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EFFECT OF CUEING ON SELF-CONTROL OF CLASSROOM BEHAVIOR[1]

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Behavioral self-control procedures, composed of self-assessment, self-recording, self-determination and administration of reinforcement, were introduced into a regular third-grade classroom immediately after a baseline period. The procedures produced a small and unstable increase in the level of on-task behavior in eight of the nine subjects. After a second baseline period, a cueing procedure was introduced, using a chart specifying on-task behavior. This enabled within-lesson changes in on-task behavior to be posted clearly for the children. The cueing procedure combined with the self-control procedures produced a high and stable increase in on-task behavior in all subjects.

Several studies have effectively used behavioral self-control procedures (*e.g.,* Broden, Hall, and Mitts, 1971; Lovitt and Curtiss, 1969). Bandura and Perloff (1967) and Glynn, Thomas, and Shee (1973) put forward a conceptual base for the analysis of behavioral self-control that incorporates the following four components:

(1) *Self-assessment.* The individual may examine his own behavior and decide whether or not he has performed a specific behavior or class of behaviors.
(2) *Self-recording.* The individual may objectively record the frequency of his performance of a given behavior or class of behaviors.
(3) *Self-determination of reinforcement.* The individual may determine from all available reinforcers the nature and amount of reinforcement he should receive contingent upon his performance of a given behavior or class of behaviors.
(4) *Self-administration of reinforcement.* The individual dispenses his own reinforcement (which may or may not be self-determined) contingent upon his performance of a given behavior or class of behaviors.

Various combinations of these behavioral self-control components have been employed in research as treatment procedures. However, most studies have had the subjects undergo a training period with external reinforcement procedures before the behavioral self-control procedures were introduced. Kanfer and Duerfeldt (1967) reported that accuracy of self-reinforcement for performance on a simple laboratory task was increased with training under external reinforcement conditions. In the classroom setting, Bolstad and Johnson (1972), Drabman, Spitalnik, and O'Leary (1973), Glynn *et al.* (1973), and Kaufman and O'Leary (1972) reported successful behavior maintenance capacities of self-reinforcement procedures when applied after periods of behavior modification by usual external reinforcement procedures. However, Santogrossi, O'Leary, Romanczyk, and Kaufman (1973) reported the failure of a self-determined reinforcement procedure to maintain a low level of disruptive behavior following a successful teacher-determined reinforcement procedure. One reason advanced by

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the authors for this failure was the relatively short period of experience of externally determined reinforcement (nine days, compared with 25 days in the Kaufman and O'Leary study and 50 days in the Glynn *et al.* study).

An important question is whether a behavioral self-control training procedure introduced into a classroom setting without prior external reinforcement would modify behavior effectively. The present study introduced the behavioral self-control procedure reported in the Glynn *et al.* study (1973) immediately after a baseline condition in an elementary classroom. This procedure incorporates the four components of behavioral self-control described above, namely, self-assessment, self-recording, self-determination of reinforcement, and self-administration of reinforcement.

This study also permitted assessment of the effects of a behavior cueing procedure on self-control in the classroom. For a child to be able to assess whether or not he has performed a specific behavior or class of behaviors, the teacher must specify clearly what behaviors are to be assessed.

Classroom studies employing behavior specifications in the form of rules, (*e.g.,* Madsen, Becker, and Thomas, 1968; Santogrossi *et al.,* 1973) have been conducted in settings where a single behavior specification applies throughout the lesson. In many classroom lessons, this is not the case. It is common for a teacher to require several changes in behavior specification during a lesson. For example, a teacher may require all pupils to remain seated, face the speaker, and be silent for the first 10 min of a lesson while lesson instructions are given. Then, pupils may perform any of a number of appropriate lesson behaviors for the ensuing 20 or 30 min. Also, frequently a teacher will want to interrupt current on-task behavior to make further teaching points, to point out examples of good work for all to see, or to add some further instruction or information. During these interruptions, the specification of on-task behavior reverts to that of the first 10 min.

