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THE EFFECTIVENESS OF GROUP VERSUS INDIVIDUAL REINFORCEMENT IN SHAPING ATTENTIVE CLASSROOM BEHAVIOR

by
Barbara Sympson Prentice

A Dissertation Submitted to the Faculty of the DEPARTMENT OF SPECIAL EDUCATION
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I hereby recommend that this dissertation prepared under my direction by Barbara Sympson Prentice entitled THE EFFECTIVENESS OF GROUP VERSUS INDIVIDUAL REINFORCEMENT IN SHAPING ATTENTIVE CLASSROOM BEHAVIOR be accepted as fulfilling the dissertation requirement of the degree of Doctor of Philosophy.

[Signature]
Dissertation Director

[Signature]
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SIGNED: Barbara Simpson Prentice
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ABSTRACT

Problem

This study was conducted to determine the difference, if any, in the effectiveness of individual reinforcement (A) or group reinforcement (B) in shaping attentive classroom behaviors. The study also sought to determine whether the order of the experimental trials, AB or BA, influenced the reinforcement methods.

Subjects

Public school children in twelve regular classrooms, ranging in chronological age from 5 years 3 months to 13 years 3 months (median age 8 years 5 months) were the subjects in this study. Divided into two groups of six classrooms, the groups were identified AB and BA according to the order in which the experimental trials were presented.

Procedure

To determine the effect of the order and the magnitude of each treatment, classes within each group were used as their own controls. Inappropriate behaviors were recorded for a predetermined daily half-hour time period, during which the children were required by their assigned tasks to be seat-bound or attentive to either teacher or peer presentations. A behavior modification program was initiated during
the experimental conditions, two and four, utilizing sweet and non-sweet edibles as positive reinforcers. Each group was recorded over the four following conditions:

1. **Baseline** (week one): Frequency of inappropriate behaviors was recorded.

2. **Experiment I** (week two): Procedures were initiated: individual reinforcement (A) for the AB Group and group reinforcement (B) for the BA Group. The inappropriate behaviors were recorded.

3. **Reversal** (weeks three and four): The experimental conditions were terminated. Inappropriate behaviors were recorded for five days: two days during the first week and three days during the second.

4. **Experiment II** (week five): Group reinforcement (B) was applied with the AB Group, and individual reinforcement (A) with the BA Group. Inappropriate behaviors were recorded.

**Results**

A two-way analysis of variance over the four conditions revealed no significant difference in the effectiveness of individual reinforcement (A) or group reinforcement (B) in shaping attentive classroom behaviors. The analysis also indicated no significant effect in the order of the experimental trials.
The individual and group reinforcement paradigms sharply reduced inappropriate classroom behaviors, and effectively shaped attentive behaviors at the $p < .0001$ level of significance.

**Conclusions**

The study supports the assumption that behavior modification procedures may be applied successfully to classroom groups of average size ranging from kindergarten through grade six. Analysis and interpretation of the data further suggest that group reinforcement may be preferable to individual reinforcement since it is as effective as a system of individual rewards and is more easily managed by a classroom teacher.
Introduction to the Study

In the early sixties, psychological research was concentrated on employing behavior modification principles as adapted from the work of Skinner (1953) to reduce the frequency of inappropriate or deviant behavior of individuals. The effectiveness of such research paradigms has been established and numerous successful case studies are documented (Baer, 1962; Krasner and Ullman, 1965; Patterson, 1965; Patterson et al., 1968; Ullman and Krasner, 1965; Williams, 1959; Wolf, Risley, and Mees, 1964).

Recent programs and research have examined the efficacy of using behavior modification technology to shape the behavior of groups (Becker et al., 1967; Cohen, Filipczak, and Bis, 1966; Hewett, 1966; Kounin, Friesen, and Norton, 1966; Nolen, Kunzelman, and Haring, 1967; O'Leary and Becker, 1967; Quay et al., 1966; Patterson, Shaw, and Ebner, 1969; Valett, 1966). The treatments have been applied with varying degrees of success in institutional settings, counseling sessions, special and regular classrooms.

In the regular classroom the number of exceptional children requiring special services "are overwhelming in
proportion to the availability of special education teachers, counselors and psychologists" (Leshin, 1967, p. 3). Therefore, promising methods such as group behavior modification, which expand services without increasing personnel, merit further research and evaluation.

Kounin et al. (1966) have implied that behavioral management techniques could be taught to classroom teachers, and that inclusion of such training would strengthen teacher education programs. Glavin and Quay (1969) support this view and further note "the research also suggested that with these techniques the disturbed child could often be managed in the regular, as well as the special class" (p. 97).

Due to conflicting evidence concerning the efficacy of special class placement for emotionally disturbed children (Rubin, Simson, and Betwee, 1966), the behavioral models for maintaining such children in the regular classroom should be tested. The experimenter, an itinerant special education teacher, assisted regular classroom teachers in keeping behaviorally disturbed children in the regular classroom. For this purpose behavior modification proved to be a useful tool.

Possibilities for increased application of group behavior modification necessitates further refining of the technology. The goal of this research is twofold: (1) to expand the knowledge concerning methodology used in shaping
behavior in regular classrooms; and (2) to examine and contrast two contingency systems.

Statement of the Problem

This study was conducted to determine the difference, if any, in the effectiveness of individual reinforcement or group reinforcement in shaping attentive classroom behaviors. The study also sought to examine the effects of the order of the experimental trials on the two treatment methods.

No attempt was made to test the effects of various classes of reinforcers. An assumption based on prior experience acknowledged that edible rewards, including sweet and non-sweet choices, and tokens redeemable for bubble gum, were positive reinforcers.

Questions

These specific questions were studied:

1. Can the effectiveness of behavior modification be demonstrated in regular classrooms of average size?

2. Is there a difference in the effectiveness of individual and group reinforcement in shaping attentive classroom behaviors?

3. Will changing the order of presentation of the experimental trials, individual or group reinforcement, affect the results?
4. Will the age of the children within the classrooms be a variable influencing the success of individual or group reinforcement procedures?

Hypotheses

The following null hypotheses were formulated:

1. No significant differences exist between individual rewards (Experiment A) and group rewards (Experiment B) in shaping attentive classroom behavior.

2. No significant difference exists between individual rewards (Experiment A) and group rewards (Experiment B) when the order of presentation is reversed.

3. No significant difference exists between conditions for the AB Group and BA Group in this study.

Statistical procedures utilized will be described in Chapter III.

Significance of the Study

An efficient method for dealing with disruptive classroom behavior needs to be developed. Recent behavioral research has focused on this problem. "The group applications of behavior technology have demonstrated stimulus control of classroom behavior and have effected impressive
changes in behavior within brief periods of time" (Walker, Mattson, and Buckley, 1969, p. 50).

In most applied research, individual reinforcement has been emphasized, requiring additional personnel to accurately observe and record behavior. The expense of additional personnel may prohibit implementation of such programs in regular classrooms. Group recording is efficient without additional personnel, and the entire process is more easily managed than individual reinforcement in the natural environment.

This study was designed specifically to compare the effectiveness of group reinforcement procedures with individual reinforcement procedures. It was found that both systems sharply and rapidly reduced inappropriate classroom behaviors. Since the group reinforcement method is more manageable and less expensive to implement than individual reinforcement methods, it merits further research and development.

**Definition of Terms**

For the purposes of this study the following terms are defined:

1. **Baseline**: A frequency average of a specific class of behaviors, recorded during the same time period for several days during which no experimental conditions were effected.
2. **Behavior modification**: The application of the results of learning theory and experimental psychology to the problem of altering maladaptive behavior (Ullman and Krasner, 1965).

3. **Conditions**: The four time periods described in Chapter III, incorporated into the design of this study.

4. **Group reward**: Positive reinforcement for the entire group contingent upon behavior of the entire experimental group.

