

BEHAVIORAL SELF-CONTROL OF ON-TASK BEHAVIOR IN AN  
ELEMENTARY CLASSROOM<sup>1</sup>

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Techniques of behavioral self-control were employed in a class where a high level of on-task behavior had been established with externally administered reinforcement procedures. The behavioral self-control techniques maintained behavior at its ongoing high level both immediately following the externally administered reinforcement treatments and during follow-up treatments after five and seven weeks. Variability in on-task behavior was reduced during the behavioral self-control phases of the study.

Classroom behavior that is independent of teacher control or control by any agent external to the learner is a commonly acknowledged primary goal of education. A practical means of attaining this goal lies in the development of procedures of behavioral self-control in classroom settings.

A conceptual base for the analysis of self-control is offered below in terms of four behavioral components. Bandura and Perloff (1967) outlined a similar conceptual system. The components are:

- (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 perform-

ance 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 recent studies have employed one or more, but not all, of these components. For example, the self-monitoring procedures of McFall (1970) and Thomas, Abrams, and Johnson (1971) incorporated both self-recording and self-assessment. Usually, the behavioral self-control components are combined with experimenter imposed restrictions (Kanfer, Bradley, and Marston, 1962; Kanfer and Duerfeldt, 1967).

While there is a considerable body of literature dealing with the components of behavioral self-control (Kanfer and Marston, 1963; Marston, 1964; Goldiamond, 1965; Bandura and Whalen, 1966; Bandura, Grusec, and Menlove, 1967; Masters, 1968; Chapman, Smith, and Layden, 1971) only a few studies have been conducted in classroom settings. Lovitt and Curtiss (1969) found that with a 12-yr-old student, higher rates of responding occurred when the student arranged the contingency requirements than when the teacher specified them. The contingency manager, not the reinforce-

<sup>1</sup>The authors wish to thank Mr. R. W. Rainey, Head teacher at Pomaria Primary School, and Mrs. L. McGuire, class teacher, for their willing co-operation and enthusiastic participation in the study. Reprints may be obtained from E. L. Glynn, The University of Auckland, Private Bag, Auckland, New Zealand.

ment magnitude, accounted for this subject's gain in performance. Also Glynn (1970), in a study with grade-nine girls, found that self-determined reinforcement contingencies were at least as effective as experimenter-determined reinforcement contingencies in terms of improving academic performance. The Glynn study left open the question as to whether behavioral self-control procedures would be effective with populations other than grade-nine girls, (e.g., younger children). Broden, Hall, and Mitts (1971) used self-recording procedures in classroom settings to increase study behavior in an eighth-grade girl and to decrease talk-outs in an eighth-grade boy. It was suggested that self-recording procedures would be most effective if they were used in conjunction with established reinforcement techniques such as teacher praise and tokens.

The present study sought to investigate a means of training very young children in the use of behavioral self-control procedures. Aspects of all the four components of behavioral self-control (self-assessment, self-recording, self-determination of reinforcement, and self-administration of reinforcement) were incorporated in the technique. As the introduction of this technique into the study came after externally administered token reinforcement treatments, the behavior maintenance capacity of the self-control treatments could be examined.

## METHOD

### *Subjects and Setting*

The class studied was a grade-two class in a Western Auckland primary school. It was considered by the head teacher to be a typical grade-two class, presenting no special problems. There were 37 children in the class with ages at the commencement of the study ranging from 6 yr 1 month,<sup>2</sup> to 7 yr, 10 months. The mean age was 6 yr, 11 months. A random sample of eight

children was selected for observation by drawing names out of a hat. The same eight children were observed throughout the study. Behavior was observed daily from 9.15 a.m. to 9.45 a.m. during the class reading lesson. Each of three reading groups worked at different daily prescribed reading tasks. Most of the teacher's time was spent working with either of the two lower-ability reading groups while the other lower-ability group and the "top" reading group were left to complete written exercises from blackboard instructions or to perform specific construction or art and craft activities related to their reading program. The teacher was a competent and experienced junior class teacher who was concerned about the loss of teaching time caused by her having to interrupt her work with the reading group in hand, in order to stem minor but frequent disruptive behavior from the other two groups.

