

APPLICATIONS OF SELF-CONTROL PROCEDURES
BY CHILDREN: A REVIEW

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Self-control procedures as used by children to affect their own behavior were reviewed. Particular emphasis was placed on self-instruction, self-determined criteria, self-assessment, and self-reinforcement. Self-punishment, comprehensive programs, and innovative self-control procedures (distraction and restatement of contingencies) were also evaluated. Basic effectiveness, comparisons with similar externally imposed interventions, maintenance, and the augmental value of the procedures were assessed. Important problems for future research were identified.

DESCRIPTORS: self-control, maintenance, review, children

In addition to developing treatment approaches to children's problems that emphasize modifications in the child's environment, behavior therapists have become increasingly interested in teaching children methods of changing their own behavior. This trend has occurred for a number of reasons. First, acting independently is valued and typically expected by our culture. Second, the child's teacher and/or parent may not always be capable of successfully implementing external controls. Third, when a child controls his/her own behavior well, adults can spend more time teaching the child other important skills. Fourth, the self-controlling child is able to learn and behave effectively when adult supervision is not available. Fifth and finally, teaching children to control their own behavior may lead to more durable behavioral changes than relying solely on external means of influence.

The term "self-control" has been employed historically as a rubric for two related, but theoretically distinct, areas of research. In one instance, the independent variable (*e.g.*, a modeling film) is implemented by the experimenter, and the dependent variable is either a child be-

havior explicitly identified as a self-controlling behavior (*e.g.*, self-administration of a reinforcer) or a behavior presumably mediated by a self-controlling behavior (*e.g.*, delay of gratification). The question asked is, "What can *we* do to influence the likelihood that the child will act to control his own behavior?" The area is exemplified by Bandura's (1969) research on transmissions of patterns of self-reward, some of Mischel's (*e.g.*, Mischel, Ebbesen, and Zeiss, 1972) evaluations of delay of gratification, and Aronfreed's (1968) studies of resistance to temptation—all using laboratory analogue settings. On the other hand, much of the applied self-control research is identified by the question, "What procedures can *children* use (*e.g.*, self-instructions or self-evaluations) to effectively control their own behavior?" Children's use of self-controlling behaviors constitutes the independent variable, and the dependent variables are indices of other child behaviors, for example, time-on-task, teachers' ratings of classroom behavior, and creative writing skills. The following review summarizes this latter area of research. Both clinical applications of self-control procedures as well as laboratory studies which bear directly on clinical issues are included.

Throughout the review, particular attention will be paid to the following questions: (a) Are self-control procedures effective in producing

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behavioral change?, (b) How do self-control procedures compare in efficacy to external control methods?, and (c) Do self-control procedures produce maintenance of behavioral effects? The final section provides conclusions and discussion of issues.

SELF-CONTROL *via* BEHAVIORAL ANTECEDENTS

Self-Instruction

Self-instruction is defined as verbal statements to oneself which prompt, direct, or maintain behavior. Children often use self-instructions, such as " 'i' before 'e' except after 'c' " and "stop, look, and listen," to facilitate the correct performance of a subsequent response. The initial documentation of the effectiveness of self-instruction was provided by Luria in 1961, although several attempts at direct replication produced equivocal results (Jarvis, 1968; Joynt and Cambourne, 1968; Miller, Shelton, and Flavell, 1970; Wilder, 1969). Other researchers have successfully used self-instructions to affect children's performance on a variety of tasks (Bem, 1967; Hartig and Kanfer, 1973; Meichenbaum and Goodman, 1969; Mischel and Patterson, 1976; Monahan and O'Leary, 1971; K. D. O'Leary, 1968; Palkes, Stewart, and Freedman, 1972; Palkes, Stewart, and Kahana, 1968). The form of the self-instructions varied from "faster" in a finger tapping task, to "Stop, listen, look and think before I answer" on the Matching Familiar Figures Test (MFF) (Kagan, Roseman, Day, Albert, and Phillips, 1964).

At least four factors appear to influence the effectiveness of self-instructions. Several authors noted that telling children to use self-instructions did not always guarantee adherence and, subsequently, examined the relationship between the use of self-instructions and performance. Monahan and O'Leary (1971) found significant correlations ranging from $-.55$ to $-.85$ between correct self-instructions (*e.g.*, "Yes, it should be pressed.") and frequency of cheating on their discrimination task. Hartig and Kanfer

(1973) found that in their younger aged experimental group, verbalizers had significantly longer latencies of transgression in the resistance-to-temptation situation than nonverbalizers. In another resistance-to-temptation task, children who did not use the self-instruction were less able to resist talking to a clown puppet than those children who did employ the self-instruction (Mischel and Patterson, 1976). Clearly, definitive evaluations of self-instruction should include assurances that children actually implement the procedure.

Second, the facility with which the children can perform the response in question may determine the usefulness of a self-instruction. Higa, Tharp, and Calkins (1978) found that unless kindergarten and first-grade children had practiced making a motor response, self-instructions actually interfered with performance.

Yet another factor which influences the effectiveness of self-instructions—history of adherence to self-instructions—was identified by Burron and Bucher (1978). In a paradigm resembling that used in studies collectively labeled the "Say-do" literature (Israel, 1978), these investigators reinforced either correspondence or noncorrespondence between a self-instruction and the relevant behavior. In a new situation involving response inhibition, seven- and eight-year-old children who had been reinforced for correspondence more successfully used self-instructions than children reinforced for noncorrespondence.

Finally, Mischel and Patterson's (1976) data point to a possible differential effect of self-instructions dependent on the focus of the instruction. Their nursery school children were better able to resist talking to a puppet if they specifically instructed themselves not to talk to the clown than if they reminded themselves to work on their assigned task. While this result is seriously confounded by the fact that children who were asked to remind themselves to work on the task often failed to verbalize the self-instruction, it may be that the relevance of the instruction with respect to future rewards de-

terminated both actual use of the instruction and its effectiveness. The children were rewarded for resisting temptation, not for completing the task. Sawin and Parke (1979) replicated these results in a resistance-to-temptation paradigm with first graders but not with second graders. The older children used *either* a prohibitive or a task-directed instruction effectively. Unfortunately, the authors did not indicate whether the actual use of relevant verbalizations was comparable across groups. While Sawin and Parke (1979) did not contingently reward their children, they made a compelling argument for differential learning histories of prohibitive and task directed instruction, with adult prohibitions more frequently followed by consequences than response eliciting instructions. This factor was proposed to interact with developmental changes in responsiveness to the specific content of the self-instructions.

In summary, self-instructions appear to be effective self-controlling procedures if the children actually implement the instructional procedure, if the children use them to influence behaviors at which they are skilled, if children have been reinforced for adhering to their self-instructions in the past, and if the focus of the instructions is the behavior most subject to consequences.

Self vs. external. In a comparison of experimenter and self-verbalized instructions, Meichenbaum and Goodman (1969) found no significant differences between these two conditions when kindergarten children were instructed to finger tap either "faster" or "slower." With first-grade children, however, more control over tapping was established with the external verbalizations, although the self-verbalizations were also effective. External verbalizations may be more salient for first-grade children than they are for kindergartners since first graders have had more experience in receiving instructions and following directions in school.