5. **Individual reward**: Positive reinforcement for the individual contingent upon his behavior within the experimental group.

6. **Inappropriate behavior**: Behavior termed not proper for the classroom and coded for the purpose of this study (Appendix A).

7. **Intra-class analysis**: Repeated observation of the same class during different experimental conditions; the class is used as its own control (Patterson et al., 1969).

8. **Positive reinforcers**: Those classes of stimuli which upon presentation strengthen the behavior that they follow (Bijou and Sturges, 1959).

9. **Reversal**: A time of non-reinforcement, and the third condition in this study.
Summary

Successful use of behavior modification in shaping individuals' behavior has been demonstrated and documented in the psychological literature. The focus of more recent work has been to adapt the method and employ the technology with groups. This latter technique is more practical for use in the real environment where controls found in laboratory situations cannot be duplicated.

A growing body of research suggests that behavioral models for group treatment could be constructed and implemented by regular school personnel. In this way expanded services could be offered to additional numbers of exceptional children, particularly the behaviorally disturbed.

The main focus of this study was to examine and contrast the effectiveness of group and individual reinforcement systems. An attempt was made to determine whether either technique was more feasible for future research and application in regular classrooms.
CHAPTER II

REVIEW OF THE LITERATURE

Introduction

While the bulk of literature concerning behavior modification has described successful application with individuals, more recent reports have documented the positive aspects of employing group technology. This review of literature will first give a brief overview of books and review articles describing behavior modification. Next, the two broad areas of research will be covered in the following order: (1) summaries and reviews of behavior modification; (2) behavior modification with individuals as reported by individual case studies; and (3) behavior modification with groups including classroom groups as described by project and program reports.

Summaries and Reviews

During the last decade there has been an increase in the number of studies and programs which incorporate behavior modification principles as adapted from the work of Skinner (1953). Ullman and Krasner (1965) in a book of case studies commented:

We had read with eagerness and made some experimental contributions to the body of literature on behavior modification that grew rapidly after
the Second World War and that was beginning to be transferred from rodents and college sophomores to the clinic, the nursery school, and the psychiatric clinic. In this material the theories of Hull and Skinner were being applied with increasing usefulness to the sort of problems clinical psychologists sought to deal with in psychotherapy. A group of techniques developed . . . (p. v)

The contribution of animal research is acknowledged and basic techniques have evolved from laboratory research to clinic and institutions (Fuller, 1949; Lindsley, 1959; Hutchinson and Azrin, 1961). Emphasis will be given to the application of the methodology devised through the reciprocal efforts of laboratories and clinics. Krasner and Ullman (1965) remarked:

In the future this trend is likely to be accelerated by an increase in the number of investigators in this area coupled with more psychologists actively interested in applying the results of these experimental investigations (p. 358).

In addition to the focus on research and application of behavior modification principles in the two volumes by Ullman and Krasner (1965; Krasner and Ullman, 1965), there have been review articles by Bandura (1961) and Grossberg (1964). A collection of papers from various disciplines edited by Ulrich, Stachnik, and Mabry (1966) further extended the discussion relative to behavioral control. Bijou and Baer have written extensively and three volumes in particular provide detailed description of the behavioral methodology (1961, 1965, 1967).
A comprehensive book by Bandura (1969) included exhaustive reference to social learning and behavioral research, giving "special emphasis to the important roles played by vicarious, symbolic, and self-regulatory processes" (p. v). This text also included a chapter on value issues. Collections of readings and papers in four recent publications describe application of behavioral paradigms in various environmental situations. Dupont (1969) focused on educating the emotionally disturbed, devoting one section to "Techniques of Behavior Modification" (pp. 130-229). Articles concerning behavior modification and other therapeutic techniques are presented by Guerney (1969) who advocates using parents, teachers, and peers as agents of change.

Evidence in support of utilizing behavior modification technology in the natural environment is well documented in a volume by Tharp and Wetzel (1969) which includes eighty case studies. The authors raise questions concerning the goal behaviors of the schools as well as the helping professions. Bradfield (1970) has edited a recent book relating behavior control to children with severe learning disabilities, gifted children, children with language problems and disadvantaged children. He discusses moral issues inherent in the theory in the final chapter. Many articles and research papers from the volumes just cited will be incorporated into sections of this review.
Behavior Modification with Individuals

Numerous individual case studies have chronicled the effectiveness of the technique (Baer, 1962; Patterson, 1965; Patterson et al., 1968; Williams, 1959; Wolf et al., 1964). Various contingencies have been employed to reduce the frequencies of inappropriate or maladaptive behavior in both laboratory and natural settings.

Premack Principle

Baer (1962) made a pleasurable activity, viewing a cartoon, contingent upon no thumb sucking. This research was successful with two young boys in a well-controlled situation and included the incorporation of the Premack principle (Premack, 1959) which implies if behavior B is of higher probability than behavior A, then behavior A can be made more probable by making behavior B contingent upon it. The Premack principle was also employed by a group of researchers (Homme et al., 1963) to control the behavior of nursery school children. High probability behaviors, those usually suppressed through punishment, proved to be highly reinforcing activities. "In summary even in this preliminary, unsystematic application, the Premack hypothesis proved to be an exceptionally practical principle for controlling the behavior of nursery school Ss" (p. 544).

The Premack principle seems to offer widespread applicability and Hewett (1966; 1967) who has worked with
behaviorally disturbed children, as well as researchers working with retarded children at Ranier School (Birnbrauer et al., 1965) have incorporated it into their research designs.

Social Reinforcement

Social reinforcement has been manipulated to reduce maladaptive behavior and increase adaptive behavior in institutional and other settings. Ferster and Appel (1961) removed all social reinforcers, and used time out from positive reinforcement as an aversive stimulus to reduce tantrum behavior. Social reinforcement was used to reduce inappropriate behavior and to shape adaptable behavior of an institutionalized preschool autistic child by Wolf et al. (1964). In this study a series of behaviors were dealt with by behavioral techniques and included temper tantrums, sleeping and eating problems, shaping the child to wear glasses, and appropriate verbal and social behavior.

Regressive crawling of a nursery school child was reduced when teachers were trained to withhold attention for this behavior, while responding to the child for acceptable actions (Harris et al., 1964). Positive social reinforcement has also been employed to decrease isolate behavior (Allen et al., 1964) and operant crying (Hart et al., 1964).
Social reinforcement is effective when paired with other reinforcement. Various staff workers in a residential psychiatric hospital used social reinforcement in addition to candy to increase the strength of appropriate behaviors such as bathing, dressing, and eating (Ayllon and Michael, 1959). Parents were taught to modify the behavior of their child when he exhibited a high frequency of psychogenic seizures (Gardiner, 1967).

Ulrich, Wolfe, and Bluhm (1968) report that students at levels including college, high school, and elementary have been given training in the principles of behavior and education so that it might benefit their own training and also be used by them to teach younger children . . . or to correct already existing behavioral problems (p. 24).

The literature reveals a trend to utilize environment and those therein to modify behavior.

The behavior therapist can extend the benefits of his treatment by including parents in the treatment (Phillips, 1960; Rickard, and Mundy, 1965; Patterson, 1965; Zielberger, Sampen, and Sloane, 1968; Tharp and Wetzel, 1969). A study by Wahler et al. (1965) refined methodology used to modify mother-child interaction.

Punishment or Aversive Controls

Bandura (1969) summarizes the behavioral view:

Punishment is rarely employed as a sole method for modifying behavior; but if it is used judiciously in
conjunction with other techniques designed to promote more effective response options, such combined procedures can hasten the change process. In addition, aversive consequences are frequently used to modify deviant behavior . . . where certain response patterns must be brought rapidly under control because of their injurious effects upon the performer or other persons (p. 294).

