Reduction of Inappropriate Behavior of Two Public Grade School Students by Operant-Conditioning

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REDUCTION OF INAPPROPRIATE BEHAVIOR OF
TWO PUBLIC GRADE SCHOOL STUDENTS
BY OPERANT-CONDITIONING

by

Ronald Nederhoed

A Thesis
Submitted to the
Faculty of the School of Graduate
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Ronald Nederhoed
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INTRODUCTION

For as long as man has tried to control the behavior of his children, his efforts to do so have been limited only by his lack of imagination. More successful methods of control were obtained largely through a trial and error process. Mothers and teachers tried coercion, corporal punishment, threats, exhortation, harsh reprimands, confined isolation, and whatever else was available in their armamentarium to direct the behavior of children.

In addition to trial and error as a means of devising methods of control, deep roots into the past have had a significant effect on the choice of methods that teachers and parents have made. The writings of seventeenth century philosophers are still studied and continue to exert a recognizable influence on child care and training in the home and in the school.

Thompson (1952) used the example of John Locke who, writing in the seventeenth century, stressed the need for training directed toward the formation of new habits in the child and the concomitant need for curbing the child's supposed natural impulses. This approach to the training of children still exists in many sections of the American culture. Rousseau (1762), almost a century later, stressed an opposite point of view—that the child should be permitted freedom to express his "natural impulses", and, "to develop without restriction the abilities he was endowed with by nature." This "back to nature" movement proposed by Rousseau was later mani-
fested in the permissive "progressive education" approach of the 1930's. Rousseau (1762) wanted to avoid the punitive systems of his day, and planned to make the student dependent on things rather than people. Rousseau explained in detail how natural reinforcers might be used. He wanted to do away with man-made rewards as well as man-made punishment. Since he felt man is naturally happy and good, and that it is society which corrupts and makes him miserable, he felt man should be taught by nature. He advocated using only those forms of coercion or punishment which arise naturally from a student's behavior.

Although Rousseau soon had disciples, it was a century and a half later than John Dewey put similar ideas into widespread practice. Dewey (1938) reinstated Rousseau's principle by emphasizing real life experiences in the school room. Dewey showed how the child can be "brought into contact with the world he is to learn about—a world which he will explore, discover, observe, and remember because it is attractive, intriguing, and naturally rewarding and punishing." However, as Skinner (1968) pointed out, not all natural reinforcers are useful. In addition, unfortunately, the teacher who confines himself to natural reinforcers "is often ineffective, particularly because only certain subjects can be taught through their use, and he eventually falls back on some form of punishment or aversive control" (Skinner, 1968).

Corporal punishment has always played an important role in education, from ancient times to the present (Skinner, 1968). The aversiveness of corporal punishment and the resulting effect on both
teacher and student have led to reform, but this has meant little more than shifting to noncorporal measures. As Skinner (1968) points out, "ridicule, scolding, sarcasm, criticism, incarceration, extra school or home work, the withdrawal of privileges, forced labor, ostracism, being put on silence, and fines—these are some of the devices which allow sparing the rod without spoiling the child."

Although somewhat less objectionable than corporal punishment, the pattern remains the same: the student spends a great part of his day within a classroom that utilized aversive control techniques much of the time.

The student who works mainly to escape or avoid aversive stimulation discovers many ways of escaping, such as tardiness, truancy, or dropping out of school altogether. Subtler forms of escape are inattention, hysterical deafness and daydreams. An equally serious result which an experimental analysis of behavior leads us to suspect is that students may counterattack (Skinner, 1968). This counterattack may be in the form of impertinence, impudence, rudeness, defiance, or physical attacks on the teacher. On the other hand, the student may be sullen, stubborn, and unresponsive. As Skinner indicates, "fear and anxiety are characteristic emotional accompaniments of escape and avoidance, anger of counterattack, and resentment of sullen inaction." These are the classical features of juvenile delinquency, of psychosomatic illness, and other maladjustments familiar to many educators.

