*THE EFFECTS OF A SELF-INSTRUCTIONAL
PACKAGE ON OVERACTIVE PRESCHOOL BOYS*

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The effects of a self-instructional package on three overactive preschool boys were investigated using a multiple-baseline design across subjects. Behavioral observations of the three target subjects indicated transfer of training effects from the experimental tasks to the classroom. On-task behaviors increased dramatically concomitant with the introduction of the self-instructional package, and treatment gains were maintained 22.5 weeks after baseline was initiated. In addition, the use of an observer-expectancy control condition gave further credibility to the demonstration of a causal relationship.

DESCRIPTORS: self-instruction, on-task behavior, overactive behavior, verbal mediation, massed practice, transfer of training, preschool children

The widespread use of behavioral principles with children has led to the development of several effective procedures for decreasing disruptive behavior and increasing attention in school settings. Aversive stimulation (Hall, Axelrod, Foundopoulos, Shellman, Campbell, and Cranston, 1971; Risley, 1968), response cost (Wolf, King, Lachowicz, and Giles, 1970), timeout (Carlson, Arnold, Becker, and Madsen, 1968; Kubany, Weiss, and Sloggett, 1971; Wahler, 1969), group contingencies (Barrish, Saunders, and Wolf, 1969; Harris and Sherman, 1973), and contingency management approaches (Hall, Lund, and Jackson, 1968; O'Leary and Drabman, 1971; Walker and Buckley, 1968) are among the procedures that have been shown to improve the behavior of "hyperactive" and disruptive children. However, these effects have been limited in two areas. First, some procedures have simply failed to affect significantly the behavior of a percentage of the subjects treated (Kazdin, 1973; Madsen, Becker, and Thomas, 1968). Second, lack of response maintenance at the cessation of intervention and failure to obtain transfer of training effects have been noted (Bornstein and Hamilton, 1975; Kazdin and Bootzin, 1972; O'Leary and Kent, 1973).

Kazdin (1975) has proposed training subjects in self-control (Bolstad and Johnson, 1972; Drabman, Spitalnik, and O'Leary, 1973; Meichenbaum, 1973) and the programming of generalization (Blanchard and Johnson, 1973; Walker and Buckley, 1972) as solutions to these problems. Within the former approach, verbally mediated self-control training would seem to have implication and utility in both problem areas defined above. That mediational processes exist in human learning has been amply demonstrated (Cole and Medin, 1973; Mahoney, 1974). In addition, the interaction between verbal and nonverbal behavior has received considerable attention (Luria, 1961; Vygotsky, 1962). Blackwood (1972) described speech as verbal chaining that produces discriminative stimuli and conditioned reinforcers. Self-produced verbalizations may therefore modify motor responses by mediating between stimulus situation and target behavior. The effects of verbal operants on motoric responses have been investigated (Bem, 1967; Lovaas, 1964; Meichenbaum and Goodman, 1969). Verbally mediated self-control training has been effective in eliminating lunchroom disruptions (MacPherson, Candee, and Hohman, 1974), and reducing rule-breaking behavior (Monahan and O'Leary, 1971), and the approach holds promise of reducing yet other forms of childrens' misbehav-

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ior (Blackwood, 1970). Additionally, since the individual is the source of behavioral control within the verbal mediation paradigm, response maintenance and transfer of training effects should be facilitated (Meichenbaum and Cameron, 1973).

One technique for training verbally mediated self-control is that of cognitive self-instruction (Meichenbaum and Cameron, 1974). This procedure consists of fading a set of prompts and instructions from an overt (spoken aloud), external (verbalized by a model) condition to a covert, self-produced target response. The effectiveness of the self-instructional package with school-age, "impulsive" children has been demonstrated (Meichenbaum and Goodman, 1971). Results have indicated that self-instructional guidance programs effectively modified the behavior of impulsive children relative to attentional and assessment control groups on several performance measures. Although improvement was maintained on a one-month follow-up assessment, no significant treatment effects were obtained on two indices of classroom behavior.

The present investigation sought to explore the functional utility of a self-instructional program for preschool, impulsive children and to demonstrate transfer of training effects from the experimental tasks to the actual classroom environment. Additionally, an observer-expectancy control condition was utilized such that treatment effects that arose were solely attributable to manipulations of the independent variable.