Deprivation of rewards such as privileges or time-outs from pleasurable events or activities can assist in reducing maladaptive behavior. Holz, Azrin, and Ayllon (1963) employed this procedure but also made an alternative acceptable behavior available to mental patients. Baer (1961) removed the contingency which maintained the behavior of young children. Time-out procedures were incorporated into a long-term behavioral design by Wolf et al. (1964) to shape the behavior of a nursery school boy. Time-out relates to systematic exclusion, frequently employed by schools after conventional methods have been found ineffective (Chapman, 1962) in controlling children's seriously disturbing actions.

Injurious or self-destructive behavior has been eliminated or reduced in severely disturbed children by reinforcement withdrawal (Lovaas et al., 1965), but this alone did not suffice for some children. Bucher and Lovaas (1968) reported that during treatment several cases of potentially dangerous self-mutilating behaviors were eliminated with a few contingent applications of painful shock. Tate and Baroff (1966) cited a case in which long-term self-mutilating behavior in a partially blind, psychotic boy was rapidly
eliminated by employing aversive shock for the maladaptive behavior in addition to verbal praise and affection for desirable behavior.

Risley (1968) after failing to reduce dangerous climbing behavior in a deviant six-year-old girl, applied shock contingent with verbal reprimands. This greatly reduced the behavior which was eventually controlled by a time-out from playing upon occurrence of the behavior.

Bandura (1969) reflects:

It is noteworthy that surprisingly brief programs of contingent shock and reinforcement withdrawal are not only effective in removing self-injurious behaviors of long standing, but they generally improve social functioning as well. . . . (p. 331).

Extrinsic Reinforcement

Operant reinforcement methodology and replication of animal experiments with both feeble-minded and normal children have demonstrated that such techniques can alter behavior. Various extrinsic reinforcements have been used: trinkets with nursery school children (Bijou, 1958a; 1958b), pennies with grade school children (Azrin and Lindsley, 1956), and candy with feeble-minded and psychotic children (Lindsley, 1954). Parents were taught to pair candy and social reinforcement for required performance when toilet-training their nineteen-month-old daughter (Madsen, 1965). Hewett (1966) incorporates extrinsic rewards into his engineered classroom design, and employs candy and a
check mark reward system. Hewett's design will be discussed again in the section concerning behavior modification with groups.

It is the opinion of Staats and Staats (1962) that reinforcement systems using tokens with which the individual purchases items of his choice are the most effective. Token economies designed for group use will be described in the following section.

**Behavior Modification with Groups**

While behavior modification with individuals is well documented and described in the literature, its application with groups is of more recent origin. The technology has been used to reduce specific deviant behaviors as well as whole classes of maladaptive behavior in a variety of environments. Contingency systems have been arranged to shape the behavior of the individual within the group, or to alter the behavior of the entire group. Bandura (1969) remarks that "unlike traditional treatment systems, these programs contain work-payment incentive systems and contingency structures that are highly compatible with those in the larger society" (p. 262).

**Institutions**

Some elaborate token economies have been implemented in institutions. Lent (1968) described a project in which a cottage of 71 trainable mentally retarded females was placed
on a total environment contingency system. A graduated token economy was instituted and as it advanced the reinforcements which operate in society were gradually integrated. Cohen et al. (1966) implemented a token program for delinquent boys of high school age in a rehabilitative institution. Their design replicated earning and buying in the outside community. The boys were paid points for engaging in academic pursuits and could purchase clothing, better meals, private rooms and other things which they valued. According to Ayllon and Azrin (1965) similar programs have been successful in hospital wards for severely disturbed psychotics. They conducted several studies and were successful in shaping behavior with a token system. The patients could originally earn tokens for approximating the desired goal behaviors, and in stages the behavior expectations were increased. Privacy, choice of eating group, permission to leave the hospital grounds and private audiences with the staff all proved to be positive reinforcers.

Atthowe and Krasner (1968) followed the same paradigm and inaugurated an incentive program with a population of chronic schizophrenics in which they attempted to mirror societal procedures. Fairweather et al. (1960) and Fairweather and Simon (1963) were concerned with the high readmission rate of patients discharged from mental hospitals and conducted studies to determine how to improve rehabilitation programs (Fairweather et al., 1969). These researchers
concluded that treatment cannot be restricted to the institution but must extend to the greater community. The project incorporated a supportive subcommunity in which marginal patients could be maintained in a facility outside the institution.

These illustrations exemplify the types of contingency and token programs that have been conducted in institutions. Reinforcement procedures are incorporated into on-going research. Special classrooms within an institutional setting will be discussed in a following section. Reinforcement programs in special classrooms will describe areas of exceptionality in which behavior modification has been employed.

Special Classrooms

Several school programs for exceptional children now incorporate behavior modification principles: a program for the retarded (Birnbrauer et al., 1965); a learning disabilities classroom (Nolen et al., 1967); and numerous programs for the emotionally disturbed or the behaviorally disturbed children (Becker et al., 1967; Haring and Phillips, 1962; Hewett, 1966 and 1967; O'Leary and Becker, 1967; Quay, 1966; Walker et al., 1969; Zimmerman and Zimmerman, 1962).

Included in the studies are experimental manipulation of the reinforcement schedules (Haring and Phillips, 1962; Hewett, 1967; O'Leary and Becker, 1967) and testing of reinforcement contingencies (Walker et al., 1969).
Three components of the treatment model, token reinforcement, social reinforcement, and aversive controls were evaluated in terms of their efficiency or potency in controlling the behavior of a second group of five subjects. The results indicated that social reinforcement exercised the greatest control over the subjects' behavior while aversive controls were slightly less effective in controlling the same behavior. Token reinforcement exercised surprisingly little control over the subjects' attending behavior (p. 78).

According to the research just cited group research has not yet furnished empirical evidence to support the assumption that modifications in behavior are due to the manipulation of precise treatment variables. Use of extrinsic incentives may be needed to effect initial behavior changes with some subjects (Bandura, 1969) with specific responses reinforced at early stages. In most designs the system advances to rewarding sets of behavior. Martin et al. (1968), working with a special class group of delinquent adolescents, found that a phase-contingent system resulted in more positive behavioral changes.

Hewett (1966; 1967) stresses that extrinsic rewards are not gimmicks to be randomly distributed to children. He employs a hierarchy of educational tasks emphasizing that behavioral expectations for the child increase as he demonstrates mastery of lower levels, and that check marks and candy are only a small part of the design. A teacher is trained to be a behavioral engineer, designing a class environment in which students have a high probability of achieving adaptable student behavior.
Ayllon and Michael (1959) first described the function of a behavioral engineer. An engineered classroom has been employed by researchers other than Hewett and includes Haring and Phillips (1962), Whelan and Haring (1966), and Quay (1966). The engineered classroom involves both structure and a systematic design.

As early as 1959, Newman noted that hyperactive and aggressive children need structure, and Cruickshank (1961) incorporated a highly structured design into his program for brain-injured and neurologically impaired children. Knoblock and Garcia (1965) advance the view that most classroom teachers have some trouble coping with deviant behavior in the classroom, and teachers need to know how and when to employ intervention techniques.

The population of special classes should consist of children whose academic and social behaviors cannot be feasibly or effectively modeled within the regular classroom setting. . . .

The ultimate goal of any special class for treatment of deviant behavior should be the reintroduction of its subjects into the regular classroom as soon as it is behaviorally possible (Walker et al., 1969, pp. 51-52).

Regular Classrooms

The entire process of removing a child from a regular classroom, treating him in the environment of a special class, and ultimately preparing him to return again to a regular class can be completely eliminated with some
children. Ulrich et al. (1968) share this view based on their studies.