Although Rousseau and Dewey were sensitive to these difficulties, they were left to philosophical speculation in attempting
to resolve them. Their writings did stimulate interest in the behavior of children and pointed to the drawbacks of controlling children's behavior through the use of punishment. Dewey attacked aversive educational practices and advocated positive and humane methods. However, Skinner (1965) believes that Dewey provided few positive alternatives to what he rejected. But, this area was gradually investigated by other disciplines. In the nineteenth century, the work of Darwin (1920) on the principles of natural evolution focused scientists' interests on human development.

I. P. Pavlov's laboratory and writing (1941) gave birth to behavior control as a science with the discovery of the conditioned reflex. He demonstrated that, through experimental manipulation, predictable relationships could be established between behavioral changes in an organism and changes in its environment, and that behavior could be controlled by appropriate control of the environment.

One of the first serious attempts to study the changes brought about by the consequences of behavior was made by E. L. Thorndike in 1898. Thorndike documented the fact that behavior is stamped in when followed by certain consequences and termed it "The Law of Effect" (Thorndike, 1911). What he was observing was the probability of a certain behavior in a particular situation.

B. F. Skinner saw Thorndike's "stamping in" as follows: "If we make a given consequence contingent upon certain physical properties of behavior, the behavior is then observed to increase in frequency" (Skinner, 1953). Skinner saw this behavior as belonging to a class of responses known as "operants" and labeled the process
"operant conditioning". He demonstrated that "operant techniques can improve the efficiency of behavior and maintain behavior in strength long after acquisition or efficiency has ceased to be of interest." Based on these developments, a conceptual and methodological system has been evolving for developing and testing methods of control. As Ulrich, Stachnik, and Mabry (1966) point out in their introduction: "this control is simply the manipulation of an organism's environmental conditions to produce new behavior, to maintain or change the organism's tendency to engage in current behavior, or to decrease or eliminate past behavior."

In the past several decades, we have observed the expansion and implementation of this behavioral approach, first with infrahuman subjects, and, more recently, with human subjects. The studies with animals have demonstrated that behavior can be modified and redirected. For example, a recent study by Ferster (1958) demonstrated positive control of the behavior of chimpanzees and pigeons by employing "time out from reinforcement" designs. Skinner's work (1938, 1953, 1957, 1961, 1963, and 1968) provides further illustrations of the laws of behavior which have been derived through careful experimental analysis.

The behavior modification techniques as discussed by Verhave (1966), Lovass (1966), Michael and Meyerson (1965), Ullmann and Krasner (1966), and Ulrich, Stachnik, and Mabry (1966) point out that behavior can be controlled by a careful and systematic manipulation of its environmental consequences. What this means with regard to man and his efforts to control his children and others is that the
application of the principles of behavior modification enables him to be more efficient and effective in his efforts. In other words, his frustrating and fruitless attempts at disciplining his children may very well be due to his ineffectual use of the reinforcing agent. In fact, he may well be reinforcing or increasing the probability of the undesired behavior.

In this regard, recent works of Ullmann and Krasner (1965), Krasner and Ullmann (1965), Ulrich and Stachnik (1965), Ulrich, Stachnik, and Mabry (1966), and Ulrich, Wolfe, and Bluhm (1968) have suggested the wide appliability of behavior modification techniques not only with animals, but with human subjects in various settings. For example, the use of these principles has been aptly demonstrated by Quay, Werry, McQueen and Sprague (1966), Whelan and Haring (1966), and Zimmerman and Zimmerman (1962) in working with exceptional children in special education classes. Ferster and DeMyer's (1961) study of autistic children, Brady and Lind's (1961) treatment of functional blindness, and Ayllon and Haughton's (1962) work with psychotic patients are further examples of the wide use made of behavior modification techniques.