A multiple-baseline design was used in an attempt to demonstrate explicitly and reliably behavioral control within the self-instructional procedure. Thus, any ensuing behavioral changes within individual subjects were more readily apparent than in the more traditional group designs.

METHOD

Subjects and Setting

The three subjects were concurrently enrolled

in one classroom of a preschool Head Start program. Children were systematically selected on the basis of teacher and aide reports of highly disruptive and undesirable classroom behavior. Accordingly, only these three children were chosen to participate in the present research. Their parents were of lower to middle-class social standing and average yearly income did not exceed \$5000.

Subject 1 (Scott) was a 4-yr-old white male described as "a disciplinary problem because he is unable to follow directions for any extended length of time". He had been unable to complete standard tasks within the preschool classroom setting and often experienced violent outbursts of temper for no apparent reason. In addition, those working closely with him agreed that compliance and cooperation appeared to be minimal.

Subject 2 (Rod) was a 4-yr-old white male described by teachers as "being out of control in the classroom". Major problems and behavioral deficits included short attention span, aggressiveness in response to other children, and a general overactivity.

Subject 3 (Tim) was a 4-yr-old white male reported to be highly distractible both at home and in preschool. Anecdotal reports indicated that most of his classroom time was spent walking around the room, staring off into space, and/or not attending to task or instruction.

Dependent Variable

The dependent variable was on-task behavior, defined as those subject behaviors directed toward the assigned tasks. During teacher instruction it was expected that the child would be attentive and silent. When asked to participate during a work period (*e.g.*, figure drawing exercises, story reading, *etc.*), on-task behaviors included performing the prescribed and accepted classroom activity. Off-task behaviors included engaging in unassigned activity: movement about the room, playing with toys, shouting, fighting, kicking, and leaving the classroom without permission.

Observation and Recording

Behaviors were observed and categorized as either on-task or off-task by two independent judges naive as to the design of the study. Judges had been trained for two weeks before baseline and had achieved interrater reliabilities exceeding 80% for four consecutive days.

During the study, rates of on-task and off-task behaviors were obtained for the selected children twice daily, four days per week. Thirty-minute observations were conducted in the morning and afternoon when class activities were more structured, to provide a clear indication of the presence or absence of appropriate behavior.

The measures of on-task performance were determined on a 10-sec observe, 10-sec record basis. That is, both observers would watch the first child on the list for 10 sec, then take 10 sec to record his behavior as "+" (on-task) or "0" (off-task). For the behavior to be coded as "+", the child had to be observed as on-task for the entire 10-sec interval. Behavior was considered off-task if the subject did not meet the above requirements. Subjects were observed in a random order that varied daily.

Both observers sat in the rear of the room (although not within view of each other), avoided all forms of physical and/or verbal contact with the children, and remained relatively unobtrusive throughout the study.

Reliability of observations. Since two observers were present during each phase of the investigation, continuous interobserver agreement data could be generated. The two records were, therefore, compared interval by interval for each child, and a measure of agreement obtained by calculating the number of observer agreements divided by the total number of agreements plus disagreements. Agreement was scored when both observers recorded the same behavior during the same 10-sec observation interval. Disagreement was scored when one observer recorded a behavior code that the other had not.

In addition, further checks on the reliability of the observers were made by the experimenter approximately every eight days, resulting in a total of 10 experimenter-calculated reliability sessions. These 10 sessions were covert in nature; the observers were not informed that a reliability assessment was being performed. This was accomplished simply by having the experimenter positioned out of view of either observer.

General Procedure

Baseline. During the first eight days of the investigation, behavioral observations were made but there were no experimental manipulations.

Self-instruction. Subjects were seen individually for a massed self-instruction session lasting 2 hr. The child worked with the experimenter for about 50 min, was given a 20-min break, and then resumed work for another 50-min. The self-instructional training was similar to that described elsewhere (Meichenbaum and Goodman, 1971) and proceeded as follows: (1) the experimenter modelled the task while talking aloud to himself, (2) the subject performed the task while the experimenter instructed aloud, (3) the subject then performed the task talking aloud to himself while the experimenter whispered softly, (4) the subject performed the task whispering softly while the experimenter made lip movements but no sound, (5) the subject performed the task making lip movements without sound while the experimenter self-instructed covertly, and (6) the subject performed the task with covert self-instruction.