Maintenance. Palkes and her associates assessed both generalization and maintenance effects of self-instruction. Results of Palkes *et al.*

(1968, 1972) indicated that training on the MFF, embedded figures, and the Trail Making Test generalized to performance on the Porteus Maze. With respect to maintenance, Palkes *et al.* (1968) found that children receiving self-instructional training on other tasks also demonstrated significant gains on the Porteus Maze but that these gains disappeared after two weeks.

Mechanisms. In determining when and how to use self-instructions, the mechanism by which the verbalizations actually influence behavior should be considered. The instructional component of the self-verbalization may act as a discriminative cue directly increasing the probability of a correct response. This view is supported by the fact that with Hartig and Kanfer's (1973) older subjects, an irrelevant verbalization ("Hickory, dickory, dock") exerted no control over resistance to temptation. Another hypothesis is that self-instructions *indirectly* affect performance by focusing attention on the task. Several studies providing tentative support for this hypothesis (Hartig and Kanfer, 1973; Meichenbaum and Goodman, 1969; Palkes *et al.*, 1972) have shown that overt (audible) self-instructions are more effective than covert (silent) instructions. In a related finding, Dubey and O'Leary (1975) demonstrated increased reading comprehension when the material was read orally as opposed to silently. However, for the "attention" function to be clearly established, a demonstration that overt verbalizations improve attention to the task as well as better task performance is necessary. In any particular situation, the relative importance of the instructional and attentional components of the self-instruction may depend on such factors as task difficulty, age of the child, and the degree to which the necessary skills have been learned.

Summary. Self-instructions are effective when used as the sole intervention procedure. Their effectiveness depends on frequency of use, the child's skill at performing the task involved and in following his/her own instructions, and the focus of the instruction. Self-instruction can be as effective as externally imposed instructions.

Limited maintenance and generalization of effects have been observed.

Self-Determined Criteria

In addition to providing stimulus control over their behavior by means of self-instructions, children may also set their own standards of performance (e.g., how many math problems they will do) prior to engaging in a task. Self-determination of performance criteria could alter behavior if the procedure: (1) served an instructional or attentional function as self-instructions apparently do, (2) functioned as a discriminating cue providing information regarding the amount of work necessary to earn a reward, or (3) prompted the child to make evaluations of his/her behavior in relation to the goals he/she has set and consequently, to provide covert or overt consequences for achievement.

The data bearing on the question of whether self-determination of criteria, when used alone (i.e., with no reward), can significantly change behavior are unambiguous. Both Bandura and Perloff (1967) and Sagotsky, Patterson, and Lepper (1978) have shown that when criterion setting is the sole intervention, children in laboratory and applied settings perform no better than control children. However, if children are rewarded for their achievement in addition to determining their own criteria, they generally perform better than control children experiencing neither criteria nor contingent rewards (Bandura and Perloff, 1967; Felixbrod and O'Leary, 1974). One might conclude from these results that self-determined criteria have no influence on children's behavior. However, such a conclusion is unwarranted until the additive effect of self-determined criteria over other procedures is examined. Sagotsky *et al.* (1978) failed to find augmental effects of self-determined criteria over self-monitoring. Related reports (Masters, Furman, and Barden, 1977; Brownell, Coletti, Ersner-Hershfield, Hershfield, and Wilson, 1977) indicating that children's performance improved as an externally set

standard was raised suggest that self-determined standards, if they were set high enough, may enhance the effects of reward.

Self vs. external. One argument that has been offered as support for the effectiveness of self-determined criteria is that self-imposed standards are just as effective as externally imposed standards when both are combined with rewards. The data have consistently supported the equivalence of the two procedures (Bandura and Perloff, 1967; Felixbrod and O'Leary, 1973, 1974) and in fact have indicated that self-imposed standards were occasionally more effective (Lovitt and Curtiss, 1969; Brownell *et al.*, 1977). Unfortunately, even externally imposed criteria appear to have little or no influence on children's behavior in the *absence* of rewards (Turkewitz, O'Leary, and Ironsmith, 1975; Bandura and Perloff, 1967).

Maintenance. When maintenance of behavior following withdrawal of criterion setting procedures was evaluated, Felixbrod and O'Leary (1974) found that response rate declined and significant differences between self-determined, externally determined, or control groups did not persist. Brownell *et al.* (1977) reported that the academic performance of children who had determined their own standards was maintained at a higher level following two extinction sessions than the performance of children receiving externally determined criteria, although neither group showed greater maintenance than the untreated control group. Support for the suggestive results of Brownell *et al.* (1977) was reported by Weiner and Dubanowski (1975) using a nonapplied laboratory task. Greater resistance to extinction was demonstrated for a self-determined criteria group as compared to a yoked external criteria control when the criterion was relatively stringent (FR-4) but not when it was more lenient (FR-1 or FR-2).

Leniency. One concern regarding the applied use of criterion setting is whether children will establish overly lenient criteria. Bandura and Perloff (1967) observed variable patterns in this regard, i.e., one-half of the 20 children altered

their criteria on a wheel-turning task by choosing more lenient standards while only 6 chose more stringent ones. However, these children had only one opportunity to change their criteria. Felixbrod and O'Leary (1973, 1974) found that children became progressively more lenient in their academic standards when they were given several opportunities to change their standards. The complexity of the leniency issue is underlined by Brownell *et al.* (1977). Children instructed to use stringent standards (*i.e.*, a small number of points for each correct arithmetic problem) spent more time on the task than children not so instructed, but the stringency instruction had no effect on the number of problems completed correctly.

Summary. Criterion-setting used alone (whether self- or externally determined) does not appear to control behavior effectively. When combined with rewards, self-determined criteria are as effective as externally controlled criteria. Whether criterion-setting enhances the effects of reward is not known; however, some data suggest that self-determined criteria might lead to increased maintenance of treatment effects. Several studies suggest that stringent criteria have more impact than lenient criteria, both in terms of initial gains and later maintenance.

SELF-CONTROL *via* BEHAVIORAL CONSEQUENCES

Self-Assessment

Self-monitoring, self-recording, and self-evaluation are some of the terms describing procedures by which children assess the quantity or quality of their own behavior. The initial use of self-assessment in clinical research was as a method for gathering baseline data prior to an intervention (Kazdin, 1974). However, reports of reactive effects of this procedure prompted its use as a therapeutic intervention. The assumption made by several researchers (Cautela, 1971) has been that self-assessment functions to change behavior through its elicitation of covert self-reinforcing or self-punishing

responses. Thus, a child who indicates on a chart that he has completed his daily chores may by his act of self-assessment elicit covert responses such as, "I am a good boy."

If self-assessment does lead to evaluative statements on the part of the child, it should have the potential function of either increasing or decreasing rates of behavior, depending upon the motivations of the child as well as the demands and expectations of significant others. Increases in behavior, such as attending in the classroom (Brodén, Hall, and Mitts, 1971), academic response rate (Lovitt, 1973), and class attendance (McKenzie and Rushall, 1974), have been noted. Decreases in behavior, such as talking out in class (Brodén *et al.*, 1971; Lovitt, 1973) and aggression (Lovitt, 1973), have also been found. Presumably, assessing desired behavior results in positive covert self-reinforcing statements, while assessing undesired behaviors results in negative covert self-consequences.