Although the direction of the application of behavior modification principles is diverse, an area of increasing concern is the use of these principles in the educational setting. Baer (1961), for example, investigated the effect of negative reinforcement versus punishment with children in an experimental setting. He concluded that punishment (withdrawal of positive reinforcement) is more effective than the use of negative reinforcement. Harris, Johnston,
Kelly, and Wolf (1964) demonstrated the use of positive reinforcement to modify regressed crawling behavior which was exhibited by a nursery school child. Furthermore, the results of this study showed that in addition to the behavior specifically controlled, "normal" behaviors in other areas developed. Kounin, Friesen, and Norton (1966) directed their efforts toward discovering techniques that teachers could utilize to manage the overt behavior of emotionally disturbed children in regular classrooms. Their study indicated that the dimensions of concrete teaching techniques can be delineated to make a difference in children's behavior in the classroom, which suggests implications for nondisturbed children as well.

Quay, Werry, McQueen, and Sprague (1966) trained five children to visually attend to a teacher. In the same study, candy and token reinforcement for correct responses to individual instruction were used with another child who displayed deficient academic skills. The authors suggested the application of behavior modification techniques to conduct problems in regular public school classrooms. Ulrich, Wolfe, and Bluhm (1968) maintain that the regular classroom is an appropriate situation in which to modify undesirable behaviors. Recent studies lend support to this view. Hall, Lund, and Jackson (1968) demonstrated that teachers can reliably modify the study behavior of poverty-area classroom students by systematic manipulation of contingent attention. Schmidt and Ulrich (1968) indicated that the level of classroom sounds as well as out-of-seat behavior in an elementary school classroom can be modified by manipulating contingencies on a group basis. Surratt, Ulrich, and Hawkins (1968)
demonstrated how the "maladaptive behaviors of individuals or small groups of students can be modified within the regular school classroom utilizing another student as the behavioral engineer."

Certainly there is a need to further investigate the feasibility of the use of behavior modification techniques with normal children in regular educational settings. It was toward this end that the present study was directed. The purpose of the present study was to apply the principles of operant conditioning to the alteration of inappropriate displayed by students in a normal classroom.

Extensive research has shown that when positive reinforcement is made contingent upon a class of behaviors, the probability of that class of behaviors is significantly increased (Skinner, 1938, 1953, 1957, 1968; Ullmann and Krasner, 1965; Krasner and Ullmann, 1965; Ulrich, Stachnik, and Mabry, 1966). In addition, the same research amply demonstrated that the withdrawal of positive reinforcement serves as effective punishment for behavior. Punishment in the form of a "time out" procedure has been effectively used to eliminate inappropriate responses (Ferster and Appel, 1961; Zimmerman and Baydan, 1963; Zimmerman and Ferster, 1963).

Weiner (1962) employed a "response cost" form of punishment and found it had a greater reduction effect than is usually achieved with a time-out procedure. Azrin and Holz (1966) point out that response cost appears to be a punishing stimulus that has a great effect on human responses, and "provides an excellent opportunity for studying concurrent reinforcement and punishment." This procedure appeared well suited to investigation in the school classroom. In
the present study, response cost was analyzed experimentally in the following manner: Students earned extra gym-recess time for specified periods of appropriate behavior, but lost a portion of gym-recess time for intervals of inappropriate behavior. It was hypothesized that employing these contingencies concurrently would lead to an increase in the amount of appropriate behavior. Since all behavior was defined as either appropriate or inappropriate, the hypothesized increase in appropriate behavior would mean a proportionate decrease in inappropriate behavior.

METHOD

Subjects

Two seven year old boys enrolled in a regular second grade class at the Indian Lake Elementary School of Vicksburg, Michigan, served as subjects. Neither had failed a grade, but the two were judged by their teacher to be the most disruptive children in the class.

Dick was reported to be the most troublesome student. He annoyed his neighbors, interrupted class discussions with loud comments, spent little time on his class assignments, and turned in work that was poor in quality. The teacher reported he had alienated the rest of the class with such childish behavior as thumbsucking, sprawling across desks, and loud, inappropriate giggling. For the most part, he ignored the teacher's attempts at discipline.

Because of his many difficulties, Dick was examined by the school psychologist, who concluded that he had "perceptual diffi-
culties," but nothing further was done during this study.