The verbalizations modelled were of four types: (a) questions about the task (e.g., "What does the teacher want me to do?"), (b) answers to questions in the form of cognitive rehearsal (e.g., "Oh, that's right, I'm supposed to copy that picture."), (c) self-instructions that guide through the task (e.g., "OK, first I draw a line here . . ."), and (d) self-reinforcement (e.g., "How about that; I really did that one well.").

It should also be noted that, in numerous tasks, the experimenter consciously erred and then corrected his error without hesitation. In

addition, since initially the children did not seem motivated to work, the experimenter paired self-praise with material reward (M&M's) as a means of creating incentive. This reward was quickly leaned out as the children found they could complete the tasks successfully. Lastly, the entire training session was presented in a story-like manner. In each situation, the subject was told that the teacher (not the experimenter) had asked him to complete the task in question. When using self-instructions, then, the subject would respond as if he were in the classroom (*e.g.*, "Mrs. B wants me to draw that picture over there. OK, how can I do that?").

More specifically, the self-instructional protocol consisted of the experimenter initially instructing the child "_____ (child's name), watch what I do and listen to what I say". Immediately, on gaining his attention, an M&M was placed in the child's mouth. When the first trial was completed, and if the child's attention had not shifted away from the experimental task, he was again given a candy reinforcer. The experimenter then said to the child, "_____ (child's name), this time *you* do it while I say the words". Contingent on correct performance, the experimenter dispensed an M&M to the child paired with self-praise at the conclusion of this second trial. Candy reinforcers were then leaned out quite rapidly and given only at the close of a trial. No more than 10 reinforcers were given to any one child during a training session. Later in the training sequence, when the child was asked to verbalize on his own, acceptable responses were those that included correct performance and the four elements outlined above (*i.e.*, questions about the task, answers, self-instructions, and self-reinforcement). If the child did not produce an acceptable response, the experimenter again modelled the task while talking aloud to himself. Following such demonstrations, the child was then returned to that part of the sequence where his error had been committed. If the child refused to comply, the experimenter merely reiterated his instructions and again modelled an appropriate response.

When the child successfully completed a trial, he was given instructions for the next step in the training sequence. When all six steps in the sequence had been completed, the experimenter presented a new task and again modelled its performance while talking aloud to himself (*i.e.*, step one).

A wide variety of tasks were employed in the 2-hr training sessions, with difficulty level increasing over time. These tasks varied from situations tapping simple sensorymotor skills (*e.g.*, copying of lines and figures) to more complex problem-solving situations (*e.g.*, block design and conceptual grouping tasks). In all instances, subjects were required to verbalize the nature of the task and their problem-solving strategy. All tasks were modified slightly from those on the Stanford-Binet, Wechsler Intelligence Scale for Children or the McCarthy Scales of Children's Abilities.²

Expectancy control. In an attempt to control for any nonspecific effects of treatment (*e.g.*, attention, interaction with stimulus materials, *etc.*) and observer-expectancy effects, all three children were given 2-hr training sessions with the experimenter on the day self-instruction was to be initiated. However, since treatment was sequentially administered in a multiple-baseline fashion across subjects, only one subject received the actual self-instruction training. The other two children were taken from the room in an identical manner and exposed to the same stimulus materials, but did not receive the self-instruction training at that time. Rather, in the expectancy-control condition, the experimenter modelled appropriate responses for the child without verbalization. More specifically, the experimenter initially instructed the child, "_____ (child's name), watch what I do". Immediately, on gaining his attention, as in self-instructional training, an M&M was dispensed to the child. If the child remained attentive through the first trial, he was given a second

²A complete list of training tasks used is available from the senior author on request.

candy reinforcer. The experimenter then said to the child, "_____ (child's name), this time *you* do it while I watch". At the conclusion of this trial, reinforcement was again dispensed and then leaned out rapidly. No more than 10 reinforcers were given to any child during each expectancy-control condition. The procedure was then repeated a second time before presenting a new task. A second presentation was provided to equate across experimental and control conditions the amount of time spent with individual stimulus materials. The sequence in which the subjects were to be given the self-instruction training was randomly determined, and observers were thus kept naive as to the nature of the treatment and the order in which it was to be presented to subjects.