While these within-lesson changes in appropriate behavior can be handled by trained observers, they present problems to young children assessing their behavior and self-administering reinforcement. A child listening to a teacher's instruction in the middle of a written expression lesson might rate himself as off-task because he was not writing at the moment he had to assess his own behavior. Similarly, a child who continued writing when a teacher had requested the class's attention might rate himself as on-task if he had to assess his behavior at that time. These confusing conditions would impair the effectiveness of behavioral self-assessment and self-reinforcement procedures.

The present study reports the outcome of an attempt to improve the procedure for cueing on-task behavior, by allowing for frequent changes in on-task behavior within a lesson.

METHOD

Subjects and Setting

The study was conducted in a regular third-grade class in an Auckland suburban elementary school. The ages of the children ranged from 7 yr, 1 month to 8 yr, 3 months. From a class of 34, nine children regarded by the principal as difficult to manage were selected as subjects. The class teacher stated that these were the nine with whom he experienced greatest difficulty in gaining and holding attention. The same nine children, eight boys and one girl, were observed for the entire study, though the treatment procedures were applied to every pupil in the class.

Observations were taken during an oral and written language lesson between 9:30 and 10:20 a.m. every morning of the school week. The lesson typically consisted of 10 to 15 min during which the teacher presented a written expression topic, picture, or newspaper article. He then conducted a class question-and-answer session to arouse interest and to elicit vocabulary. The remaining 35 to 40 min were spent in individual written work. This period was frequently interrupted by teacher demands for the

attention of the class to words, facts, or instructions placed on the blackboard and to lengthy teacher commentary pointing out strengths and weaknesses of completed sentences individual children were writing. The major behavior problem for the teacher was the very low level of pupil attention, especially during those parts of the lesson when he was giving instructions or talking to the whole class.

Dependent Variable—On-task Behavior

This was defined as the percentage of 10-sec observation intervals in which an individual child's behavior was classified as on-task. On-task behaviors were: (a) *During teacher instruction:* remaining in one's seat, being silent, looking at the teacher or speaker; (b) *During work periods:* writing a story, drawing a picture, or performing any other activity prescribed by the teacher (*e.g.,* searching reference books for specific information or working with modelling clay). Behaviors classified as off-task included movement about the room (other than fetching or returning equipment), playing with toys and writing implements, shouting, arguing, hitting, kicking, banging furniture, and leaving the classroom without permission.

Observation Procedure

A pool of eight observers (including the authors) served throughout the study. For purposes of reliability of data collection, two observers operated independently on six of the 10 days in each of the first four phases of the study. Apart from the authors, the remaining six observers were naive as to the design of the study. Observer reliability was calculated in terms of number of intervals in which the two observers agreed, divided by the total number of observation intervals $\times$ 100 (Wasik, Senn, Welch, and Cooper, 1969). The same nine subjects were observed in a random order, which varied daily. The observers watched the first child on the list for 10 sec, and would then spend the ensuing 5 sec coding the subject's behavior as A (on-task) or O (off-task). For his behavior to be coded as A, the child had to be observed in on-task behavior for the majority of the 10-sec interval. The procedure was followed until all nine subjects' behavior had been observed and coded. The cycle was continued until the lesson ended.

Experimental Design

This was a four-phase ABAB design, where the A phases were baselines and the B phases were treatment phases. The second treatment phase differed from the first, as detailed below. Data were gathered daily throughout the study.

Baseline 1. For 10 days, baseline rates of on-task behavior were established. Before the first day of Baseline 1, the authors had spent three sessions in the classroom during the target lesson to identify the nine subjects and to work on the specification of on-task behavior for the lesson. During Baseline 1, the teacher announced the on-task behavior requirements at the beginning of each lesson; throughout the lesson, when he required the attention of the class, he frequently restated the on-task behavior requirement with the words: "Everybody stop, look, and listen".

Behavioral self-control. (Self-assessment, self-recording, self-determination, and self-administration of reinforcement). During this period, a series of intermittent tape-recorded signals was played. The signals were produced by a "Zenith Neometer" (model Za, warble tone 3000 Hz). Intervals between signals varied randomly over 1, 2, 3, 4, and 5 min. Depending upon the point at which the tape was started, 10 to 12 signals occurred during each lesson.