Bill got along well with the rest of the class and his behavior was generally considered more appropriate than Dick's. He did, however, emit behaviors which were inappropriate and disruptive to the class activities. The teacher reported that he made frequent disturbances, bothered individuals near him, ignored the teacher's directions or obeyed them only reluctantly, roamed around the room, and talked during the periods when he should have worked.

Repeated attempts by the teacher to eliminate these inappropriate behaviors displayed by these two students met with little success. Classroom observation suggested that some attempts by the teacher to reprimand them might actually be reinforcing the undesirable behaviors. The inappropriate behaviors were occurring at high rates, and recent studies (for example, Hall, Lund, and Jackson, 1968; Madsen, Becker, Thomas, Koser, and Plager, 1968) have shown how important teacher-attention contingencies can be in maintaining classroom behavior.

Apparatus

The study was conducted in a typical public school classroom equipped with desks and facilities for thirty-one students and one teacher. The observer's equipment consisted of a watch with a sweep second hand and a clipboard with a recording matrix not unlike that of Hall, Lund, and Jackson (1968), which indicated appropriate or inappropriate behavior in ten-second intervals.
Procedure

Sessions were conducted each weekday morning between the hours of 9:00 and 11:00. The teacher began each session by instructing the class in that day's assignments. The remainder of the time, the teacher conducted a small reading group in one corner of the room and the remaining students in the classroom were assigned work in writing, arithmetic, and reading to be completed individually at their desks.

Agreement as to what behavior would be labeled inappropriate was obtained by consultation between teacher and experimenter. Inappropriate behavior was recorded and operationally defined as any of the following: talking, shouting, standing, walking, running, playing, laying across a desk, poking or shoving a neighbor, and making noise. The only exception was if the student had prior approval from the teacher or was responding to a direct request from her (for example, the student was allowed to leave his seat to get additional writing paper or to sharpen a pencil). If the student was not engaged in appropriate behavior as defined above, his behavior was defined and recorded as appropriate.

The method used for recording behavior was a modification of that used by Hawkins, McArthur, Rinaldi, Gray, and Schaftenaar (1967). This technique consisted of holding a watch with a sweep second hand and recording, for each consecutive ten-second interval, the behavior of each subject according to the predetermined categories. The watch ran continuously throughout the session. If any fraction of an interval contained inappropriate behavior, the whole
interval was considered an interval of inappropriate behavior. Thus, in sixty seconds, the behavior defined as inappropriate could be recorded as having occurred as many as six times. The percent of intervals of inappropriate behavior for each session was obtained by dividing the total number of intervals of inappropriate behavior by the total number of intervals possible for that session and multiplying the result by one hundred.

As Hawkins (et al, 1967) pointed out, one advantage of this technique is that it can be used in recording any type of behavior that cannot easily or meaningfully be divided into discrete responses, such as being out of the seat, talking, or lying across a desk. As the above authors point out, a second advantage of this technique is that many different behaviors can be recorded at the same time by one observer. All recording was done in this manner.

For several days prior to the first session, the observer used the above technique to record the behavior of a student in another classroom to become familiar with the recording procedure.

The study was conducted in four phases which will be discussed in order. During the Baseline Phase, the observer collected baseline data to determine the number of intervals during which inappropriate behavior occurred for each subject. Each subject sat a short distance from the observer.

Preliminary to the Baseline Phase, a knowledge-of-results procedure was given two trials with Dick. This procedure was discarded because it proved to be too cumbersome and impractical for the observer. Therefore, at the beginning of the first session, a
simplified approach was used. A sheet of paper was taped to the top left-hand corner of each subject's desk which listed the following behaviors: talking, shouting, standing, walking, running, playing, poking, shoving, laying, and making noise. They were also told the following:

Starting today, the amount of time you can spend in gym-recess each day depends on how you behave in class that day. You are to do as the teacher tells you. If you do, you can earn extra gym time. If you do any of the things on the list without the teacher's permission, you may lose gym time. If you are doing what you are supposed to be doing, you will get a plus on the paper at the end of every five minutes and will get an extra minute of gym time. Each time you do something on the list without permission, you will get a check mark and will lose a minute. Any questions?