### *Dependent Variable*

*On-task behavior.* This was defined as the percentage of 10-sec observation intervals in which a given child's behavior could be classified as "on-task" in terms of this particular reading lesson. On-task behaviors for a group working with the teacher were looking at the teacher or blackboard, taking part in oral discussion with the teacher and reading to the teacher, while on-task behaviors for other groups were writing or reading in one's place, visiting the library corner to change a reading book, and painting or art and craft activities as specified on the blackboard. Other behaviors, such as moving aimlessly about the room, playing with toys, shouting, arguing, or leaving the room, were classified as "off-task".

### *Observation Procedures*

Two independent observers watched the eight children in the following manner. The children's names were listed in identical order on the observation sheets for both observers before the lesson commenced. The first child was observed by both observers at the same time for a 10-sec

<sup>2</sup>American readers should note that New Zealand children begin their elementary education at five years of age.

interval. This was followed by a 5-sec interval during which the observed behavior was coded as "A" (on-task) or "O" (off-task). To meet the on-task criterion, the child had to be working for 7 sec or more of the 10-sec observation interval. The second child was then similarly observed by both observers and so on until the behavior of all eight children had been coded. The cycle was then recommenced, each child being observed at least 10 times during the reading lesson. Observers recognized children by where they sat in the room and by the experimenters' descriptions of what they looked like. The rank order in which each child was observed was randomly varied for every observation session.

During the first behavioral self-control phase an attempt was made to have observers record the accuracy of the students' self-assessment, and self-recording of behavior. In addition to coding the children's behavior "A" or "O", the observers were asked to note on the observation sheet, at the time when the tape recorder sounded, the accuracy of the self-recording behavior of the child that was being observed. The following code was used. "R" indicated that the child was on-task and that he showed this by putting a check mark on his own record card. "+" indicated that the child was off-task yet he put a check mark on his record card to show that he was on-task. "-" indicated that the child was on-task yet he did not put a check mark on his record card to show that he was on-task. Thus, "R" denoted accurate self-assessment, and self-recording; "+" and "-" denoted inaccurate self-assessment and self-recording of reinforcement, the former assessment "+" meaning that the child was giving himself too much reinforcement and the latter assessment "-" meaning that the child was giving himself too little reinforcement.

Unfortunately, the observers for this study found it difficult to code concurrently both behavior and the accuracy of self-assessment and self-recording of reinforcement, and data were obtained for only five days.

Observation sessions occurred daily, apart

from a break of one week between the class contingency 3 phase and the group contingency 1 phase and a break of four weeks between the self-control 1 phase and the self-control 2 phase. Reliability of observation was calculated between the two observers in terms of number of agreements divided by total number of observations  $\times 100$  (Wasik, Senn, Welch, and Cooper, 1969).

### *Experimental Phases*

The study extended over the latter two thirds of the school year and consisted of 10 different phases as outlined below. During all phases, the teacher described on-task behavior for the children before the lesson began in accordance with the criteria defined earlier in this section.

*Baseline 1.* For 10 days, baseline rates of on-task behavior were established for the eight children. Before baseline data were collected, two observers spent a half-hour period in the class, together with the third author for four days to allow the children to adapt to their presence.

*Class contingency 1.* (Intermittent reinforcement for entire class on-task.) According to a pre-determined random schedule, the 30-min lesson was divided into 10 intervals ranging from 1 to 5 min. At the end of each interval, the third author would signal the class by sounding a small clicker if, and only if, no instance of off-task behavior was observed by her in the 5 sec following that interval. This was ascertained by visual and auditory sweeps of the whole class. The children were instructed that every time they heard the click, the entire class was on-task and they had earned 1 min of free time. Free time earned each day (anything from 0 to 10 min) was awarded to the class during the last 10 min before morning recess at 10.30. Free time could be spent inside or outside the classroom.

*Class contingency 2.* (Intermittent reinforcement for entire class on-task with additional back-up reinforcers.) The procedure was exactly as for class contingency 1, with the addition of

further reinforcers (a special set of equipment— toys, puzzles, parlor games, dolls), which were available for use only during the earned “free-time” period. The additional reinforcers were introduced because the observers and teacher noticed that free time by itself did not seem to be a powerful reinforcer for all children, particularly the girls.

*Baseline 2.* During this phase, both the intermittent reinforcement procedure and the free-time contingency were withdrawn. Observation of behavior continued as in baseline 1.