RESULTS

Reliability

The levels of agreement between observers across experimental conditions for all subjects were: Subject A, 96%; Subject B, 92%; Subject C, 93%. Overall observer-observer reliability was 94% agreement. Comparable experimenter-calculated reliabilities for Observer A were: Subject A, 92%; Subject B, 93%; Subject C, 91%. Experimenter-calculated reliabilities for Observer B were: Subject A, 94%; Subject B, 90%; Subject C, 92%. Overall experimenter-observer reliability was 92% in both cases, indicating a difference between observer and experimenter-calculated reliabilities of 2%. A subsequent analysis of variance from raw data demonstrated that reliabilities calculated by observers were not significantly different from those determined by the experimenter ($F < 1$, $df = 2/81$, $p > 0.10$).

On-Task Behavior

Figure 1 represents the daily per cent on-task behavior scores for each subject across experimental conditions. The mean rate of on-task behavior during the baseline condition for Scott, Rod, and Tim was 10.4%, 14.6%, and 10%,

respectively. Following the 2-hr training in self-instruction, there was an immediate and dramatic increase in on-task behavior. Posttreatment means for the three experimental subjects were Scott, 82.3%; Rod, 70.8%; Tim, 77.8%. Postchecks were instituted on the sixtieth and ninetieth observation days after baseline was initiated, and results indicate that treatment gains were maintained. Percentage of postcheck on-task behaviors for the three subjects were: Scott, 70% and 77%; Rod, 64% and 67%; Tim, 70% and 68%. It should again be noted that observations occurred only four days per week. Thus, the final follow-up data collected (*i.e.*, observation day 90) are a sample of classroom behavior 22.5 weeks after baseline was initiated.

DISCUSSION

The present results demonstrate the utility of a self-instructional package as a means of increasing on-task behavior in preschool boys. Moreover, through the use of a multiple-baseline design across subjects and an observer-expectancy control manipulation, the results are made even more compelling. Specifically, the successive application of the self-instructional procedure and the corresponding increase in targeted subject's on-task behavior, as compared to nontargeted subject's baseline stability, unequivocally support the demonstration of a causal relationship. Since observers had no knowledge as to the timing of treatment effects, results cannot be attributed to expectation biases in the observational process. The present investigation was intended not only to demonstrate the utility of a self-instructional program for preschoolers, but also to extend treatment effects and behavioral improvement beyond the experimental situation. Results indicated that behavioral gains transferred to the classroom setting and were maintained for a considerable period of time.

These findings are superior to those found in previous work with verbal mediation and self-

Fig. 1. Daily per cent on-task behaviors for Scott, Rod, and Tim across experimental conditions.

instructional training. For example, whereas Meichenbaum and Goodman (1969) obtained control of nonverbal responding in first graders through self-instruction, minimal effects were obtained with kindergarten subjects. The disparity between these findings and the present results may be due to the fact that Meichenbaum and Goodman (1969) used a minimal training, self-instructional method, in which their subjects did not totally fade verbal operants to the covert level. In addition, it is conceivable that their target behavior (*i.e.*, tapping speed) may have interacted with developmental variables related to psychomotor skills. It thus seems likely that self-instructional training may lend itself more readily to the modification of certain classes of behavior rather than others. More specifically, while qualitative task errors related to task approach have been shown to be modifiable by self-direction, performance related to task ability has not been similarly affected (Palkes, Stewart, and Freedman, 1972). Using writing deficiencies as target behavior, Robin, Armel, and O'Leary (1975) found self-instruction superior to direct training following an extensive and task-specific training package. The authors noted, however, that while motor control deficiencies may have been affected by self-instruction training, other abilities such as spatial-representation were not. Therefore, it would appear that behaviors accompanied by stable ability factors may not be as responsive to alterations in self-control strategies. Moreover, behaviors not directly affected by the demands of the task, such as resistance to temptation (Hartig and Kanfer, 1973), rule following (O'Leary, 1968), and on-task behavior may, in turn, be more influenced by self-instructional training. Certainly, further research is needed to explicate the classes of behavior most amenable to modification via self-instruction.