As an isolated procedure, self-assessment with children has not been particularly effective. Both Santogrossi, O'Leary, Romanczyk, and Kaufman (1973) and Turkewitz, O'Leary, and Ironsmith (1975) instructed disruptive children to make global ratings of their social behavior in the classroom. In neither study was there a reduction in disruptive behavior. Similarly, a study by Layne, Rickard, Jones, and Lyman (1976) demonstrated the failure of self-assessment to strengthen room-cleaning behavior. On the other hand, Sagotsky *et al.* (1978) found a self-assessment procedure to be highly effective in reducing off-task behavior and increasing academic rate and accuracy, and Nelson, Lipinski, and Boykin (1978) successfully taught retarded adolescents to increase their rates of appropriate verbalizations by using a self-recording procedure.

Three factors may influence the effectiveness of self-assessment procedures: accuracy of the assessments, difficulty of the task, and type of child. While children are capable of accurately assessing their behavior (*e.g.*, Santogrossi *et al.*, 1973, reported 95% reliability with indepen-

dent observers), additional training is sometimes necessary. Both Hundert and Bucher (1978) and Nelson *et al.* (1978) successfully taught increased accuracy of self-recording with respect to arithmetic performance and appropriate verbalizations. The training procedures involved contingently rewarding recordings which matched those of independent observers. Matching contingencies can be faded to a minimal checking routine without loss of accuracy (see Wood and Flynn, 1978). However, in neither of these cases did increased accuracy lead to better performance. Hypothesizing that the effect of accuracy on performance might depend on task difficulty, Peacock, Lyman, and Rickard (1978) examined the reactivity of self-monitoring room-cleaning tasks. When adolescent boys were rewarded for accurately monitoring easy tasks, both accuracy and task performance increased. In contrast, increased reliability of monitoring hard tasks was not accompanied by parallel task improvements. Thus, accuracy may be a factor in determining the reactivity of self-assessment, but perhaps only when the task is easy for that child to accomplish. The type of child using the self-assessment may also be important. The studies by Santogrossi *et al.* (1973), Turkewitz *et al.* (1975), and Layne *et al.* (1976) involved children with a history of behavioral difficulties. In all of these studies, self-assessment failed as an intervention. The study by Sagotsky *et al.* (1978), however, was performed with unselected elementary school students. Thus, one could speculate that the disruptive children in the former three studies did not generate negative self-evaluations when rating their own behavior as clearly inappropriate. In the Sagotsky *et al.* (1978) study, the normal school population could be expected to value success in terms of what others may expect of them. Therefore, self-assessment might be a useful procedure for those children who already demonstrate a clear motivation to improve their behavior.

Further support for a motivational factor comes from the observation that although self-

assessment may not be an effective procedure initially, it may be successful in maintaining behavior change achieved via an externally imposed token program. Bolstad and Johnson (1972), Turkewitz *et al.* (1975), and Seymour and Stokes (1976) implemented a system of self-assessments without rewards, following successful token programs. In all cases, the effects of the token programs were maintained with self-assessment alone perhaps because the token programs increased the children's motivation to exhibit appropriate behavior or increased the likelihood that self-evaluations prompted covert self-reinforcing statements.

Augmental value. In a number of other studies, self-assessment has been combined with reinforcement procedures, and its additive effect has been evaluated. Salzberg (1972) found no incremental effect of self-assessment over a strong contingency on rate of arithmetic problem completion. Similarly Knapczyk and Livingston (1973) found that a system of tokens plus self-assessment was no different from tokens alone in terms of effects on accuracy of reading assignments. Only Seymour and Stokes (1976) reported increments in the amount of work behavior observed for three of four unsocialized girls when self-assessment was added to a relatively ineffective token program. It may be that the additive effects of self-assessment are obscured by powerful reward programs.

Self vs. external. Comparative research indicates that self-assessment is just as effective as external assessment when both are followed by rewards. Bolstad and Johnson (1972) compared self- and external assessment procedures in the regulation of first- and second-graders' disruptive behavior. Both groups were rewarded on the basis of the assessments. These children showed significantly more improvement than no-treatment control children, and no differences were observed between self- and external assessment. Frederiksen and Frederiksen (1975) recently demonstrated a similar result in a study with mildly retarded children as did Wood and Flynn (1978) with predelinquent youths.

Maintenance. The usefulness of self-assessment as a maintenance strategy has been demonstrated (see above). The more direct question of whether experience using self-evaluation facilitates maintenance when both assessment and contingencies are withdrawn was addressed by Wood and Flynn (1978), and the results were encouraging. Youngsters in a residential setting were taught better room-cleaning habits via either an external evaluation or self-evaluation system with tokens contingent on clean rooms. The self-evaluation skills were developed in the context of a faded matching program a la Turkewitz *et al.* (1975). During rather lengthy extinction periods (60 and 22 days) when neither evaluations nor tokens were used, children who had participated in self-evaluation maintained high levels of task performance. In contrast, the external evaluation group showed a marked decrease in room-cleanliness. Although this work remains to be replicated, the hypothesis that self-assessment would facilitate maintenance following program termination was clearly confirmed.

In addition to being a procedure that is less time consuming for the adult, self-assessment can be useful as a priming device. Broden *et al.* (1971) found that a teacher who had previously refused to praise a child did so following an increase in the child's on-task behavior which resulted from self-assessment. Self-assessment increased on-task behavior sufficiently to facilitate the application of a more powerful procedure.

Summary. Self-assessment used alone does not appear to effect significant changes in the behavior of those children who are in need of clinical interventions. It may be more effective with children who already demonstrate a desire to perform appropriately. Accuracy of the assessments and task difficulty are also apparently important factors to consider. Self-assessment does not add significantly to the effects of an already effective reward system. When used in conjunction with rewards, however, self-assessment is as effective as external assessment. Self-assessment may be useful for maintaining effects when

other interventions are withdrawn. Finally, recent findings strongly suggest that experience using self-assessment facilitates maintenance of treatment gains even when all programmatic treatment is terminated.

Self-Reinforcement

Theoretical discussions of self-reinforcement by Catania (1975) and Bandura (1976) illustrate the complexities in conceptualizing this process of self-control and in agreeing on a language system for communicating constructs, operations, and findings. In spite of their differences, both Bandura and Catania ultimately concluded that self-reinforcement can be fruitfully studied only in the context of self-evaluations that are compared to some criterion. That is, the self-administration of contingent rewards necessitates an observation and evaluation of the response in question in the same way that external administration of rewards requires noting that a response which meets an established criterion of adequacy has occurred. This conceptualization of the self-reinforcement process may accurately describe many naturally occurring instances. However, Masters and Santrock (1976) successfully isolated self-administered consequences from both observation and evaluation in a laboratory setting. The experimenter repeatedly instructed children to utter one of a variety of verbalizations each time an externally determined criterion had been met. Persistence on the task was significantly greater when children were told to verbalize pride in their work than when they were told to utter neutral statements. Results from this and additional experiments led Masters and Santrock to conclude that not only the content of these self-administered consequences but also the affective component of the verbalizations influenced performance. Similarly, Kanfer, Karoly, and Newman (1975) periodically told children in a dark-tolerance test to say "I am a brave boy (girl). I can take care of myself in the dark." This self-reinforcing statement was significantly more

effective than verbalizing "Mary had a little lamb. . . ."