Each day during Experimental Phase 1 a sheet containing the list of behaviors was taped to each subject's desk and the above instructions were repeated. No other comments were made to the subjects during the sessions. The sheet of paper was used to record the pluses and checks for each subject. Each time a subject displayed any inappropriate behavior, the observer immediately went to that subject's desk and placed a check mark on the sheet provided. The observer's watch remained running, which meant that recording time was lost during the placing of a mark on a subject's paper. However, this task was accomplished in less than ten seconds. If a subject's behavior met the "appropriate" criterion for any continuous five minute period (no intervening inappropriate intervals), the observer immediately got up and placed a plus mark on the subject's sheet. A subject would receive only one check mark per interval. Thus, if he received a check at the beginning of an interval for
talking, he would receive no more check marks during that interval, even though he might leave his seat and poke his neighbor within the same interval.

Normal gym-recess time allowed was fifteen minutes. Therefore, if a subject showed no inappropriate behavior whatsoever during the two-hour session, he would gain an extra twenty-four minutes of gym time. If a subject were unable to maintain any continuous five minute periods of appropriate behavior, but had twenty four intervals of inappropriate behavior, he would lose all of his gym-recess time. At the end of each session, the number of checks was subtracted from the number of pluses, and each subject was told whether he had earned or lost gym-recess time and, if any, how much. If subtraction yielded a minus figure, that number of minutes was taken away from the subject's gym-recess time, but if it were greater than fifteen, he simply lost all of it (there was no other penalty involved).

Prior to the first session of the Reversal Phase, no lists were given, nor were any instructions given. The subjects were told that the previous conditions were no longer in effect. At the scheduled time, the observer would enter the classroom, walk directly to a chair in the rear corner of the room, sit down, and begin recording. The observer again sat near the subjects, but attempted to look as if he were observing all the children without selection. He was unresponsive to everyone in the classroom, and tried to remain as unanimated and inconspicuous as possible.

Prior to the first session of Experimental Phase 2, a sheet like that used in Experimental Phase 1 was again taped to each subject's
desk and the same instructions as before were given. Checks and pluses were likewise again made contingent upon the subjects' behavior, with gym-recess time determined as in the previous Experimental Phase. Each session the subjects received sheets and instructions; after each session, they found out how they had done.

Reliability

Reliability checks were conducted during the Baseline Phase, Experimental Phase 1, and Experimental Phase 2 on both subjects (one session in each phase). Reliability was checked by having two observers independently record each subject's behavior according to the criterion outline above. All observers were people involved in recording behavior in a similar manner in other on-going studies and were, therefore, already familiar with and experienced with using the technique. The number of intervals of inappropriate behavior recorded by one observer was divided by the number recorded by another observer, the smaller being divided by the larger. This result multiplied by one hundred yielded an index of reliability referred to by Hawkins et al, (1967) as "percent agreement". The last check was made on Dick, while the others were made on both subjects. The checks yielded an average of 96% agreement, with a range from 87% to 98%.

RESULTS

The data for all phases of the experiments are presented in the graphs for each subject. Each point on the graphs represents the percentage of intervals of inappropriate behavior displayed by each
FIGURE 1. Percent of intervals of inappropriate behavior for Dick for each session.
FIGURE 2. Percent of intervals of inappropriate behavior for Bill for each session.
subject during one day's session. The Baseline Phase of each graph represents the data collected before the reinforcement contingencies were instituted. Experimental Phase 1 indicates the application of the reinforcement contingencies. The Reversal Phase is the return to noncontingent baseline conditions. Experimental Phase 2 is the reinstatement of reinforcement conditions, as in Experimental Phase 1.

Evidence of the degree of reduction in percentage of intervals of inappropriate behavior is readily observed by comparison of the percentages of intervals of inappropriate behavior in the Baseline Phase, Experimental Phase 1, the Reversal Phase, and Experimental Phase 2 for both subjects.

