchik, 1979) to as long as 2 hours (Webster & Azrin, 1973). The most common duration appears to be 2-10 minutes for forced movements procedures and 30 minutes for various forms of restitution. Given that overcorrection is administered contingent on each occurrence of the inappropriate behavior, that it may require physical guidance, and that emotional, aggressive, or escape behaviors may be

generated, it is obvious that the procedure may become time consuming and/or aversive for those staff members involved and may involve abusive physical contact between staff and clients. Finally, difficulties in forcing a large, non-compliant person through overcorrection procedures should not be overlooked.

SUGGESTIONS FOR FUTURE USES AND FUTURE RESEARCH

The research on overcorrection reveals a consistent response decelerating effect when applied on a response contingent basis. Unfortunately, the factors responsible for this effect have had little analysis. The identification of behavioral principles underlying the effects of overcorrection procedures would aid in designing overcorrection procedures for the maximal effectiveness within the practical constraints accompanying each individual application of the procedure. Among the factors which may contribute to the response suppressing effects of overcorrection procedures are: the interruption of ongoing sequences of undesirable behavior; aversive aspects of physical contact and sometimes vigorous physical guidance; time out from available sources of positive reinforcement while engaging in overcorrection; the avoidance or escape contingencies under which overcorrection activities are emitted; the forced occurrence of any behavior which is effortful; the fact that overcorrection movements occur under extinction conditions or culminate in potentially punishing consequences; and unspecified punishing stimuli (e.g., harsh voice tone, "rough" physical guidance) accompanying the overcorrection.

To add substantially to the literature, future research need not replicate the effects of overcorrection with new dependent variables. The range of behavior problems with which overcorrection has proven effective is quite extensive and sufficient to demonstrate the generality of the procedure. Analytic research to identify which of the previously mentioned factors is crucial to the effects of overcorrection should be conducted. Identification of critical components of overcorrection will not only allow for the design of more efficient overcorrection procedures, but will also increase the reliability with which overcorrection procedures produce response suppressing effects.

Parametric research attempting to analyze the minimal overcorrection duration necessary for effective response suppression would greatly benefit the field. Recent research has demonstrated shorter duration overcorrection manipulations to be effective decelerators (i.e., Harris & Wolchik, 1979; Luce et al., 1980; Luce & Hall, in press). If parametric research demonstrated that the very short durations are as effective as longer durations, then the less restrictive, shorter duration procedure would be preferred for practical reasons. Certainly 10-20 seconds of overcorrection contingent on the inappropriate behavior would be preferable to a procedure requiring 10-20 minutes if the two were equal in terms of response suppression.

Strategies for assessing and enhancing the generalization and maintenance of overcorrection effects should be reconsidered. As stated earlier, there are few data supporting any generalization across setting, experimenters, or behaviors in the overcorrection literature. Generalization of effects to non-treatment settings can be programmed by bringing the behavior under control of training stimuli which are similar to those in the non-training setting. (See Marholin et al., 1980 for suggestions regarding generalization.) However, this is not a permanent solution since the absence of the overcorrection contingencies in the non-training setting will be eventually contacted. The problems inherent in generalization and maintenance can be most productively addressed by training behaviors which are incompatible with the undesirable behavior and which are maintained by reinforcement contingencies in the field setting. If this strategy proves unfeasible, it will probably be necessary to maintain some form of punishment in the "non-training" environment unless the contingencies of reinforcement which control the undesirable response can be identified and directly altered.

A final comment should be made about terminology since the verbal behavior of scientists and practitioners can have a powerful influence on research and application activities. Considering the wide range of procedural variations falling under the rubric of "overcorrection" and the various connotations arising from this term, it is suggested that researchers adopt names which are more directly descriptive of the procedures employed. Terms such as contingent exercise (Luce et al., 1980), physical restraint, forced arm movements, or contingent leg lifts more precisely describe the procedures they represent and are free of the superfluous meaning associated with the term "overcorrection." There is little utility in the continued use of a term which corresponds with neither a specific procedure nor a principle of behavior.

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