Self vs. external. When combined with either an explicit or implicit self-evaluation process, self-reinforcement effectively modifies children's behavior in both laboratory (Bandura and Perloff, 1967; Montgomery and Parton, 1970) and applied (Glynn, 1970) settings and produces effects equivalent to those achieved when the evaluations and consequences are externally determined (Bandura and Perloff, 1967; Glynn, 1970). Switzky and Haywood (1974) replicated Bandura and Perloff's (1967) results and in addition identified a significant interaction between the motivational orientation of the children and the efficacy of self- vs. external reward. Children who described themselves as being motivated primarily by self-satisfaction performed best under the self-control condition while children who emphasized the importance of external contingencies responded best under externally imposed reinforcement. Support for the potential superiority of self- as compared to external reinforcement was also obtained by Brigham and Stoerzinger (1976). Responding on a laboratory task for equivalent experimenter-selected or self-selected reinforcers, children worked harder for self-selected rewards and for the opportunity to earn that choice of rewards.

Augmental value. In evaluating additive effects of self-reinforcement, Spates and Kanfer (1977) examined whether self-praise and self-reprimands ("I'm right," or "I'm wrong") would improve arithmetic performance over and above a self-instructional procedure. While no significant gains were reported, it should be noted that the children were not provided with any information (e.g., the answers to the problems) on which to base their self-reinforcement and no data were presented indicating whether the children accurately administered their own consequences. In contrast, Ballard and Glynn (1975) demonstrated that self-reinforcement added significantly to the effects of self-recording when applied to classroom writing skills. The sequential addition of self-reinforcement to

various aspects of writing was also systematically related to the accuracy of the children's self-recordings. For example, when the number of different action words was reinforced, the accuracy of self-recording that behavior was significantly higher (70%) than during phases of the study when other skills were reinforced (24% and 51%). (Further discussion of self-reinforcement used in combination with other procedures appears in the previous Self-Assessment section and the Comprehensive Programs section to follow.)

Maintenance. The maintenance of effects following self-reinforcement has not been assessed, although Bolstad and Johnson (1972) reported no difference in extinction following self- and externally controlled programs involving a combination of evaluation and reinforcement. Suggestive evidence that self-reinforcement may facilitate maintenance was provided by Masters, Gordon, and Clark (1976). Children observed a model receive self-dispensed or externally dispensed rewards. Viewing a self-rewarding model led to the greatest recall of which behaviors were rewarded indicating that self-reward may increase the salience of the behaviors involved which, in turn, could facilitate maintenance.

Summary. Self-reinforcement is clearly one of the most powerful self-control procedures—effective when used alone, incremental when added to other procedures, and equal to or better than external reinforcement. Although comparative maintenance effects have not been assessed, the self-reinforcement research illustrates the importance of describing the populations for which self-control procedures may be most applicable.

Self-Punishment

Notably absent from the literature on applications of self-control in children are studies involving self-administered aversive stimulation, or self-punishment. However, some determinants of when children use mild punishment in the form of self-criticism have been delineated (Aronfreed, 1968; Grusec, 1966). Masters and

Santrock (1976) evaluated the effects of self-critical statements on laboratory task performance. These statements as well as verbalizations emphasizing negative affect (*e.g.*, "Ugh, this is no fun," "This is hard") produced less persistence at the task than did neutral or positive comments.

Another method of decreasing the frequency of a behavior involves the removal of positive reinforcers, commonly referred to as "response-cost." Kaufman and O'Leary (1972) utilized response-cost and reward programs to maintain the classroom social behavior of a group of hospitalized adolescents. Following the termination of an externally imposed program, a self-determined response-cost program maintained disruptive behavior at a low level and was as effective as a self-determined reward system. No adverse effects of the cost procedure were noted. Similar results were reported by Humphrey, Karoly, and Kirschenbaum (1978) in a normal second-grade reading class. Children self-evaluated their workbook performance and then self-imposed either a reward or a response-cost. Both procedures increased the number of pages completed with self-reward proving slightly, but not significantly, more effective. These two studies suggest that self-administered response-cost can be effective as either a maintenance strategy or a primary intervention.

COMPREHENSIVE SELF-CONTROL PROGRAMS

Attempts to teach children a wide range of self-management skills as the primary treatment regimen have met with varying degrees of success. The prototypic example of implementing a comprehensive self-control program was described by Meichenbaum and Goodman (1971). Second-grade children exhibiting hyperactivity and poor self-control were taught to define the task, verbalize a strategy for accomplishing it, evaluate their performance, and praise themselves on a series of sensory-motor and conceptual laboratory tasks. Generalized posttreatment

gains on the MFF, Porteus Maze, and prorated WISC IQ were maintained at a 1-month follow-up. The procedure also augmented the effects of a modeling intervention. However, no generalization to measures of classroom behavior or teachers' ratings of self-control was observed.

The Meichenbaum-Goodman procedure has been repeatedly implemented and the early results largely replicated. Douglas, Parry, Marton, and Garson (1976) provided their hyperactive subjects with a much longer training program (24 sessions over 3 months) incorporating similar procedures and partially augmented with direct instruction and contingency management consultation to parents and teachers (18 sessions). These children made significant gains on several nonacademic laboratory tasks both at posttreatment assessment and at a 3-month follow-up as compared to an untreated control group. Some effects were also noted on achievement tests, but no generalization to the classroom was observed.

Hypothesizing that self- and external control procedures might be differentially effective depending on the child's attribution of causality and medication status, Bugental, Whalen, and Henker (1977) evaluated these effects with hyperactive children on the Porteus Mazes and teacher ratings. The 12-session tutorial program consisted of either social reinforcement or self-control training *à la* Meichenbaum and Goodman. Although no changes were obtained on the teacher rating scale, maze performance indicated that the self-control training was particularly successful for nonmedicated children who attributed good grades to their own efforts rather than to luck. Social reinforcement tended to benefit medicated children who reported few personal causality attributions. In a 6-month follow-up evaluation of these children, Bugental, Collins, Collins, and Chaney (1978) found that both self- and external control groups demonstrated maintenance of maze performance gains. The self-control group showed improved (more internalized) locus of control scores,

whereas the external control group evidenced improved social behavior. The authors appropriately suggested that a combination of the two procedures with emphasis placed on the procedure fitting the child's attributional status would be ideal.

Thus, the Meichenbaum-Goodman procedure has effects on tasks similar to those used in training and augments the effects of modeling (Meichenbaum and Goodman, 1971) and praise and feedback (Robin, Armel, and O'Leary, 1975). Generalization of this training to other laboratory tasks has been well-substantiated, unless the training was conducted on a very restricted range of tasks as occurred in Robin *et al.* (1975). They found no generalization from the letters used in handwriting training to other letters or geometric forms. The failure of the Meichenbaum-Goodman procedure to produce generalized effects in the classroom is also very consistent, the only exception being reported by Bornstein and Quevillon (1976) who achieved generalization to classroom on-task behavior with three overactive preschool boys. A replication of the Bornstein and Quevillon procedure with second- and third-grade hyperactive children by Friedling and O'Leary (1979) was not successful. The observed lack of generalization to other settings has probably been due to inadequate systematic programming of generalized use of the procedures. As with self-instruction and self-assessment, a faded checking approach would seem advisable.

Comprehensive self-control programs have been successfully implemented as maintenance strategies following the withdrawal of externally imposed treatment programs. Most of the research focusing on transfer from external to self-control has employed a combination of self-evaluation and self-reinforcement (Anderson, Fodor, and Alpert, 1976; Bolstad and Johnson, 1972; Drabman, Spitalnik, and O'Leary, 1973; Glynn, Thomas, and Shee, 1973; Turkewitz *et al.*, 1975). Neilaus, Israel, and Pravder (Note 1) included criterion setting in the self-man-

agement skills used to maintain behavior successfully in the classroom.