The Baseline Phase for both subjects indicates a high percentage of inappropriate behavior for students in a public school classroom during regular activities. For Dick, the average percentage of intervals of inappropriate behavior during the Baseline Phase was 49%, with a range from 64% to 37%. At the onset of Experimental Phase 1, when gym-recess time was made contingent upon the intervals of inappropriate behavior, there was an immediate drop in percentage to 5% for the first session. The average percentage of intervals of inappropriate behavior for Experimental Phase 1 was 2.6%, with a range from 7.8% to 0.0%.

For Bill, the average percentage of intervals of inappropriate behavior during the Baseline Phase was 43%, with a range from 61% to 30%. Bill also showed at the onset of Experimental Phase 1 a drop in percentage, to 11% for the first session. The average percentage...
of intervals of inappropriate behavior for Bill in Experimental Phase 1 was 2.2%, with a range from 11% to 0.0%.

At the onset of the Reversal Phase, during which there was a return to baseline conditions, there was an immediate increase in percentage of intervals of inappropriate behavior for both subjects: Dick went from 0.2% in the last Experimental Phase to 35% for the first Reversal Phase session; Bill went from 0.0% to 13% for the same sessions. The average percentage of intervals of inappropriate behavior for Dick during the Reversal Phase was 44.6%, with a range from 66% to 35%; for Bill, 32.6%, with a range from 56% to 13%.

The first session of Experimental Phase 2 shows an immediate drop in the percentage of intervals of inappropriate behavior from the last Reversal Phase session for each subject. Dick went from 45% to 5.5%, while Bill went from 35% to 1.3%. This decrease was maintained by both subjects during Experimental Phase 2. Dick's average percentage of intervals of inappropriate behavior was 0.9%, with a range from 5.5% to 0.0%; Bill's average was 0.5%, with a range from 1.3% to 0.0%. All of the shifts in percentages of intervals of inappropriate behavior from one phase to the next were immediate with no apparent transition or gradual change in the percentages.

Along with the primary effect of the reduction of inappropriate behavior, there were several other interesting effects on each subject that were noted by both the teacher and the observer. As indicated previously, the teacher had reported that Dick engaged in a number of behaviors judged to be immature, such as thumbsucking, which appeared to alienate the other students. Most of these be-
haviors, which occurred frequently during the Baseline Phase, dropped out completely or were seen only on rare occasions during the remainder of the study even though they were not operationally defined as inappropriate—even during the Reversal Phase. The teacher also reported that Dick turned in more work and that the work he turned in improved in quality.

With Bill, too, interesting effects were noted in addition to the primary effect already mentioned. In Bill's case, this was primarily in regard to his class work. He, as Dick, was noted to turn in more work which in addition was of a better quality, according to the teacher. It was not possible to study any possible generalizations of the effects reported here because the school year ended at the conclusion of this study. The teacher did frequently report that the reduction in inappropriate behavior appeared to be maintained following a session.

DISCUSSION

This study clearly suggests that the inappropriate behavior of students can be modified within the regular school classroom utilizing an operant design that employs a combination of positive reinforcement and punishment contingencies. Research in operant conditioning has raised many questions concerning the use of punishment contingencies because of the diverse effects it may have on the subject (Azrin and Holz, 1966). More specifically, many writers have in the past questioned both the effectiveness and safety of making punishment contingent upon inappropriate behavior, (Estes,
1944; Sears, 1957). However, recent research has increasingly demonstrated that punishment can be used effectively to modify behavior without generating undesirable side effects (Risley, 1968).

Many writers have suggested that attending to inappropriate behavior may reinforce that behavior even though the withdrawal of positive reinforcement is also contingent upon it (Madsen, Becker, and Thomas, 1968; Hall, Lund, and Jackson, 1968; Zeilberger, Sampen, and Sloane, 1968). For example, the attending behavior of a teacher who is reprimanding a student may exert more control than the accompanying punishment. That teacher, then, would unintentionally be maintaining the deviant behavior of the student. One might suspect, then, the observer's attending to inappropriate behavior (giving check marks) in this study might reinforce this behavior. However, in the present study, the effects of the experimenter's actions contingent upon inappropriate behavior clearly did not reinforce that behavior, as there was a consistent decrease in inappropriate behavior for both subjects.