In numerous instances, however, it was suggested to teachers that the problem could be solved as well in the regular classroom as it could in a special class if certain ways of handling the child could be changed . . . a teacher who was given some skills in handling behavioral problems could better effect changes in behavior during her prolonged contact with the child in the classroom than could a psychiatrist or clinical psychologist during an hour session once a week in his office (p. 3).

When behavior is conditioned in the classroom, it will most likely persist and generalize in this same setting. Benson (1969) notes that procedures are being devised by Haughton in the schools of Eugene, Oregon, to maintain children with behavioral problems in their regular classrooms. Patterson, Littman, and Bricker (1967) observed aggressive responses reinforced by social attention in a pre-school setting, and other researchers have observed that the social environment reinforces deviant behavior in many classrooms.

Anderson (1964), Grinée (1964), Hotchkiss (1966), and Ebner (1967) noted that either teacher or peers positively reinforced "hyperactive" behaviors in classrooms. However, further observations by Hotchkiss (1966) and Warren and Mondy (1968) reveal that when the child displays socially adaptive behavior and is ignored, the desirable behavior is not reinforced.
Patterson (1965) reported a case in which he had worked within the classroom to reduce the disruptive behavior of a hyperactive boy. For every ten-second interval of appropriate behavior the child received a point, negotiable for candy or pennies to be shared with his classmates. The peer pressure generated behavior improvement in the boy, and the subject's improved behavior facilitated his acceptance by the peers.

This exemplifies one pattern for group reinforcement. In most of the group-wide contingency systems which have been described in this section, the reinforcements were administered on an individual basis. Few investigators have tested the efficacy of group contingency structures.

Patterson et al. (1969) say "it is our impression that involving the peer group (by dividing the spoils with them and instructing them not to attend to S's deviant behavior) accelerates the generalization of conditioning" (p. 27). A study by Glaser and Klaus (1966) revealed that reinforcement influenced group behavior in the same way as individual behavior when all members had to work together to gain positive reinforcement.

Walker et al. (1969) incorporated a group contingency system into their design: "The institution of group points in making a highly desirable reinforcer (trips) available while simultaneously providing aversive control in
the form of group peer pressure against individual deviant behavior is effective as a group control" (p. 60).

**Summary**

Research has proven conclusively that reinforcement procedures can reduce the maladaptive behavior of individuals in various environments. Rapid reductions in appropriate behavior have also been recorded by research studies within groups. Since many more variables interact when research is conducted with groups, precise cause and effect between contingencies and behavior have not been empirically established.
CHAPTER III

METHOD OF PROCEDURE

Introduction

This chapter will describe the method and procedure used in this study. Hypotheses formulated to ask precise questions will be presented first. The related experimental design will be outlined and statistics to be used in analyzing the data described. The planning, selection of subjects, training of recorders, and the procedures of the experiment will be reported.

Hypotheses and Design

To answer the questions posed in Chapter I, the following null hypotheses were formulated:

1. No significant differences exist between individual rewards (Experiment A) and group rewards (Experiment B) in shaping attentive classroom behavior.

2. No significant difference exists between individual rewards (Experiment A) and group rewards (Experiment B) when the order of presentation is reversed.

3. No significant difference exists between conditions for the AB Group and BA Group in this study.
The goal of the study was to compare the effectiveness of two reinforcement methods, individual rewards (Experiment A) or group rewards (Experiment B) in reducing inappropriate behaviors (as defined in Appendix A) and shaping attending behaviors. The attending behavior is incompatible with inappropriate behavior, and is at the base of Hewett's (1966) hierarchy of educational tasks. No attempt was made to include assessment of learning or school achievement during the time of the study.

Design

To test the effects of two types of reinforcement in regular classrooms, including the effects of changing the order of presentation of the experiments, the following experimental design was employed. Two groups of six classrooms each were designated the AB Group and the BA Group, according to the order of the presentation of the experimental trials. All classrooms were to be observed during a specific half-hour daily time period. Inappropriate behaviors were designated the dependent variable, and the four conditions, the independent variables.

For each classroom within the two groups an intra-class design was adapted from the intra-subject design (Patterson et al., 1969) in which each subject is used as its own control and observed over a period of time under different experimental conditions. The experimenter decided to
employ a daily half-hour time period for this study during which students were required to be seat-bound or attentive to teacher or peer presentations. Each classroom would be observed for this same daily time period for the five weeks of the study. The four conditions are:

1. **Baseline** (week one): The daily half-hour time period during which all inappropriate behaviors (as defined by coding sheet Appendix A) are recorded for all children within the classrooms.

2. **Experiment I** (week two): During which the first experimental procedures are initiated for the daily time period. The individual reinforcement (A) is to be employed for the AB Group, and Group reinforcement (B) for the BA Group. Inappropriate behaviors are recorded.

3. **Reversal** (weeks three and four): During which the experimental conditions are terminated. Inappropriate behaviors are recorded for five days during this time; two days during the first week of the condition, and three days during the second week.

4. **Experiment II** (week five): During which group reinforcement (B) is applied to the AB Group of classrooms and individual reinforcement (A) is applied with the BA Group of classrooms. Inappropriate behaviors are again recorded.
The following table illustrates the pattern of the study.

**TABLE 1**

**PATTERN FOR RESEARCH DESIGN**

<table>
<thead>
<tr>
<th>Group</th>
<th>Conditions</th>
<th>1 (1 week)</th>
<th>2 (1 week)</th>
<th>3 (2 weeks)</th>
<th>4 (1 week)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>Baseline</td>
<td>Experiment A</td>
<td>Reversal</td>
<td>Experiment B</td>
<td></td>
</tr>
<tr>
<td>BA</td>
<td>Baseline</td>
<td>Experiment B</td>
<td>Reversal</td>
<td>Experiment A</td>
<td></td>
</tr>
</tbody>
</table>

Week 1 Week 2 Weeks 3 and 4 Week 5

A two-way analysis of variance over the four conditions will be employed to test the data from this study. The results will be presented in a table and the two groups will also be contrasted graphically. Since an "assumption of analysis of variance is that the measures within each category or subgroup must represent random samples" (Popham, 1967, p. 179), a t-test for small samples will be run to determine that there is no significant difference between the AB Group and the BA Group.

**Planning**

During the planning stage the experimenter discussed the proposed study with administrators and teachers in several Tucson schools. Agreement for participation was secured from both administrators and public school teachers.
Prior to inauguration of the study, the entire design was outlined and explained to the participants.

The experimenter arranged for the daily half-hour time period in which each classroom would be recorded for the study. That the study period must be a quiet time was stressed, and the details of the four conditions were explained. The planned reward system was described; the necessity for this has been advocated by other researchers (Bijou and Sturges, 1959). Each of the participating teachers agreed that the students could consume the edibles as they were earned.

The need for including reversal or a non-reward condition following an experimental condition was explained, and teachers agreed to postpone starting any behavioral programs of their own until this study was terminated. To keep from interfering with the normal school routine, students in the participating classrooms could attend any special activities that occurred on experimental days. A missed day would be added to the end of the experimental condition.

**Subjects**

Children in twelve regular public school classrooms participated in this study. Grades kindergarten through six were represented, and included 329 children ranging in age from 5 years 3 months to 13 years 5 months. The median
age for the subjects was 8 years 5 months; the ages determined by rounding to the nearest month.

Each classroom that participated in the study had one or more children who had been referred for special help for conduct or behavior problems. In addition the same children frequently had learning problems. All of the classroom teachers had volunteered to participate in the research. Two of the teachers had prior experience with application of behavior modification while the remaining ten teachers and one student teacher had not.

To insure a wide and balanced age range for both groups of the design, the classrooms were first paired in this manner: kindergarten/kindergarten; first grade/first grade; second grade/second grade; second-third grade/third grade (low group); third grade (high group)/fourth grade; and fifth grade/sixth grade. Placement into groups was done by tossing a coin for the first classroom of each pair. Table 2 shows the pattern of classes assigned to each group and includes the age range for each class. Further descriptions of each participating classroom will be included in Chapter IV.