Each child in the class was provided with a 10 by 2 in. (25.4 by 5 cm) card bearing his name and four rows of squares, one row for each day of the week. Children were instructed by the teacher that the cards were designed to enable them to earn checks for being on-task. These points were exchanged at the end of the lesson for free time at the rate of 1 min for every check mark. The free time was spent in an adjacent room containing a variety of activi-

ties such as toy construction kits, parlor games, and jigsaws. None of these activities was available at any other time. Children could, if they preferred, spend their free time outside in the school playground. Being permitted to play outside while other classes were still at work proved to be quite a popular reinforcer for some children.

In order to earn a check on their card, children had to be on-task at the moment a signal occurred. If a child considered he was on-task *at that moment,* he placed a check in one of the spaces. At the end of the lesson, the children were dismissed by the teacher and allowed to proceed to the activity room according to how many checks they had recorded on their cards for that day. Children who had the most checks would leave first. Children who had no checks received no free time. Instructions stressed that children should not discuss their cards with other children.

Baseline 2. During this period of two weeks, the taped signals, behavioral self-control procedures, and free-time contingency were withdrawn.

Behavioral self-control + cueing. The taped signals, behavioral self-control procedures, and free-time contingency were reinstated, but with some alterations.

First, observers reported that the 4- and 5-min intervals between signals seemed a little too long for these children. Frequently, a subject would be observed to be on task for 2 or 3 min and would then lapse into inattention when a signal occurred in the fifth minute. For this reason, it was thought that subjects may not have been receiving sufficient reinforcement for the proportion of on-task behavior they performed. Accordingly, a new signal tape was prepared, similar to the first, except that the 4- and 5-min intervals were dropped. With this new tape in operation, 15 to 18 signals occurred per lesson, instead of the 10 to 12 of the previous behavioral self-control period.

Second, as mentioned earlier, confusion arose because of the frequency of teacher change in specifying on-task behavior. Furthermore, once a specification had been given (*e.g.,* "Everybody stop, look and listen"), and after the teacher had finished giving some instruction or comment, there would be no clear direction for the children to resume work. All observers reported that when a signal occurred at such times, children had difficulty in deciding whether or not they were on-task. Also, some children who were actually working steadily at their written work did not always stop this when the teacher demanded attention. If a signal occurred at these times, children would tend to take a check because they were performing the specified lesson tasks and were therefore (from their point of view) on-task.

To overcome this confusion, a behavior specification chart was prepared. On one side, lettered in red, was the specification for those times when the teacher wanted the attention of the entire class, namely:

(RED) LOOK AT THE TEACHER
STAY IN YOUR SEAT
BE QUIET

On the other side of this chart, lettered in green, was the specification for the other times.

(GREEN) WORK AT YOUR PLACE
WRITE IN YOUR BOOKS
READ INSTRUCTIONS ON
THE BLACKBOARD

Throughout the lesson, the teacher was asked to use the chart to cue whichever set of behaviors was then on-task. The children were asked to mark themselves on-task only if they were "doing what the chart says" when signals occurred. In this way, a clear and unambiguous statement of on-task behavior was posted for the children throughout the lesson. Also, the teacher was provided with a visible reminder of the last behavior specification he had given, and, if necessary, of the need to change his previous specification.

RESULTS

Observer Reliability

Interobserver agreement throughout the 24 days on which two observers were present ranged from 84% to 98%, with better than 90% agreement on 17 of the 24 days. The mean interobserver agreement for the first four phases of the study were: baseline 1, 88%; self-control, 93%; baseline 2, 90%; self-control + cueing, 94%.

On-Task Behavior

Table 1 presents, for each subject, the mean percentage of on-task behavior in each phase of the experiment. Data in Table 1 were analyzed in a repeated-measures analysis of variance. The phases effect was found to be both significant ($p < 0.001$) and strong (the omega-squared estimate of Hays [1963] being 0.85).