One possible reason why this attending was not reinforcing is that the experimenter was a relatively neutral, unanimated agent without a long conditioning history with these pupils. Teacher attending behavior may be reinforcing because of a history of interaction with a student.

One of the most interesting features of the present study is the percent of intervals of inappropriate behavior found in the first session of each phase for both subjects, beginning with the first experimental phase. The percentage of each subject dropped immedi-
ately in the first session of Experimental Phase 1 even though they had not yet been reinforced. Likewise, the first session for each subject in the Reversal Phase shows an immediate change. Both percentages increased even though they had not yet had a session without reinforcement. In the first session of Experimental Phase 2, both subjects showed an immediate decrease in intervals of inappropriate behavior even though they had not been reinforced throughout the entire previous session. It would appear that these shifts represent a strong responding to instructions given by the observer.

It will also be noted that, with the exception of the first session, the percentages of intervals of inappropriate behavior in Experimental Phase 2 are all low and consistent. Even though low, the percentages during Experimental Phase 1 show considerable variation. These differences suggest that in Experimental Phase 1 the subjects were testing their environment, while less of this occurred in Experimental Phase 2 due to their having a longer conditioning history.

A study by Surratt, Ulrich, and Hawkins (1968) demonstrated that when tight control over the elimination of students' behavior is obtained by utilizing a differential-reinforcement-of-other-behavior procedure (instead of an extinction reversal), changes in behavior are consistent. In the present study, the students' behavior was subject to random, intermittent reinforcement variables during Reversal, and the data shows fluctuation.

Risley (1968) demonstrated that punishment can be used to modify a child's behavior without generating undesirable side effects.
or suppressing desired behaviors. The present study supports this view. For both subjects, inappropriate behaviors were decreased within a short period of time, with no indication of any undesirable effects. Other interesting behavioral changes did accompany the decrease in inappropriate behaviors, but all were considered desirable.

The present study also suggests that there are serious limitations to an approach which utilizes operant techniques to control behavior in the classroom without integrating it more directly with the teaching being done. To begin with, it is impractical to use a full-time person to monitor and selectively reinforce the behavior of only a few students in the class. Surratt, et al (1968) demonstrated that an approach can be devised that utilizes students to monitor and modify the behavior of other students. An alternate means might allow the teacher to deal with the class as a whole.

These results, then, suggest that as means are devised which allow the teacher to employ operant techniques to the class as a whole, the efficiency and effectiveness of classroom teaching will be greatly enhanced.
FOOTNOTES

1 This study is part of a comprehensive program which was undertaken at Indian Lake Elementary School, a modern facility in a rural setting in southwestern Michigan. This program was directed by Roger E. Ulrich, Ph.D., of Western Michigan University's Department of Psychology, and was designed to accomplish three interrelated goals. One of the program's goals was to provide the school's faculty with a background in the science of behavior control and a knowledge of the techniques currently available. This was accomplished by classes offered through the Psychology Department. A second goal was the demonstration of the feasibility and usefulness of applying these principles and techniques to varied areas in the educational setting. The third goal, studying what method could be devised and evaluating their effectiveness, was aided by frequent discussion meetings. In addition, meetings were held with parent groups to acquaint them with what was taking place in the school.

2 and 3 Names are fictitious.

4 Dick was given a sheet on which there was a list of the inappropriate behaviors and a graph showing percent of intervals recorded as inappropriate for two sessions. A heavy crayon line crossed at the 40% level. The subject was told that the dots on the graph meant he was doing things listed on the graph and that these were things he should not be doing during study time. He was further told that the fewer times he did them the lower dot would be on the graph, and that
he would receive extra gym time for every time that the dot went on
the graph every five minutes to let him know how he was doing (the
observer had to calculate the percentage of intervals of inappropri-
ate behavior every five minutes.
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