The number of classrooms which participated in the study precluded conducting the entire research in one five-week session. Consideration of such variables as length of school day, the half-hour time scheduled for each class,
<table>
<thead>
<tr>
<th>Class</th>
<th>Grade</th>
<th>Size</th>
<th>Age Range (years-months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1st grade</td>
<td>19</td>
<td>5 - 2 to 6 - 2</td>
</tr>
<tr>
<td>2</td>
<td>1st grade</td>
<td>31</td>
<td>6 - 3 to 8 - 4</td>
</tr>
<tr>
<td>3</td>
<td>2nd grade</td>
<td>26</td>
<td>7 - 2 to 9 - 1</td>
</tr>
<tr>
<td>4</td>
<td>2nd/3rd grades</td>
<td>26</td>
<td>7 - 3 to 9 - 5</td>
</tr>
<tr>
<td>5</td>
<td>3rd grade</td>
<td>23</td>
<td>8 - 5 to 10 - 9</td>
</tr>
<tr>
<td>6</td>
<td>4th grade</td>
<td>28</td>
<td>9 - 3 to 11 - 9</td>
</tr>
<tr>
<td>7</td>
<td>5th grade</td>
<td>28</td>
<td>10 - 3 to 12 - 3</td>
</tr>
<tr>
<td>8</td>
<td>6th grade</td>
<td>34</td>
<td>11 - 3 to 13 - 3</td>
</tr>
</tbody>
</table>
location of schools, availability of recorders, and the mechanics of scheduling necessitated two five-week sessions. Both were conducted in the spring term of 1968.

Since the experimenter preferred that each of the five weeks include five school days, the first session began in February and was completed prior to Easter and spring vacation. The second session began after Easter and was completed in early May. Table 3 indicates which classrooms were studied in each session.

**TABLE 3**

CLASSROOMS PARTICIPATING IN EACH FIVE-WEEK SECTION OF THE STUDY

<table>
<thead>
<tr>
<th>Section I</th>
<th>Section II</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Five-week Session</td>
<td>Second Five-week Session</td>
</tr>
<tr>
<td>(eight classrooms)</td>
<td>(four classrooms)</td>
</tr>
<tr>
<td>BA 1 - Kindergarten</td>
<td>AB 1 - Kindergarten</td>
</tr>
<tr>
<td>AB 2 - 1st grade</td>
<td>AB 2 - 1st grade</td>
</tr>
<tr>
<td>BA 2 - 1st grade</td>
<td>AB 3 - 2nd grade</td>
</tr>
<tr>
<td>AB 3 - 2nd grade</td>
<td>BA 3 - 2nd grade</td>
</tr>
<tr>
<td>AB 4 - 2nd/3rd grades</td>
<td>BA 4 - 3rd grade</td>
</tr>
<tr>
<td>BA 4 - 3rd grade</td>
<td>AB 5 - 3rd grade</td>
</tr>
<tr>
<td>BA 5 - 4th grade</td>
<td>AB 6 - 6th grade</td>
</tr>
<tr>
<td>BA 6 - 5th grade</td>
<td></td>
</tr>
</tbody>
</table>

**Training Recorders**

The six recorders for the study attended a series of training sessions. A doctoral student in psychology at The
University of Arizona, who was an experienced recorder, assisted with the training sessions. A recording sheet similar to the sheet in Appendix B was used for the training sessions. Practice recording was done by observing a classroom through a one-way mirror, and inter-observer reliability was stressed.

After several sessions had been completed, the entire group, experimenter and six recorders, engaged in a practice session in a regular classroom. They sat quietly in the rear of the room and attempted to replicate conditions which would prevail during the study.

Each recorder used a clip board with a stop watch taped to the top. It was decided in this final training session that it would be easier to coordinate the timing with another recorder by using the sweep hand on the room clock. During all training sessions recorders were told to keep their eyes sweeping the entire class and the psychologist cautioned them not to become intrigued with one behavior, because then they might fail to record all behaviors.

Recorders were instructed to enter the classrooms quietly and sit at the rear or side of the rooms as much out of view of the students as possible. They were not to interact with the students in any way. If a student approached them and asked what they were doing, they were instructed to reply, "I am busy doing my work."
Since the experimenter could not attend all of the experimental sessions, two co-workers and a student teacher were trained to act interchangeably as experimenter and recorder. Any of the four could give verbal instructions to the class and supervise the dispensing of the rewards. The various team members, six persons other than the experimenter, were shown the muffin tin reward trays (Appendix C), and the sweet and non-sweet edibles in addition to the tokens which were to be dispensed. Each team was also given the edibles, tokens, and bubble gum so that they could manage the contingency system independently.

Requirements for each of the four conditions were outlined and the differences between the two types of reinforcement carefully explained. The necessity of including a seating chart so that individual inappropriate behaviors could be recorded for experimental condition A (individual reinforcement) was also stressed.

Rewards

Sweet and non-sweet edibles and tokens redeemable for bubble gum were employed as rewards. The tokens were half-size plastic poker chips, three of which were redeemable for a one-penny package of bubble gum. At the end of two time periods in each of the experimental sessions, the students who had earned a reward could choose one from the tray.
Rewards were the same for all classes with the exception of the two kindergartens. Tokens were not made available for these children because there was no place in which to store them.

Time Intervals

For each of the study periods, each half-hour time was divided into two varied intervals. The first interval was determined randomly by drawing slips numbered 9 through 20. The second interval was the time remaining. The randomized chart was prepared prior to the inauguration of the study (Appendix D).

The time intervals were given equal weight in determining whether an individual child earned a reward, or the entire group earned a reward. It was possible to earn two rewards each day. A kitchen timer was set for the intervals, and the bell indicated the end of an interval plus reward time.

Verbal Directions

During baseline and reversal conditions, the recorders were not to interact with the students. The experimenter would give verbal directions to the classes prior to inaugurating experimental sessions. The verbal directions would be similar to the following:

I have come to help your classroom teacher, Mrs. ________, to see whether this class can improve in behavior. I am going to mention just
two rules. Do not talk without raising your hand and do not leave your seat without permission. I am going to set this reminder (holding up timer), and when it rings the children that have followed directions will get a surprise (for individual reward sessions).

Depending on the age level, someone in the class might be asked to repeat the two rules. The directions would vary for the group reward sessions. They might be:

I have come to help your classroom teacher, Mrs. _______. The whole class is going to have to work together in following these rules in order to get a surprise. (The same or appropriate rules will be given as above. Such infractions as gum chewing, and being late to class were mentioned at the request of some teachers.)

When dispensing the rewards the experimenter was permitted to say "good." If during the group reinforcement trials one child kept the whole class from getting a reward, the experimenter could cite that child and comment to the effect, "Well, I guess that _______ didn't wish to have the class earn a treat today."

Inter-observer Reliability

Throughout the study inter-observer reliability was to be stressed and two recorders would be present at least twice weekly in the classrooms. Recorders needed to keep constant check on timing, so that team members were checking in the same intervals. Results of periodic checks will be reported in Appendix E.
Summary

Methods and procedures used in all phases of the study have been explained in this chapter. Descriptions were included for planning, the design, the experimental phases, selection of subjects and participating classrooms, method of data collection, formulation of the hypotheses, statistics to be employed, training of recorders, criteria for the experimental time period and examples of verbal directions. The necessity for presenting a detailed plan of the research to all participating classroom teachers, recorders and administrators also was stressed.
CHAPTER IV

RESULTS OF THE STUDY

Introduction

Data collected during the study are analyzed in this chapter; results of hypotheses testing will be reported. Means of recorded misbehaviors will be presented for both the AB Group and BA Group in both tabular and graphic form. The classrooms within each group will be described and contrasted with their respective group means.