The potential of comprehensive self-control programs has not been fully realized. As programs are implemented that take advantage of the information now available for maximizing the impact of each component of the program, more accurate evaluations of the impact of comprehensive training will be possible.

INNOVATIVE SELF-CONTROL PROCEDURES

This review emphasizes the analysis of behavior according to antecedents, responses, and consequences. A growing body of reports describes procedures, some of which are not as easily categorized as antecedents or consequences but which enable children to control their own behavior. These procedures have been variously labeled cognitions, plans, or strategies. We will discuss them under the rubrics of distraction and restatement of contingencies in an attempt to identify possible differences in the procedures which may relate to their functional roles in controlling other behaviors.

Distraction

Children who count to 10 may distract themselves from provoking situations and thereby improve their inhibition of aggressive responses. The distractor does not explicitly focus on the behavior being controlled in the way self-instructions or self-evaluations do, or on its consequences as in self-reinforcement, but may function as an effective self-control procedure primarily by influencing the child's affective state. Not only has the effectiveness of distraction been documented but information is available on the characteristics of distractors that make them most effective. Using a delay of gratification paradigm, Mischel and Ebbesen (1970) and Mischel, Ebbesen, and Zeiss (1972), for example, showed that instructing children to think "fun things" enabled them to forego an

immediate, less preferred food for a delayed but more preferred food. Looking at either or both foods or thinking "sad things" resulted in significantly briefer delays or waiting periods. Kanfer, Karoly, and Newman (1975) increased the tolerance of kindergarten children for darkness by having them say "The dark is a fun place to be. There are many good things in the dark," statements which emphasize positive affect. Having the children say "Mary had a little lamb. Its fleece was white as snow" had little effect on dark tolerance.¹ Mischel (see Yates and Mischel, 1979) concluded that the best distractors or attentional strategies for delaying gratification in preschool children were attending to a real but irrelevant stimulus or to a symbolic representation of the reward. Attending to the real reward or to a symbolic but irrelevant stimulus hindered delay. Yates and Mischel (1979) collected normative data on the distractors chosen by preschool through third-grade children. Preschool children always preferred a real rather than a symbolic stimulus, but the older children preferred irrelevant distractors. Apparently children must and do learn to choose effective distractors. In addition to looking at a distracting stimulus or verbalizing a distracting statement, children have been taught distracting motor responses. Robin, Schneider and Dolnick (1976) evaluated a self-control procedure designed to reduce tantrums and aggression in the classroom that involved imitating a turtle pulling into its shell, relaxing, and problem-solving. Aggression was decreased in two classrooms, although the relative contributions of the distracting responses (doing "turtle" and relaxing) and problem solving were not assessed.² In sum, distractors ap-

pear to be most effective if they focus on irrelevant stimuli and engender a positive affect (e.g., "fun things" or relaxing).

Restatement of Contingencies

Relatively little is known about whether and how a restatement of contingencies (sometimes called a reason) can be successfully implemented by children as a self-control procedure. However, several examples of the potential usefulness of this approach are available. One verbalization effectively employed by Patterson and Mischel's (1976) children was to remind themselves that they could "play later." The "if I don't . . ." portion of the contingency statement was not explicitly included. MacPherson, Candee, and Hohman (1974) found that asking children to copy "mediation essays" augmented the impact of externally imposed contingencies on inappropriate lunchroom behavior. These essays described the inappropriate lunchroom behavior, its aversive consequences, an appropriate behavior, and its positive consequences. Although this procedure was used as a punishment for inappropriate behavior and was not implemented independently by the children, restatement of the contingencies was explicit, written by the children, and superior in effect to copying from a health text. Kanfer and Zich (1974) effectively enhanced resistance to temptation by playing a tape of either the experimenter or the child himself saying "If you (I) do not turn around and look at the toys, you (I) will be a very, very good boy." The best resistance was displayed by children who heard their own voice with the experimenter absent from the room. Although the child did not control the restatement of contingencies, the effects of the procedure as externally imposed were clear. Finally, Snyder and White (1979) instructed institutionalized, conduct-problem adolescents to use restatements of contingencies along with specification of task demands and self-reinforcement in their daily lives to successfully alter their inappropriate behavior in the context of an on-

¹The most effective self-statement was "I am a brave boy (girl). I can take care of myself in the dark." This statement seemed to be more than a distractor, at least implicitly focused on the target behavior, and may have functioned as a self-reinforcer. Also the demand characteristics appeared to be strongest for this condition.

²See Goldfried and Trier (1974) for a discussion of relaxation as a self-control procedure for adults.

going token program. This self-verbalization procedure was more effective than simple discussion of contingencies or no additional intervention. Conclusions based on these results must, however, be tempered by a number of methodological concerns which the authors discussed. To summarize, restatement of contingencies may be a useful self-control procedure and probably functions both as a self-instruction would and perhaps as an immediate self-reinforcement for behavior leading to more long-term rewards.

The results regarding distractions and restatements of contingencies are encouraging, and the procedures are both theoretically and clinically creative. Other self-control procedures which have been used effectively with adults but rarely with children deserve attention. For example, problem solving has been successfully implemented by adults (D'Zurilla and Goldfried, 1971) but only in conjunction with other procedures by children (Camp, Blom, Hebert, and van Doorninck, 1977; Robin *et al.*, 1976). Manipulations of stimulus conditions, effective in helping adults control their eating behavior (Stuart, 1967) have not, to these authors' knowledge, been similarly documented with children.

DISCUSSION

Many children varying considerably in age and clinical status have been taught a wide range of techniques intended to help them control their own behavior. Beyond the summaries of results with specific procedures appearing throughout this review, several general conclusions can be drawn. First, most of the self-control techniques, when implemented alone rather than in combination with other procedures, have successfully enabled some children to control both academic and social behaviors. The outstanding exception to this conclusion is criterion-setting. Second, self-control procedures are probably as effective as similar, externally imposed procedures. The tentative nature of this conclusion is based on the fact that most self- *vs.* external comparisons have been made in circumstances

where the target procedure was combined with another procedure, usually reinforcement. Third, when comparative maintenance effects have been assessed, the results have been positive. Fourth, the intricacies of how and when self-controlling behaviors can be effectively taught and implemented are becoming clearer. Finally, the creative combination of traditional self-control techniques and the development of new approaches indicate that teaching children methods for controlling their own behavior merits further and more sophisticated attention.

Several factors have been identified as determining the effectiveness with which children employ self-control procedures. Whether the child "correctly" implements the self-control procedure is a primary factor. Telling a child to self-instruct does not always ensure implementation, but both correlational data and direct manipulations which either cue the child or require overt self-instructions strongly support the benefits of the procedure when it is used. Inaccurate self-assessment has no impact on behavior, while accurate assessments result in behavior change, at least if the tasks are easy to perform. The positive effects of self-reinforcement have been found with methodologies which ensured use of the procedure. When steps have been taken to maximize actual implementation of the more complex self-control procedures (*e.g.*, Robin *et al.* 1976; Snyder and White, 1979), success was reported. Even in the case of criterion-setting, which is not a particularly powerful procedure, the most encouraging data come from children who have been reinforced for setting stringent criteria, presumably the most appropriate way to implement the procedure.