*Class contingency 3.* (Intermittent reinforcement for entire class on-task with additional back-up reinforcers.) The procedure was the same as previously described for class contingency 2.

After the class contingency 3 phase, a one-week break in the study occurred due to the student observers being unavailable. During this week, it was discovered that the teacher had, of her own initiative, introduced a further modification of procedure. She had selected one child from the class to take over the function of the third author. This child had been instructed to enter chalk marks at 5-min intervals on the blackboard beside the names of any of the three reading groups in which all children were displaying on-task behavior within the 10-sec period following every 5-min interval. Reading groups were given access to free time with back-up reinforcers in proportion to the number of chalk marks earned. Though no formal data were collected during this period, it is the opinion of the teacher that there had been a decline in on-task behavior.

*Group contingency 1.* (Intermittent reinforcement for reading groups being on-task with taped signals.) The intent of this treatment was to evaluate the effectiveness of the tape-recorded signalling procedure without actually introducing behavioral self-control techniques. Hence, it was decided to leave control of reinforcement in the hands of the child who administered the reinforcement during the one-week break. A tape recorder was introduced, with a tape on

which were recorded a series of intermittent “beeps”. These were produced by a “Zenith Neometer” (model ZA, warble tone 3000 Hz). The clicker used in the earlier treatment phases did not produce a suitable sound for recording. Interval between “beeps” varied randomly over 1, 2, 3, 4, or 5 min, so that children were unable to predict when a “beep” would occur. Approximately 10 beeps occurred in a 30-min period. The child in control of reinforcement was instructed to enter chalk marks beside any of the three reading groups in which all children in that group were displaying on-task behavior within the 10-sec period following every “beep”. As in other phases, access to free-time with back-up reinforcers was contingent upon amount of on-task behavior.

*Behavioral self-control 1.* (Self-assessment, self-recording, self-determination, and self-administration of reinforcement.) In this treatment the tape-recorded signals were continued, as in the group contingency phase. Each child in the class was provided with a 10 in. by 2 in. (25.4 by 5 cm) piece of cardboard bearing his name and five rows of 20 squares, one row for each day of the week. Children were instructed by the teacher that they would be able to decide for themselves whether or not they had earned a point (only partial self-assessment as the teacher defined on-task behavior). Whenever a “beep” occurred they were instructed to place a check in one of the squares only if they were “on-task”, at that moment. Children were individually permitted access to time-off plus back-up reinforcers each day, on the basis of 1 min for every square containing a check mark (self-recording and partial self-determination of reinforcement as the types and maximum amount of reinforcement was experimenter-determined). The pupils themselves dispensed the reinforcers (self-administration of reinforcement). After 10 days of behavioral self-control, there was a further gap of four weeks due to the unavailability of observers. During this interval the teacher was instructed to continue the behavioral self-control procedures during the morning reading period

and not to vary them in any way. Frequent visits to the school ensured that these instructions were followed.

*Behavioral self-control 2.* (Self-assessment, self-recording, self-determination, and administration of reinforcement.) This phase was a one-week follow-up assessment of the behavioral self-control procedures, after an interval of four weeks when formal data were not collected.

*Baseline 3.* For one week, the tape-recorded signals, the behavioral self-control procedures, and the free-time plus back-up reinforcers were withdrawn from the classroom.

*Behavioral self-control 3.* (Self-assessment, self-recording, self-determination, and administration of reinforcement.) The behavioral self-control procedures were reinstated for one week, the final week of the school year.

RESULTS

*Reliability of Observations*

Throughout 82 of the 85 days of the study, inter-observer agreement was 90% or better. For the remaining three days, one day in the group contingency 1 phase, one in the self-control phase 1, and one in baseline 3, the inter-observer agreement was 89%, 84%, and 89% respectively.

*On-Task Behavior*

Figure 1 presents the mean daily on-task behavior scores of all subjects. It can be seen that there was a definite increase in level of on-task

behavior over baseline 1 during all treatment phases and a definite decrease in level of on-task behavior during baseline 2 and baseline 3.

Table 1 indicates in whole numbers the means and variances in on-task behavior scores over the 10 phases of the study. In the three behavioral self-control phases, the variances are noticeably smaller than those of the other phases.