Analysis of Data

During the study data were recorded for each of the twelve participating classrooms for the daily half-hour sessions. Weekly and condition totals were found by adding the daily counts. When more than one recorder was present the totals were averaged. Inter-observer reliability was high throughout the study, and some random samples of reliability are presented in Appendix E.

Table 4 shows the means and standard deviations for both groups of this study.

A necessary assumption for using analysis of variance is that group samples must not be significantly different
TABLE 4
MEANS AND STANDARD DEVIATIONS OF MISBEHAVIORS FOR THE TWO GROUPS ON THE FOUR CONDITIONS

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Group AB</th>
<th>Group BA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Baseline</td>
<td>1133.67</td>
<td>255.22</td>
</tr>
<tr>
<td>Experiment I</td>
<td>59.50</td>
<td>18.75</td>
</tr>
<tr>
<td>Reversal</td>
<td>619.17</td>
<td>260.84</td>
</tr>
<tr>
<td>Experiment II</td>
<td>101.33</td>
<td>57.48</td>
</tr>
</tbody>
</table>
(Popham, 1967) and this was determined by testing with the following formula:

$$ t = \frac{M_1 - M_2}{S_{DM}} $$

$M_1$ = AB Group Baseline mean (1133.67)

$M_2$ = BA Group Baseline mean (929.50)

$S_{DM}$ = Standard error of the difference between means

The standard error formula for small sample tests was used since both samples were small and the sampling distributions are not normal in such instances. The appropriate formula is:

$$ S_{DM} = \sqrt{\frac{N_1S_1^2 + N_2S_2^2}{N(N-1)}} $$

Using this formula $S_{DM}$ was 191.55.

$$ t = \frac{1133.67 - 929.50}{191.55} $$

$$ t = 1.06 $$

The $t$-test result was too small to indicate that the AB and BA Groups were significantly different, and analysis of variance could be employed to analyze the data.

The accumulated frequencies of inappropriate behaviors were transferred to data processing cards, and run
through a two-way analysis of variance program at the Computer Center, University of Arizona. Table 5 presents the results.

The significant overall $F$ for trials clearly demonstrated that subjects had changed across the baseline, experimental I, reversal, and experimental II phases taken together. To test whether the major inter-phase changes were separately significant, correlated $t$-tests were applied to the changes from baseline to experimental phase I, from experimental phase I to reversal, and from reversal to experimental phase II. Correlated $t$-tests were used because the directions of observed change were specified in advance of the data collection. Since the alternative order groups, AB Group and BA Group, had not differed significantly from each other, they were combined for these inter-phase analyses.

Significant $t$-ratios were obtained for each inter-phase change: from baseline to experimental phase I, $t = 10.69$ ($df = 11, p < .005$); from experimental phase I to reversal, $t = 7.57$ ($df = 11, p < .005$); and from reversal to experimental phase II, $t = 8.49$ ($df = 11, p < .005$). These results clearly support the advance expectations that imposing experimental contingencies would reduce inappropriate behaviors from baseline, that removing the experimental contingencies would invite some resurgence of inappropriate behavior and that reinstatement of experimental contingencies
**TABLE 5**

**TWO-WAY ANALYSIS OF VARIANCE OF INAPPROPRIATE BEHAVIORS FOR THE TWO GROUPS**

<table>
<thead>
<tr>
<th>Source</th>
<th>MS</th>
<th>df</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>201,315.6436</td>
<td>47</td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>70,509.3409</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Groups</td>
<td>105,094.0833</td>
<td>1</td>
<td>1.567</td>
</tr>
<tr>
<td>Error (Groups)</td>
<td>67,050.8667</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td>241,284.2361</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Trials</td>
<td>2,537,564.5833</td>
<td>3</td>
<td>76.800***</td>
</tr>
<tr>
<td>Groups by Trials</td>
<td>27,432.1389</td>
<td>3</td>
<td>.830</td>
</tr>
<tr>
<td>Error (Trials)</td>
<td>33,041.4111</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

***p < .0001
(individual or group reinforcement) would again reduce the inappropriate classroom behaviors. The effects are visually discernible from the pattern of the AB and BA group means presented in Figure 1.

Hypotheses

The following conclusions can be made concerning each of the formulated hypotheses:

**Hypothesis 1.** No significant differences were found between individual rewards (Experiment A) and group rewards (Experiment B) in shaping attentive classroom behavior. The null hypothesis cannot be rejected because no significant differences were found between individual and group reinforcement in shaping attentive classroom behavior.

**Hypothesis 2.** No significant difference exists between individual rewards (Experiment A) and group rewards (Experiment B) when the order of presentation is reversed. The null hypothesis cannot be rejected because no significant differences were found when the order of the experimental trials was reversed.

**Hypothesis 3.** No significant difference exists between conditions for the AB Group and the BA Group in this study.
Fig. 1. Pattern of the means of inappropriate behaviors for the AB and BA groups over the four conditions.
The null hypothesis is rejected because a highly significant difference was found as a function of trials. There was a sharp reduction from baseline to the first experimental trial, an increase from Experiment 1 to reversal and reinstatement of the second experimental trial again reduced the frequencies of inappropriate behaviors.

Classrooms within the Groups

The following section will describe the twelve classrooms, six in the AB Group and six in the BA Group. Each class description will include: grade level, age range, number of students enrolled and daily time period for the research. Problem students within each class will also be discussed.

All but one class, AB 4, were located in parts of town that served lower middle class families and included students who came from homes where Spanish was the predominant language. Class AB 4 was located in an upper middle class neighborhood and had no bilingual children. Each classroom will also be contrasted graphically with the means of its respective group.

Class AB 1

Class AB 1, kindergarten level, with 34 students enrolled was one of the largest classes in the study. The chronological age range was from 5 years 3 months to 6 years
6 months; this made it the youngest class in the study. It was also the only class in which a student teacher participated in part of the sessions.

Several children in the class had been referred for special testing and help, and ultimately were promoted to a pre-first rather than first grade. The time period selected for the study was the first half hour of the morning kindergarten session, beginning at approximately 8:35 A.M. when the children entered the room and seated themselves on an area rug. During the half-hour period attendance was taken, the teacher presented a lesson, and the children were encouraged to participate in "show and tell." The presentation related to a social studies or science unit, and was the only half-hour time period in the morning when the children were required to be quiet and attentive.

Each child was required to remain seated on the rug for the time period, to answer role or respond to the teacher's questions, and to attend to the presentations. The coding sheet categories (Appendix A) were used to designate inappropriate behaviors.

All children in the class responded to the rewards given in the experimental sessions, and Cheetos were the favorite selection from the reward tray. Tokens were not available to the kindergarten classes.
Figure 2 shows the profile for this class when contrasted with the group mean for the four conditions. Each total is slightly above the group mean. The figure also indicates that both individual and group rewards were effective in shaping the attentive student behaviors.

Class AB 2

Class AB 2, first grade, with 19 students enrolled was the smallest class in the study. The class was lowest of three first grades and homogeneously grouped according to readiness tests and the judgment of kindergarten teachers. Enrollment was kept low throughout the year since the class included so many children with problems. The children had language problems, problems of behavior, and learning problems. Their age range was from 6 years 2 months to 7 years 8 months.

The time period selected followed morning orientation and ran from 8:30 to 9:00. This period was scheduled at the teacher's request to coincide with arithmetic, when the children were "inattentive" and not learning according to the teacher's expectations.

On the first day of baseline an inappropriate behavior emerged which necessitated an additional category for the coded behaviors. A male student would not follow the teacher's directions, and, in addition, "sassed" the teacher.
Fig. 2. Pattern of total inappropriate behaviors for AB Class 1, a kindergarten group contrasted with AB Group means for each of the four conditions.
Therefore, the other (0) category was added to include such obvious misbehaviors.