Table 1 also shows that the self-control + cueing phase resulted in a much stronger increase in on-task behavior than the first self-control phase. During the first self-control phase, only one subject (S6) showed an increase in on-task behavior over baseline 1 level greater than 30%, whereas during the self-control + cueing phase, all nine subjects showed increases greater than 30%. This information is complemented by Figure 1. Figure 1 shows that the effect of the first self-control phase is very unstable. Graphs of all subjects display increased variability during the first self-control phase over the baseline 1 phase. This variability is reduced in the self-control + cueing phase. Table 2 presents the standard deviations of on-task behavior for each subject in each phase. Data in Table 2 were analyzed in a repeated-measures analysis of variance. The phases effect was found to be significant ($p < 0.001$) and of considerable magnitude (the omega-squared estimate of Hays [1963] being 0.48). Table 2 substantiates the visual impression gained from Figure 1. Table 2 shows that for eight of the nine subjects, there is less variability during the self-control + cueing phase than during the first self-control phase. Furthermore, for seven of the nine subjects, the variability during the self-control + cueing phase is lower than its baseline 1 level.

DISCUSSION

Behavioral Self-Control Procedures Without External Reinforcement Experience

Previous studies have demonstrated the effectiveness of behavioral self-control procedures in a classroom setting when introduced after a period of external reinforcement (Drabman *et al.*, 1973; Glynn *et al.*, 1973; Kaufman and O'Leary, 1972). Results in the present study suggest that behavioral self-control procedures may be employed successfully by pupils *without* prior external reinforcement, provided that care-

Table 1

Mean Percentage of On-Task Behavior, Over All Phases

Subjects	*Baseline 1*	*Self-Control*	*Baseline 2*	*Self-Control + Cueing*
1	47	64	47	91
2	53	63	51	92
3	50	76	57	88
4	55	78	51	86
5	50	51	47	91
6	41	77	46	92
7	47	62	54	93
8	52	72	40	90
9	58	85	64	97
$\bar{X}$	49.6	69.8	50.78	91.11