In addition to ensuring accurate and appropriate use of the procedures, we should consider the level of competence the child has to perform the behavior he/she wishes to control. The principle of shaping, so carefully considered in conducting externally imposed procedures, has received no attention in the self-control literature. That skill level can be a relevant factor

has been documented (Higa *et al.*, 1978; Peacock *et al.*, 1978). If children were taught to shape their own behavior while using self-control procedures, certainly the effectiveness of the procedures would be improved. Other important information about the most effective methods for teaching children self-control procedures is contained in the modeling literature. For example, children: (a) closely matched the patterns of self-reward displayed by models (Bandura and Kupers, 1964), (b) rejected the criteria of a model whose performance was extremely superior to their own (Bandura and Whalen, 1966), and (c) adopted stringent criteria if the model was potentially rewarding (Mischel and Liebert, 1967). It would behoove applied researchers to take more cognizance of this substantial body of data.

The implications are clear. Children must be taught, not just told, to use self-controlling skills. Adequate teaching involves overt use of the skill initially, reinforcement for that use, fading of external checking, and training covert implementation—all with shaping the behavior in mind. Not only is this factor clinically relevant, but conclusions regarding the effectiveness of using self-control procedures are limited by the quality of the training and the extent to which evaluations are made after external control over implementation has been largely withdrawn. We do not know, for example, the effects of self-reinforcement without external prompts or checking and with shaping.

Other predictors of effectiveness are the characteristics of the child involved. Age has been noted as a factor in some of the self-instructional research. Locus of control predicts responsiveness to self-reinforcement and more comprehensive programs. Clinical status relates to the impact of self-assessment. All of these characteristics point directly or indirectly to important aspects of the child's history with respect to the procedures in question. Sawin and Parke (1979) speculated that the most effective types of self-instruction are those most frequently associated with consequences when externally imposed. A

history of reinforcement for following self-instructions facilitated future successful implementation of the procedure (Burron and Bucher, 1978). The differential findings related to locus of control and clinical status suggest that a history of experiencing consistent external contingencies increases the saliency and use of self-administered consequences. Thus, if the child's own past has not properly prepared him/her for successfully using self-control procedures, an appropriate history may need to be established prior to teaching self-control techniques.

Self-control procedures have been developed and evaluated partially in the hope that better generalization and maintenance could be achieved with these procedures than with externally imposed interventions (Stokes and Baer, 1977). Clear conclusions regarding this expectation are difficult to draw because these effects have been assessed much less frequently than has the initial influence of the procedures and most of the laboratory analogue studies assessed the effect of the procedures on only one occasion and one task. When generalization was evaluated, positive results were usually reported (Bornstein and Quevillon, 1976; Douglas *et al.*, 1976; Meichenbaum and Goodman, 1971; Palkes *et al.*, 1968, 1972; Turkewitz *et al.*, 1975). A characteristic of all the procedures producing generalization was nonspecificity of self-instructions. For example, Palkes *et al.*'s (1968) self-instruction, "Look and think before I answer," was not response-specific. No generalization was achieved when Robin *et al.*'s (1975) children verbalized instructions specific to the letter of the alphabet they were attempting to write. With respect to maintenance, the results are somewhat mixed but appear to interact with the quality of the training. The effects of self-instructional training were not maintained (Palkes *et al.*, 1968) but when self-evaluation and self-reinforcement were added to self-instruction (Meichenbaum and Goodman, 1971), effects were maintained at one-month follow-up. Allowing children to impose lenient criteria (Felixbrod and O'Leary, 1973) led to

rapid extinction, but when strict criteria were imposed (Weiner and Dubanowski, 1975), better maintenance was demonstrated for self- than for externally set standards. Excellent maintenance was reported by Wood and Flynn (1978) following implementation of a self-evaluation procedure which the children were taught to use in the context of a carefully faded matching program. The limited data regarding maintenance are encouraging and highlight the importance of providing proper training in the use of self-control techniques. It is not known, however, if better maintenance or generalization is achieved with self- rather than externally imposed procedures, because children continue to use the procedures in the absence of systematic external prescriptions to do so, or whether another unidentified factor accounts for the differential results. No one has, for example, attempted to assess whether children actually continue to use the self-control procedures they have been taught.

Throughout this review, we have noted the relative influence of self- *vs.* externally implemented procedures and have concluded that the initial effects are probably comparable and that self-control may be more advantageous with respect to maintenance. The distinction thus made between self- and external control is not meant to imply that the use of self-control procedures and the behaviors they influence can somehow exist and persist in spite of or in the absence of external contingencies. Most theorists (*e.g.*, Skinner, 1953; Thoresen and Mahoney, 1974) contend that self-control is perhaps more or less, but never completely, without external influences. The necessity for external controls in teaching children to use self-control procedures is evident. Although systematic external control can and has been successfully faded (see Wood and Flynn, 1978), naturally occurring events must, at the very least, support the behavior change thereby indirectly reinforcing the child's use of the procedure. The goal for applied researchers should therefore be to develop methods for teaching children to control their own

behavior on a continuing basis with a minimum of external support.

Research efforts which would most fruitfully foster achievement of this goal include:

1. Laboratory analogue studies to establish or better document the effects of (a) self- *vs.* external instructions, (b) criterion-setting with appropriate attention to shaping and stringency, (c) self-reinforcing statements on self-assessment, (d) self-reinforcement without prompts, and (e) restatement of contingencies.
2. Applied evaluations of self-instructions implemented with faded adherence checking, of self-reinforcement, and of distraction.
3. Comparisons of self- *vs.* external maintenance effects particularly with self-instruction, self-determined criteria, and self-reinforcement with shaping and fading procedures held constant.
4. Determinations of the child characteristics that interact with effectiveness of self-control procedures.

REFERENCE NOTE

1. Neilaus, T. H., Israel, A. C., and Pravder, M. D. *The effectiveness of transition to a multiple component self-control program in maintaining changes in disruptive behavior produced by a teacher-controlled intervention.* Unpublished manuscript, State University of New York at Albany, 1977.

REFERENCES

- Anderson, L., Fodor, I., and Alpert, M. A comparison of methods for training self-control. *Behavior Therapy*, 1976, **7**, 649-658.
- Aronfreed, J. *Conduct and conscience: The socialization of internalized control over behavior.* New York: Academic Press, 1968.
- Ballard, K. D. and Glynn, E. L. Behavioral self-management in story-writing with elementary school children. *Journal of Applied Behavior Analysis*, 1975, **8**, 387-398.
- Bandura, A. *Principles of behavior therapy.* New York: Prentice-Hall, 1969.
- Bandura, A. Self-reinforcement: Theoretical and