While the teacher had been informed to expect an extreme reduction in "inappropriate" behaviors when the experimental phase was instituted, she probably registered greater incredulity at the change than any other teacher in the study. The teacher was reluctant to have the no reward (reversal) reinstated, but cooperated when the necessity for this procedure for research purposes was stressed.

Figure 3 compares this class to the AB Group means. Since N for this class was small it could be expected to be slightly below the group mean.

Class AB 3

Class AB 3, a second grade with 26 students enrolled, was the lowest of three homogeneously grouped second grade classes. Chronological ages ranged from 7 years 2 months to 9 years 1 month. The classroom teacher was one of two teachers in the study who had prior experience with behavior modification.

The entire class was below grade level, academically, and included several children who were behavioral problems at home as well as in school. The half-hour time period was scheduled during reading from 9:20 to 9:50 at the teacher's request. The children were required to do independent seat-work or be attentive to the teacher in the reading group.
Fig. 3. Pattern of total inappropriate behaviors for AB Class 2, a first grade group, contrasted with AB Group means for each of the four conditions.
A new male student, both retarded and behaviorally disturbed, was added to the class during the third week of the study. He contributed a disproportionate number of inappropriate behaviors during the reversal and second experimental phases. The addition of a student in the middle of the study is a variable difficult to control when doing research in the public schools, and illustrates a problem commonly encountered when conducting research in the natural environment.

The pattern for this classroom is contrasted with the group mean in Figure 4.

Class AB 4

Class AB 4, a combination second and third grade, had 26 students enrolled who ranged in age from 7 years 3 months to 9 years 5 months. The classroom teacher, a second year teacher, was the youngest and least experienced teacher who volunteered to participate in the study. At her request the study time was during reading and began after the morning orientation at approximately 9:15 and concluded at 9:45.

The class functioned very well academically and was located in a school serving an upper middle class Anglo population. One male student following referral for emotional and behavioral problems was recommended for placement in a special school. Placement was deferred since a sibling was already being served by the special school.
Fig. 4. Pattern of total inappropriate behaviors for AB Class 3, a second grade group, contrasted with AB Group means for each of the four conditions.
All students responded well to the experimental conditions including the child designated behaviorally disturbed. Figure 5 contrasts this classroom with the AB Group means.

Class AB 5

Class AB 5, a third grade with 23 students enrolled, was the lowest of two third grades grouped according to academic functioning. The chronological age range was from 8 years 5 months to 10 years 9 months. The arithmetic period from 12:30 to 1:00 was selected for the study.

In addition to the coded categories on the check list in Appendix A, tardiness was counted as an inappropriate behavior. On the second day of baseline, the class received a transfer student from another third grade where the boy had also participated in the study. He had the distinction of being the only student to participate twice in the study. The class also included a girl who had been referred for help at the time of the study. Her home environment was poor and unsupporting, and, eventually, the child was placed in a foster home.

Recorders commented in writing that the class was "quiet" in spite of considerable moving around the room. The teacher was considered to be very consistent without having been trained in this facet of behavior modification. During reversal the class exhibited fewer inappropriate behaviors than the group mean, and the mere presence of
Fig. 5. Pattern of total inappropriate behaviors for AB Class 4, a second and third grade combination class, contrasted with AB Group means for each of the four conditions.
recorders seemed to indicate to this class that behavior expectations had changed.

Data from this class is graphed in Figure 6 on the following page.

Class AB 6

Class AB 6, sixth grade level, with 34 students was one of the two largest classes and the highest grade level to participate in the study. The age range of the students was from 11 years 3 months to 13 years 3 months. The classroom teacher requested she be included in the study since she felt her language arts class was a difficult one with which to work. The language arts period followed the lunch hour and was scheduled from 1:00 to 1:30.

For language arts only, all the sixth grade students who functioned at a low level were grouped together. Another sixth grade teacher worked with the more able students. Several of the students attended counseling sessions, and one girl was a problem in both the school and neighborhood.

The experimenter can report that students at this grade level reacted as favorably to the experimental sessions as the lower grade children. Peer disapproval was very strong at this level when individual students committed infractions during the group reward sessions. This coincides with other research that found "peer group involvement
Fig. 6. Pattern of total inappropriate behaviors for AB Class 5, a third grade group, contrasted with the AB Group means for each of the four conditions.
contributes significantly to behavior control" (Patterson et al., 1969, p. 27).

Figure 7 reveals how closely the profile for this class parallels the group mean.

BA Class 1

BA Class 1, kindergarten level, had 26 students enrolled who ranged in age from 5 years 4 months to 7 years 1 month. This older group attended an afternoon kindergarten session. Recording began when children came to school at 12:30 and concluded at 1:00.

The child in the room that presented the most problems was a retarded girl who had been examined and diagnosed by a local agency, Children's Evaluation Center. Several other children had been referred for observation because of behavioral problems.

Approximately the same behavior was expected from this kindergarten class as from kindergarten AB 1. Poor acoustics prevailed in both classrooms (they were housed in the same building). Recorders commented that the teacher used such a low voice that one had to strain to hear her; outside noises seemed extreme.

This was the only class in the study that exhibited fewer inappropriate behaviors during baseline than the reversal condition. The profile for this class is presented in Figure 8.
Fig. 7. Pattern of total inappropriate behaviors for AB Class 6, a sixth grade group, contrasted with the AB Group means for each of the four conditions.
Fig. 8. Pattern of total inappropriate behaviors for BA Class 1, a kindergarten group, contrasted with BA Group means for each of the four conditions.
BA Class 2

BA Class 2, a first grade with 31 students enrolled was the largest class in the BA Group. The age range was from 6 years 3 months to 8 years 4 months, and the oldest boy in the class had both learning and behavior problems. The time selected for the study was the last half of the reading period, from 11:00 to 11:30.

Many children in this class came from homes where Spanish was spoken, and several students in the class were repeating first grade. During the sessions the classroom teacher worked with about a third of the class in the reading circle while the rest of the class did independent seatwork at their tables.

The experimental sessions rapidly reduced the frequencies of inappropriate behaviors and most students chose to collect tokens redeemable for bubble gum rather than take the individual edible rewards. Tokens became very valuable, and the children became very much upset if they lost their tokens.

At the end of one session when the children were allowed to redeem their tokens, one boy had nine to turn in. The classmates accused him of stealing, and the teacher removed him for conference. The child tearfully claimed he did not steal them from his peers, but that he had gotten them at home from his brother's game. The experimenter
informed him that he could spend only the tokens earned for
good behavior in the classroom. (The boy's story concerning
the game was true.) The entire episode illustrates another
type of variable encountered in the natural environment.

Figure 9 shows how closely the profile of this first
grade classroom matches the group mean.

BA Class 3

BA Class 3, a second grade, had an enrollment of 26
children who ranged in age from 7 years 4 months to 9 years 3
months. The entire class read below grade level and included
many bilinguals. Several children were receiving help from
a remedial reading teacher, and two children had been
referred because of behavior problems. At the teacher's re­
quest the study time included the end of the reading period
when the children were becoming inattentive. This was before
lunch from 11:00 to 11:30.

This class can be compared to AB Class 3, a low
second grade group from another school. Both classes ex­
hibited more inappropriate behaviors when in the group
reward phase (Experiment B) than the individual phase
(Experiment A). The differences were not significant when
compared to the groups, and could have occurred by chance.
However, the experimenter suggests that peer pressures may
not be operating for this grade level to the extent they do
for some of the other levels.
Fig. 9. Pattern of total inappropriate behaviors for BA Class 2, a first grade group, contrasted with BA Group means for each of the four conditions.
BA Class 4

BA Class 4, a third grade, had 28 students enrolled who ranged in age from 8 years 3 months to 10 years 10 months. This class was the highest of two third grades and AB Class 4 was the low group. The oldest boy in the class was borderline in intelligence with a verbal IQ of 83, who manifested nervous mannerisms, including a facial tic. The teacher had no strong time preference for the research; a half hour from 10:10 to 10:40 was selected to fit the experimenter's schedule.