Figure 2 presents individual graphs of on-task behavior for the eight subjects. It can be seen that the graphs of Dean, Wayne, Billy, and Chris follow the pattern of the group results. However, in the cases of David, Debbie, and Clifford a reversal effect during baseline 3 when the behavioral self-control procedures were removed is not as pronounced. Also, for these three subjects it appears that the behavioral self-control procedures were less effective in maintaining consistently high levels of on-task behavior during the behavioral self-control 2 phase (follow-up). Robbie's results differed from the rest of the subjects in that his baseline 1 graph indicates an ascending, rather than a relatively constant or descending, baseline trend. His graph does show a reversal effect during baseline 3 when the behavioral self-control procedures were withdrawn.

The mean scores shown in Table 1, and data in Figures 1 and 2 provide clear evidence that the intermittent reinforcement procedure introduced in the class contingency 1 phase and strengthened in the class contingency 2 phase with the additional back-up reinforcers, produced a definite increase in the level of on-task

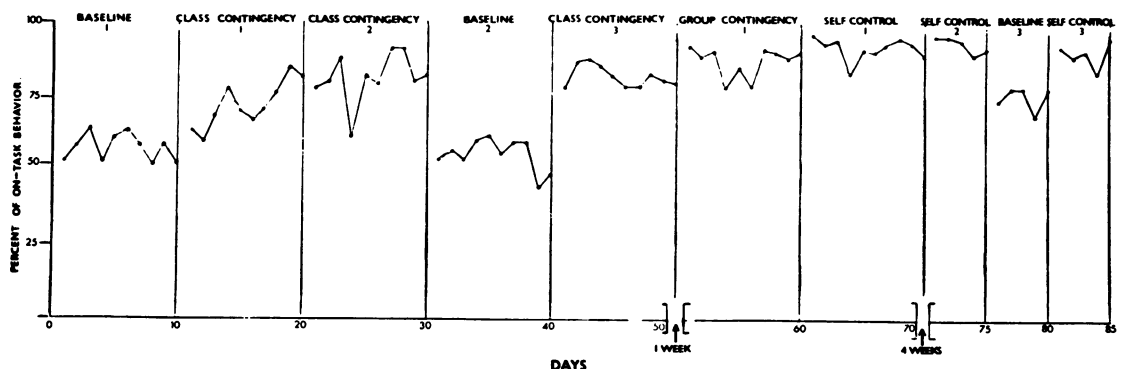


Fig. 1. Mean daily on-task behavior (all subjects).

Table 1

Mean and variances in on-task behavior scores over 10 phases of the study (whole numbers).

	Phase									
	Base- line 1	Class Contin- gency 1	Class Contin- gency 2	Base- line 2	Class Contin- gency 3	Group Contin- gency 1	Self- Control 1*	Self- Control 2*	Base- line 3	Self- Control 3*
MEAN	58	72	81	55	83	88	93	93	75	90
VARIANCE	120	104	121	182	90	65	10	26	105	54

\*Behavioral self-control phases

behavior. Withdrawal of the procedure (baseline 2) resulted in a reverting to the baseline 1 level of on-task behavior and reinstatement (class contingency 3) resulted in a return of on-task behavior to its former class contingency 2 level. Thus far, the data in this study clearly replicate the findings of a number of similar studies of behavior modification in classrooms, (*e.g.*, Becker, Madsen, Arnold, and Thomas, 1967; Hall, Panyon, Rabon, and Broden, 1968; O'Leary and Becker, 1969; Glynn and Quinnell, 1970).

The effect of introducing the tape-recorded signals *per se*, (while still preserving externally administered reinforcement) seemed to be very slight. There was a small increase in mean level of on-task behavior from the class contingency 3 phase to the group contingency 1 phase (Table 1). The tape-recorded signals certainly cannot be considered as detrimental to the on-going high level of on-task behavior that was established in this class during class contingency 3.

Introduction of the behavioral self-control procedures produced a further slight increase in on-task behavior level (Table 1). Figure 1 shows that there was a definite decrease in level of on-task behavior level following withdrawal of the tape-recorded signals and the behavioral self-control procedures in baseline 3. There was a corresponding increase during their reinstatement in final experimental phase. The behavioral self-control procedures were able to maintain on-task behavior at the high level produced by the externally administered reinforce-

ment procedures, both during the 10-day phase immediately following the group contingency phase and during follow-up phases, five and seven weeks later.