- methodological considerations. *Behaviorism*, 1976, 4, 135-155.
- Bandura, A. and Kupers, C. J. Transmission of patterns of self-reinforcement through modeling. *Journal of Abnormal and Social Psychology*, 1964, 69, 1-9.
- Bandura, A. and Perloff, B. Relative efficacy of self-monitored and externally imposed reinforcement systems. *Journal of Personality and Social Psychology*, 1967, 7, 111-116.
- Bandura, A. and Whalen, C. K. The influence of antecedent reinforcement and divergent modeling cues on patterns of self-reinforcement. *Journal of Personality and Social Psychology*, 1966, 3, 373-382.
- Bem, S. L. Verbal self-control: The establishment of effective self-instruction. *Journal of Experimental Psychology*, 1967, 74, 485-491.
- Bolstad, O. D. and Johnson, S. M. Self-regulation in the modification of disruptive classroom behavior. *Journal of Applied Behavior Analysis*, 1972, 5, 443-454.
- Bornstein, P. H. and Quevillon, R. P. The effects of a self-instructional package on overactive preschool boys. *Journal of Applied Behavior Analysis*, 1976, 9, 179-188.
- Brigham, T. A. and Stoerzinger, A. An experimental analysis of children's preference for self-selected rewards. In T. A. Brigham, R. Hawkins, J. Scott, and T. F. McLaughlin (Eds), *Behavior analysis in education: Self-control and reading*. Dubuque, Iowa: Kendall/Hunt, 1976.
- Broden, M., Hall, R. V., and Mitts, B. The effect of self-recording on the classroom behavior of two eighth grade students. *Journal of Applied Behavior Analysis*, 1971, 4, 191-199.
- Brownell, K. D., Coletti, G., Ersner-Hershfield, R., Hershfield, S. M., and Wilson, G. T. Self-control in school children: Stringency and leniency in self-determined and externally imposed performance standards. *Behavior Therapy*, 1977, 8, 442-455.
- Bugental, D. B., Collins, S., Collins, L., and Chaney, L. A. Attributional and behavioral changes following two behavior management interventions with hyperactive boys: A follow-up study. *Child Development*, 1978, 49, 247-250.
- Bugental, D. B., Whalen, C. K., and Henker, B. Causal attributions of hyperactive children and motivational assumptions of two behavior-change approaches: Evidence for an interactionist position. *Child Development*, 1977, 48, 847-884.
- Burrone, D. and Bucher, B. Self-instructions as discriminative cues for rule-breaking or rule-following. *Journal of Experimental Child Psychology*, 1978, 26, 46-57.
- Camp, B. W., Blom, G. E., Hebert, F., and van Doorninck, W. J. "Think aloud": A program for developing self-control in young aggressive boys. *Journal of Abnormal Child Psychology*, 1977, 5, 157-169.
- Catania, A. C. The myth of self-reinforcement. *Behaviorism*, 1975, 3, 192-199.
- Cautela, J. R. Covert conditioning. In A. Jacobs and L. B. Sachs (Eds), *The psychology of private events: Perspective on covert response systems*. New York: Academic Press, 1971.
- Douglas, V. I., Parry, P., Marton, P., and Garson, C. Assessment of a cognitive training program for hyperactive children. *Journal of Abnormal Child Psychology*, 1976, 4, 389-410.
- Drabman, R. S., Spitalnik, R., and O'Leary, K. D. Teaching self-control to disruptive children. *Journal of Abnormal Psychology*, 1973, 82, 10-16.
- Dubey, D. R. and O'Leary, S. G. Increasing reading comprehension of two hyperactive children: Preliminary investigation. *Perceptual and Motor Skills*, 1975, 41, 691-694.
- D'Zurilla, T. J. and Goldfried, M. R. Problem solving and behavior modification. *Journal of Abnormal Psychology*, 1971, 78, 107-126.
- Felixbrod, J. J. and O'Leary, K. D. Effects of reinforcement on children's academic behavior as a function of self-determined and externally imposed systems. *Journal of Applied Behavior Analysis*, 1973, 6, 241-250.
- Felixbrod, J. J. and O'Leary, K. D. Self-determination of academic standards by children: Toward freedom from external control. *Journal of Educational Psychology*, 1974, 66, 845-850.
- Frederiksen, L. W. and Frederiksen, C. B. Teacher-determined and self-determined token reinforcement in a special education classroom. *Behavior Therapy*, 1975, 6, 310-314.
- Friedling, C. and O'Leary, S. G. Effects of self-instructional training on second- and third-grade hyperactive children: A failure to replicate. *Journal of Applied Behavior Analysis*, 1979, 12, 211-219.
- Goldfried, M. R. and Trier, C. S. Effectiveness of relaxation as an active coping skill. *Journal of Abnormal Psychology*, 1974, 83, 348-355.
- Glynn, E. L. Classroom applications of self-determined reinforcement. *Journal of Applied Behavior Analysis*, 1970, 3, 123-132.
- Glynn, E. L., Thomas, J. D., and Shee, S. M. Behavioral self-control of on-task behavior in an elementary classroom. *Journal of Applied Behavior Analysis*, 1973, 6, 105-114.
- Grusec, J. E. Some antecedents of self-criticism. *Journal of Personality and Social Psychology*, 1966, 4, 244-252.
- Hartig, M. and Kanfer, F. H. The role of verbal self-instructions in children's resistance to temptation. *Journal of Personality and Social Psychology*, 1973, 25, 259-267.
- Higa, W. R., Tharpe, R. G., and Calkins, R. P. Developmental verbal control of behavior: Impli-