Despite the obtained results indicating strength, durability, and generalizability of treatment effects, one is unable to acknowledge firmly the treatment components responsible for initial behavioral change or transfer within the

present therapeutic package. The present self-instructional program involved a wide variety of procedures, including instruction, self-instruction, verbal modelling, prompts, reinforcement, and fading. Future investigations might therefore include a component analysis as a means of separating the effects of self-instruction from the full therapeutic package. With regard to the issue of transfer of behavioral improvement, Meichenbaum and Goodman (1971) reported a lack of generalization using a similar self-instructional program. Since the present research differed from the Meichenbaum and Goodman (1971) investigation in four major respects (*i.e.*, preschool *versus* school-age children, massed *versus* spaced practice, brief use of material rewards, and "story-like" self-instructional training), isolation of individual procedural contributions becomes impossible. Any one of the above components, singly or in combination, may have been responsible for the observed effects. In terms of practical considerations, future studies should therefore also attempt to uncover the "active" agents of change responsible for generalization of treatment effects.

The maintenance of behavioral improvement following treatment intervention was quite remarkable. The authors suggest, however, that such dramatic transfer from the experimental setting to the classroom was a function of two factors: (1) The preschool environment has been described as a "behavioral trap" (Baer and Wolf, 1970) which, upon entry, shapes and maintains an ever-increasing repertoire of appropriate behaviors in children. As a result of such "trapping", changes in the boys' behavior may have produced changes in the teacher's behavior, leading to maintenance of treatment gains. (2) Children in the present investigation were asked to imagine, in the presence of the experimenter, that they were performing tasks assigned by their classroom teacher. The use of such specific covert rehearsal may thus facilitate development and maintenance of appropriate classroom behavior. Although these hypotheses

remain to be tested, future investigators attempting to implement the self-instructional package should be forewarned that generalization may not occur without consideration of the above issues.

The present study used several techniques to increase the likelihood of reliable and accurate assessment of behavior. This research differs from past investigations (Romanczyk, Kent, Diamant, and O'Leary, 1973) in that here both observers were aware that overt assessment was constantly being performed and only a two-category code was in effect. These differences, no doubt, force observers to record behaviors more reliably at all times (Reid, 1970). Despite the reliability results obtained and the precautions taken to ensure accurate data collection, the phenomenon of observer drift (O'Leary and Kent, 1973) remains a potential source of bias. While constant, overt reliability checks led to high rates of interobserver agreement, these assessments may have been inflated due to consensual observer drift (Lipinski and Nelson, 1974). That is, both observers may have drifted from accurate recording as a highly reliable, though inaccurate, pair.

As a check on such possibility, observers were not aware that on 10 occasions during the investigation, covert assessment was also being performed by the experimenter. This strategy was an attempt to approximate comparison to a "pure" calibrator or constant criterion (Johnson and Bolstad, 1973). In this regard, it may be argued that the experimenter's knowledge of predicted effects would, no doubt, influence his recording and thereby further compound the potential consensual observer drift. Recent evidence, however, has indicated that even when observers have knowledge of predicted results, this is not apt to influence behavioral recording (Kent, O'Leary, Diamant, and Dietz, 1974). The present results indicated that covert, experimenter-calculated reliability assessments were comparable to the overt, observer-calculated levels of agreement. Such findings therefore argue against observer drift within this particular

observer pair. In addition, Kent *et al.* (1974) stated that if reliability assessment is to reflect routine data-collection characteristics, assessment must be covert in nature. Present results suggest that accurate reliabilities can also be obtained by means of constant overt reliability assessment.

In conclusion, the positive results obtained in the present research indicate that further investigation of the treatment package is warranted. Future studies should attempt to demonstrate therapeutic effectiveness across a wide variety of situations, subjects, and behaviors. In addition, it appears that the role of self-instruction in the modification of childrens' behavior demands greater exploration. Behavior modifiers have for some time ignored the study of such "meditational" variables due to the problems they present in empirical investigation. The present research attempted to demonstrate, in part, that an experimental analysis of behavior can be equally applied to this topical domain with a comparable degree of confidence in the reliability of the findings.

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