#### *Accuracy of Self-Assessment, Self-Recording, and Self Determination of Reinforcement*

Data relevant to this aspect of the study are limited because of the difficulty of recording such behaviors. Forty-nine accuracy checks were made during five days of the behavioral self-control phase 1. In whole numbers, 76% were "R" or accurate and 24% were inaccurate, 15% being "+" where the pupil gave himself too much reinforcement and 9% being "-" where the pupil gave himself too little reinforcement. These checks suggest that on the majority of occasions that the children were observed they were accurate in their use of the treatment procedures.

Individual means of the percentage of reinforcement taken by the eight children for the entire behavioral self-control phase 1 are compared with the mean percentages of on-task behavior for the same period in Table 2. Over the 10 days, David tended to take too much reinforcement, Clifford and Billy took about the right amount of reinforcement while Robbie, Dean, Deborah, Wayne, and Chris took too little reinforcement. The general trend suggests that the children took too little reinforcement rather than too much. This was contrary to expectations that children would take too much reinforcement.

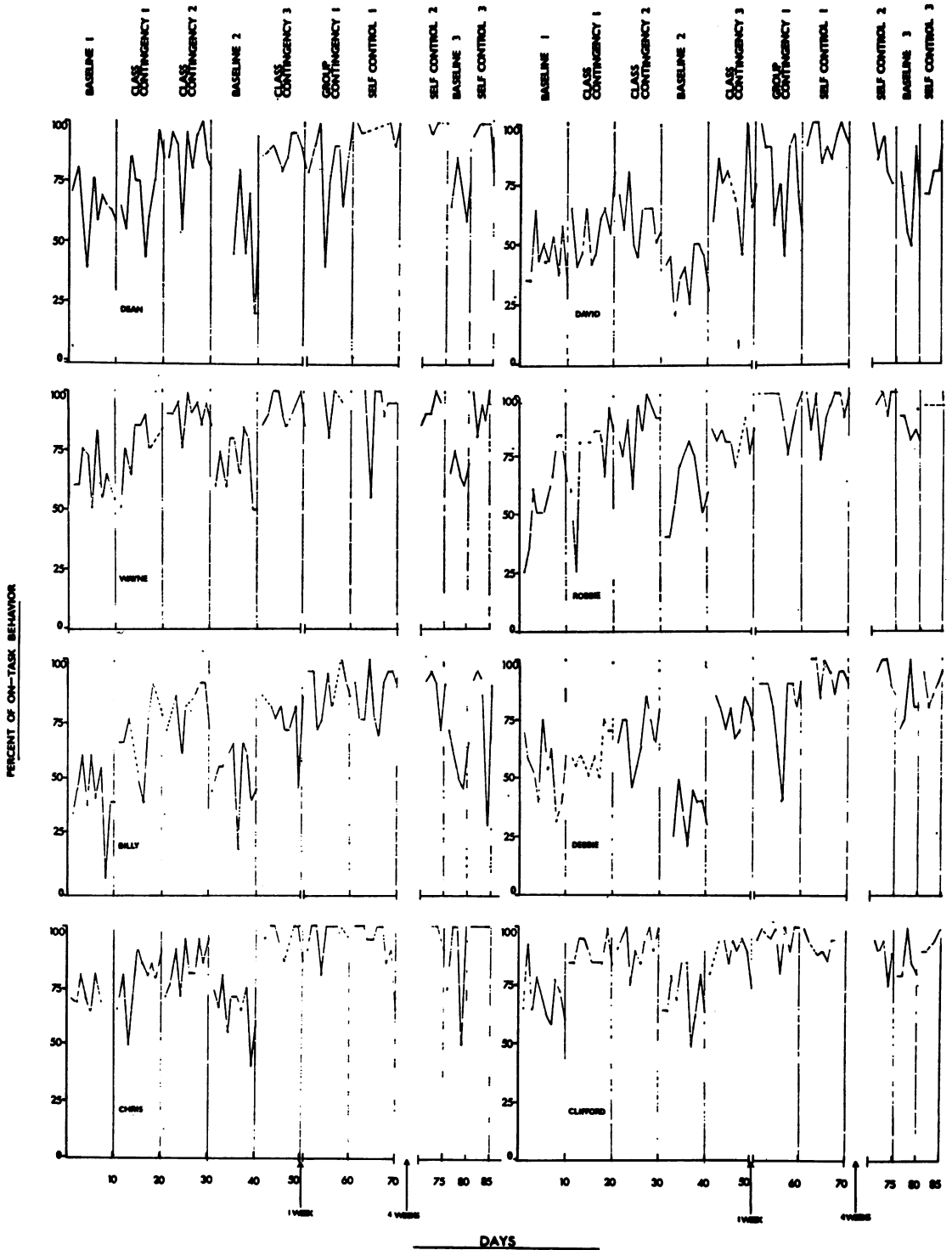


Fig. 2. Individual daily on-task behavior scores.

Table 2

Individual means of the percentages of reinforcement determined by children for behavioral self-control phase 1, compared with their mean percentages of observed on-task behavior.

	Name							
	David	Clifford	Billy	Robbie	Dean	Deborah	Wayne	Chris
Mean % of Reinforcement Determined	93	100	86	92	65	62	67	69
Mean % of On-Task Behavior	77	96	82	95	82	81	94	96

No formal observations were taken on the type of reinforcer that the children administered to themselves. However, the range of reinforcers was such that they appeared to the teacher and to the experimenters to function as positive reinforcers in all treatment phases of the experiment.

### DISCUSSION

The present study demonstrated that grade-two children could successfully use behavioral self-control procedures in a regular classroom setting to maintain high rates of on-task behavior that had been established by externally administered reinforcement procedures. Whether behavioral self-control would be as effective without the prior training under externally administered reinforcement conditions remains to be determined. Other studies conducted out of the classroom have suggested that the direct introduction of behavioral self-control can be as effective as the direct introduction of externally administered reinforcement. (Marston, 1967; Bandura and Perloff, 1967). However, these studies have been conducted in laboratory settings, and further classroom behavior analysis research is necessary if this issue is to be resolved.