- cations for self-instructional training. *Journal of Experimental Child Psychology*, 1978, **26**, 489-497.
- Humphrey, L. L., Karoly, P., and Kirschenbaum, D. S. Self-management in the classroom: Self-imposed response cost versus self-reward. *Behavior Therapy*, 1978, **9**, 592-601.
- Hundert, J. and Bucher, B. Pupils' self-scored arithmetic performance: A practical procedure for maintaining accuracy. *Journal of Applied Behavior Analysis*, 1978, **11**, 304.
- Israel, A. C. Some thoughts on correspondence between saying and doing. *Journal of Applied Behavior Analysis*, 1978, **11**, 271-276.
- Jarvis, P. E. Verbal control of sensory-motor performance: A test of Luria's hypothesis. *Human Development*, 1968, **11**, 172-183.
- Joynt, D. and Cambourne, B. Psycholinguistic development and the control of behavior. *British Journal of Educational Psychology*, 1968, **38**, 249-260.
- Kagan, J., Roseman, B. L., Day, D., Albert, J., and Phillips, W. Information processing in the child: Significance of analytic and reflective attitudes. *Psychological Monographs*, 1964, **78**, (1, Whole No. 578).
- Kanfer, F. H., Karoly, P., and Newman, A. Reduction of children's fear of the dark by competence-related and situational threat-related verbal cues. *Journal of Consulting and Clinical Psychology*, 1975, **43**, 251-258.
- Kanfer, F. H. and Zich, J. Self-control training: The effects of external control on children's resistance to temptation. *Developmental Psychology*, 1974, **10**, 108-115.
- Kaufman, K. F. and O'Leary, K. D. Reward, cost, and self-evaluation procedures for disruptive adolescents in a psychiatric hospital school. *Journal of Applied Behavior Analysis*, 1972, **5**, 293-309.
- Kazdin, A. E. Self-monitoring and behavior change. In M. J. Mahoney and C. E. Thoresen (Eds), *Self-control: Power to the person*. Monterey, California: Brooks/Cole, 1974.
- Knappczyk, D. R. and Livingston, G. Self-recording and student teacher supervision: Variables within a token economy structure. *Journal of Applied Behavior Analysis*, 1973, **6**, 481-486.
- Layne, C. C., Rickard, H. C., Jones, M. T., and Lyman, R. D. Accuracy of self-monitoring on a variable ratio schedule of observer verification. *Behavior Therapy*, 1976, **7**, 481-488.
- Lovitt, T. C. Self-management projects with children with behavioral disabilities. *Journal of Learning Disabilities*, 1973, **6**, 15-28.
- Lovitt, T. C. and Curtiss, K. A. Academic response rate as a function of teacher- and self-imposed contingencies. *Journal of Applied Behavior Analysis*, 1969, **2**, 49-53.
- Luria, A. R. *The role of speech in the regulation of normal and abnormal behavior*. New York: Liveright, 1961.
- MacPherson, E. M., Candee, B. L., and Hohman, R. J. A comparison of three methods for eliminating disruptive lunchroom behavior. *Journal of Applied Behavior Analysis*, 1974, **7**, 287-297.
- Masters, J. C., Furman, W., and Barden, R. C. Effects of achievement standards, tangible rewards, and self-dispensed achievement evaluations on children's task mastery. *Child Development*, 1977, **48**, 217-224.
- Masters, J. C., Gordon, F. R., and Clark, L. V. Effects of self-dispensed and externally dispensed model consequences on acquisition, spontaneous and oppositional imitation, and long-term retention. *Journal of Personality and Social Psychology*, 1976, **33**, 421-430.
- Masters, J. C. and Santrock, J. W. Studies in the self-regulation of behavior: Effects of contingent cognitive and affective events. *Developmental Psychology*, 1976, **12**, 334-348.
- McKenzie, T. L. and Rushall, B. S. Effects of self-recording on attendance and performance in a competitive swimming training environment. *Journal of Applied Behavior Analysis*, 1974, **7**, 199-206.
- Meichenbaum, D. H. and Goodman, J. The developmental control of operant motor responding by verbal operants. *Journal of Experimental Child Psychology*, 1969, **7**, 553-565.
- Meichenbaum, D. H. and Goodman, J. Training impulsive children to talk to themselves: A means of developing self-control. *Journal of Abnormal Psychology*, 1971, **77**, 115-126.
- Miller, S. A., Shelton, J., and Flavell, J. H. A test of Luria's hypothesis concerning the development of verbal self-regulation. *Child Development*, 1970, **41**, 651-665.
- Mischel, W. and Ebbesen, E. B. Attention in delay of gratification. *Journal of Personality and Social Psychology*, 1970, **16**, 329-337.
- Mischel, W., Ebbesen, E. B., and Zeiss, A. R. Cognitive and attentional mechanisms in delay of gratification. *Journal of Personality and Social Psychology*, 1972, **21**, 204-218.
- Mischel, W. and Liebert, R. M. The role of power in the adoption of self-reward patterns. *Child Development*, 1967, **38**, 673-683.
- Mischel, W. and Patterson, C. J. Substantive and structural elements of effective plans for self-control. *Journal of Personality and Social Psychology*, 1976, **34**, 942-950.
- Monahan, J. and O'Leary, K. D. Effects of self-instruction on rule-breaking behavior. *Psychological Reports*, 1971, **29**, 1059-1066.
- Montgomery, G. G. and Parton, D. A. Reinforcing effect of self-reward. *Journal of Experimental Psychology*, 1970, **84**, 273-276.

- Nelson, R. O., Lipinski, D. P., and Boykin, R. A. The effects of self-recorders' training and the obtrusiveness of the self-recording device on the accuracy and reactivity of self-monitoring. *Behavior Therapy*, 1978, **9**, 200-208.
- O'Leary, K. D. The effects of self-instruction on immoral behavior. *Journal of Experimental Child Psychology*, 1968, **6**, 297-301.
- Palkes, H., Stewart, M., and Freedman, J. Improvement in maze performance of hyperactive boys as a function of verbal-training procedures. *Journal of Special Education*, 1972, **5**, 337-342.
- Palkes, H., Stewart, M., and Kahana, K. Porteus maze performance of hyperactive boys after training in self-directed verbal commands. *Child Development*, 1968, **39**, 817-826.
- Patterson, C. J. and Mischel, W. Effects of temptation-inhibiting and task-facilitating plans on self-control. *Journal of Personality and Social Psychology*, 1976, **33**, 209-217.
- Peacock, R., Lyman, R. D., and Rickard, H. C. Correspondence between self-report and observer-report as a function of task difficulty. *Behavior Therapy*, 1978, **9**, 578-583.
- Robin, A. L., Armel, S., and O'Leary, K. D. The effects of self-instruction on writing deficiencies. *Behavior Therapy*, 1975, **6**, 178-187.
- Robin, A., Schneider, M., and Dolnick, M. The Turtle Technique: An extended case study of self-control in the classroom. *Psychology in the Schools*, 1976, **13**, 449-453.
- Sagotsky, G., Patterson, C. J., and Lepper, M. R. Training children's self-control: A field experiment in self-monitoring and goal-setting in the classroom. *Journal of Experimental Child Psychology*, 1978, **25**, 242-253.
- Salzberg, C. L. Freedom and responsibility in an elementary school. In G. Semb (Ed), *Behavior analysis and education—1972*. Lawrence: University of Kansas, Support and Development Center for Follow Through, 1972.
- Santogrossi, D. A., O'Leary, K. D., Romanczyk, R. G., and Kaufman, K. F. Self-evaluation by adolescents in a psychiatric hospital school token program. *Journal of Applied Behavior Analysis*, 1973, **6**, 277-287.
- Sawin, D. B. and Parke, R. D. Development of self-verbalized control of resistance to deviation. *Developmental Psychology*, 1979, **15**, 120-127.
- Seymour, F. W. and Stokes, T. F. Self-recording in training girls to increase work and evoke staff praise in an institution for offenders. *Journal of Applied Behavior Analysis*, 1976, **9**, 41-54.
- Snyder, J. J. and White, M. J. The use of cognitive self-instruction in the treatment of behaviorally disturbed adolescents. *Behavior Therapy*, 1979, **10**, 227-235.
- Spates, C. R. and Kanfer, F. H. Self-monitoring, self-evaluation, and self-reinforcement in children's learning: A test of a multistage self-regulation model. *Behavior Therapy*, 1977, **8**, 9-16.
- Stokes, T. F. and Baer, D. M. An implicit technology of generalization. *Journal of Applied Behavior Analysis*, 1977, **10**, 349-367.
- Stuart, R. B. Behavioral control of overeating. *Behaviour Research and Therapy*, 1967, **5**, 357-365.
- Skinner, B. F. *Science and human behavior*. New York: Macmillan, 1953.
- Switsky, H. N. and Haywood, H. C. Motivational orientation and the relative efficacy of self-monitored and externally imposed reinforcement systems in children. *Journal of Personality and Social Psychology*, 1974, **30**, 360-366.
- Thoresen, C. E. and Mahoney, M. J. *Behavioral self-control*. New York: Holt, Rinehart & Winston, 1974.
- Turkewitz, H., O'Leary, K. D., and Ironsmith, M. Generalization and maintenance of appropriate behavior through self-control. *Journal of Consulting and Clinical Psychology*, 1975, **43**, 577-583.
- Weiner, H. R. and Dubanowski, R. A. Resistance to extinction as a function of self- or externally determined schedules of reinforcement. *Journal of Personality and Social Psychology*, 1975, **31**, 905-910.
- Wilder, L. The role of speech and other extra-signal feedback in the regulation of the child's sensorimotor behavior. *Speech Monographs*, 1969, **36**, 426-434.
- Wood, R. and Flynn, J. M. A self-evaluation token system versus an external evaluation token system alone in a residential setting with predelinquent youths. *Journal of Applied Behavior Analysis*, 1978, **11**, 503-512.
- Yates, B. T. and Mischel, W. Young children's preferred attentional strategies for delaying gratification. *Journal of Personality and Social Psychology*, 1979, **37**, 286-300.

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