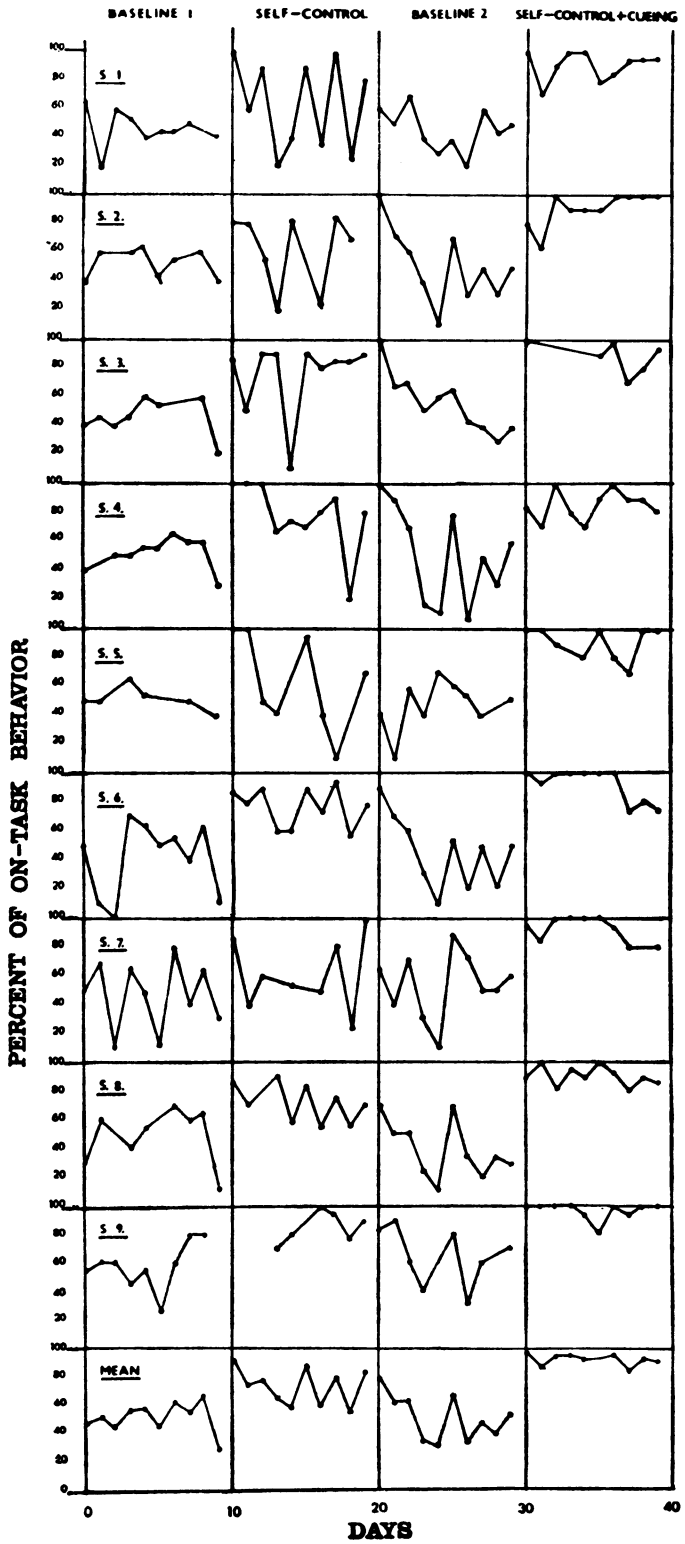

Fig. 1. Individual and group mean daily percentage of on-task behavior throughout the study.

Table 2
Standard Deviations of On-Task Behavior Over All Phases

Subjects	*Baseline 1*	*Self-Control*	*Baseline 2*	*Self-Control + Cueing*
1	12	38	22	9
2	9	25	24	11
3	18	25	19	11
4	13	24	40	10
5	7	28	16	11
6	24	14	24	11
7	23	24	22	9
8	21	13	19	12
9	14	11	18	6
$\overline{X}$	15.7	22.4	23.7	10.00

ful attention is given to cueing on-task behavior. Only when self-control procedures were combined with continuous cueing was there a stable increase in on-task behavior in this study. The self-control and the cueing procedures employed are readily applicable to an entire class.

Increased Effectiveness of Behavioral Self-Control + Cueing Phase

The procedural alterations of increasing the number of signals occurring and introducing the behavior specification chart cannot be isolated in terms of their individual contributions to the effectiveness of this phase. However, reports from all observers indicated that the chart eliminated much of the indecision and confusion that subjects had about assessing their behavior.

The chart could have functioned as a discriminative stimulus, each side indicating a different set of responses to be reinforced. Obtaining reinforcement for "doing what the chart says" would also reinforce the response of looking at the chart to see what the current on-task behavior was. Observers reported that children in this phase were making a number of rapid glances up to see which side of the chart was in view. It is suggested that the use of the chart contributed more to the higher level of on-task behavior in this phase than did the increase in number of opportunities for reinforcement. Certainly in combination, these two procedural changes resulted in a very high and stable level of on-task behavior in all subjects.

Implementation of the Self-Control Procedure

The amount of time involved per instance of self-assessment and recording took approximately 10 sec, and informal observations suggested that the procedure interfered minimally with the child's academic productivity. In classrooms for retarded children, however, there was a disruption of academic productivity associated with the self-assessment and recording procedure. In several normal classrooms, however, the procedure has worked successfully in increasing on-task behavior. Further research is needed to assess whether increased attention results in increased academic productivity, whether the treatment be praise, an incentive program, or a self-management program.

Lack of Follow-up Procedures

It was expected that the teacher would continue to operate the self-control + cueing procedures beyond the period of the experiment. Because regular observers were not available beyond the experimental period, a detailed follow-up was not possible. However, informal observation indicated that the level of on-task behavior of these subjects had dropped considerably two weeks after the experiment ended. This drop was thought to be due to the teacher's discontinuing of the cueing and reinforcement

procedures. The lack of generalization of treatment effects in this study contrasts with a previous study by Glynn *et al.* that reported evidence of generalization of treatment effects of self-control procedures over time. In that study, however, the teacher had participated in a behavior modification project in her classroom for 12 weeks before pupil self-control procedures were introduced.

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