Another point to bear in mind is that the change to behavioral self-control procedures in this study also involved a change to individual contingencies, from the previous class or group contingencies. This factor may have contributed to the success of the behavioral self-control procedures. The design of this study did not allow this hypothesis to be tested out.

An interesting result in this study was the re-

duction in variability of on-task behavior which occurred under the behavior self-control phases (Table 1). It leads to the hypothesis that behavioral self-control techniques may produce more stable rates of responding than do external reinforcement procedures and suggests a further avenue for research.

This study did not examine the children's accuracy of self-assessment, self-recording, and self-determination of reinforcement in detail. For this to be done, more comprehensive observation procedures need to be devised to enable a finer analysis of such behavior to take place. Had more experienced observers been available, the coding procedures that were used in the behavioral self-control 1 phase could have been fully implemented during all the behavioral self-control phases, thus providing more data. From informal experimenter observation it appeared that the accuracy of the children's behavior was sufficiently reinforced by the teacher's and the pupils' verbal comments to enable the procedures to function successfully. The fact that such reinforcers seemed to be necessary supports Broden, *et al.*, (1971) suggestion that self-recording procedures are more effective if they are used in conjunction with established reinforcement techniques. Other research has investigated such factors as prior learning (Kanfer and Marston, 1963) the influence of models (Bandura and Whalen, 1966; Bandura, Grusec, and Menlove, 1967; McMains and Liebert, 1968), the effects of rule structure and training method (Liebert, Honratty, and Hill, 1969) on the accuracy of self-assessment, self-recording, and self-determination of reinforcement, but



none of these studies has been conducted in classroom settings nor have they employed a functional analysis of behavior as a frame of reference.

In summary, it would appear that the behavioral self-control techniques employed in this study hold promise for the management of classroom behavior. They were inexpensive, they involved little teacher time and preparation, and they enabled the teacher to give more individual help and attention to her children. If the goal of having children's classroom behavior become relatively independent of teacher behavior is to be achieved, then all the component aspects of behavioral self-control need to be systematically investigated and researched.

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Received 1 March 1972.

(Revision requested 22 May 1972.)

(Revision requested 30 August 1972.)

(Final acceptance 18 September 1972.)