The class was involved in reading or language arts, and required to work independently at this time. A very relaxed atmosphere prevailed in the class where a teacher with 18 years experience was in charge. During the third baseline day, the teacher was called out of the room unexpectedly for the first ten minutes. Observers recorded fewer inappropriate behaviors during her absence than when she was present. As she left she told the children they could leave their seats to exchange books while she was gone.

This classroom is contrasted with the BA Group mean in Figure 11.
Fig. 10. Pattern of total inappropriate behaviors for BA Class 3, a second grade group, contrasted with BA Group means for each of the four conditions.
Fig. 11. Pattern of total inappropriate behaviors for BA Class 4, a third grade group, contrasted with BA Group means for each of the four conditions.
BA Class 5

BA Class 5, a fourth grade group, had 28 students enrolled and the age range was from 9 years 3 months to 11 years 9 months. This was the lowest of two fourth grade classes grouped according to academic ability, and had 17 boys enrolled and 10 girls. Several students received special help in reading, and about half the class was bilingual.

Two low-achieving boys, one of whom had a verbal IQ in the mid-70's, also had behavior problems. The teacher had requested assistance in working with the two boys. An afternoon time period was arranged at the teacher's request; the social studies period from approximately 1:20 through 1:50 was used throughout the study.

Prior to the first experimental session the teacher commented that she had been having difficulty with gum-chewing and asked that this also be added as an inappropriate behavior. She agreed that students could chew gum they had earned with the tokens, and a fine example for applying the Premack principle resulted. With one exception, all students took tokens from the reward tray in this classroom. A rather heavy boy always took a candy he could eat immediately, and the experimenter interpreted this as an inability to delay gratification.
All students, including the two boys designated as special problems, responded well to the contingencies set forth in the experimental sessions. This class was probably the most enthusiastic about being included in the study, and after its termination would ask the experimenter when she was coming back to their class again.

The profile for this class is graphed on Figure 12 on the following page.

BA Class 6

BA Class 6, a fifth grade group, had 28 students enrolled. The age range was from 10 years 3 months to 12 years 3 months, and the class was one of five heterogeneously grouped fifth grades. Several bilinguals were enrolled in the class and one Negro student. The class also included a boy who, the previous year, had been given individual help for both behavioral and learning problems.

The classroom teacher, who had been moved from fourth to fifth grade along with this child, had become quite sophisticated in behavioral strategies. She was very much interested in being included in the study because she viewed it as a further learning situation.

Since the school was a considerable distance from the others that were participating, the study time was scheduled near the end of the day from 3:00 to 3:30. The
Fig. 12. Pattern of total inappropriate behaviors for BA Class 5, a fourth grade group, contrasted with BA Group means for each of the four conditions.
class had a language arts or social studies lesson at this time of the day which met the criteria for the study.

During the experimental phases the boy who had been assisted in a prior year, through contingency arrangements, emitted no inappropriate behaviors. Very few of his classmates from the prior year were in class with him again.

The profile for this class is graphed in Figure 13 on the following page.

Summary

Results of hypotheses testing revealed that there was no significant difference in the effects of two reward systems, individual or group, in reducing inappropriate behaviors in twelve regular classrooms. Both systems reduced maladaptive behaviors and shaped attentive behaviors which are incompatible with maladaptive behaviors. There was no significant difference in the classrooms within each group or between the groups on either of the four study conditions according to a two-way analysis of variance.

These results occurred despite the considerable variation of the classrooms within the groups. Classrooms included grades kindergarten through six, and ranged in size from 19 to 34 children. All classes included at least one child with behavioral problems and most classes included some bilingual children.
Fig. 13. Pattern of total inappropriate behaviors for BA Class 6, a sixth grade group, contrasted with BA Group means for each of the four conditions.
CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

The purposes of this chapter are: (1) to make a summary of the study; (2) to draw conclusions from the data; and (3) to make recommendations for additional research.

Summary

For this study behavioral data was collected and recorded in twelve regular classrooms for a predetermined daily half-hour time. The entire study was conducted in two five-week sessions in the spring semester of 1968.

The study focused on assessing two methods of shaping attentive classroom behavior through reduction of inappropriate behavior. One method reinforced each individual student contingent upon his appropriate behavior, and the second method reinforced the classroom group contingent upon their collective behavior.

Both experimental methods, individual reinforcement (A) and group reinforcement (B), were very effective in reducing inappropriate classroom behavior. There was no statistically significant difference in the effectiveness of the two reinforcement methods.
Conclusions

This study has demonstrated that two types of behavior modification methodology, individual and group reinforcement, can successfully reduce inappropriate behavior in regular classrooms of average size ranging from kindergarten through grade six. Since group reinforcement is more manageable and less expensive to implement than individual reinforcement, it should be tested further as a management tool in regular classrooms. Skill in behavior management could increase the effectiveness of many teachers.

Analysis of the data from this study supports a premise advanced by other researchers which is that behavioral models for group treatment could be constructed and implemented by regular school personnel (Walker et al., 1969). Leshin (1967) stresses that there is a chronic shortage of special education personnel and concludes "most children will have their needs met by regular elementary and secondary teachers or their needs will not be met at all" (p. 3). Therefore, incorporation of behavioral methodology into regular classrooms could meet the needs of additional numbers of exceptional children, especially the behaviorally disturbed.

The efficacy and efficiency of a behavior modification program, for a rather narrow range of goal behaviors, was demonstrated to teachers during this study. These
results indicate that teachers could be trained to apply the technology and techniques in many classroom situations.

Most children exhibit hyperactive behaviors at times but children labeled disturbed exhibit such behaviors more frequently than do their classmates. All classrooms contain children who exhibit maladaptive behavior in varying degrees. This research suggests that more children who exhibit such behaviors could be assisted while remaining in regular classrooms if teachers were trained in behavior modification technology. Research by Glavin and Quay (1969) also supports this premise.

Limitations

Research in the natural environment exposes an experimenter to variables that are beyond his ability to control. Examples of variables encountered in this study include additional personnel in the classroom, the bell timer which signaled the end of intervals, and changed teacher behavior as a result of the presence of observers.

Definitions of inappropriate behavior were subjective and were assumed to be incompatible with attending behavior. This assumption could be challenged.

Recommendations

Group behavior modification, rewarding the entire group for the collective behavior of all individuals within the group, merits further study and research. Such rewards
as trips (positive reinforcement) coupled with peer disapproval (aversive consequences) have been used successfully with groups (Walker et al., 1969). The relative strength of various classes of group reinforcers needs to be researched. The closer such reinforcers approximate contingencies in the natural environment, the more acceptable the entire technology will be to the critics.

Greater application of the technology in public schools could serve the twofold purpose of "treating present behavior problems and for preventing future problems" (Ulrich, et al., 1968, p. 2). Since there is a chronic shortage of special education personnel in relation to the number of children requiring special services (Leshin, 1967), this methodology deserves consideration. Specially trained personnel could spend more professional time with groups rather than with individual children.

The efficiency of employing group behavior modification in regular classrooms or in specific environmental situations is its strongest point. This study supports the view that both individual and group behavior modification can shape behavior. Because a teacher or allied professional can assist greater numbers of children when working with groups rather than with individuals, more research is needed to refine and improve group technology.
APPENDIX A

CODED INAPPROPRIATE CLASSROOM BEHAVIORS

The coding categories have been adapted from Becker et al. (1966).

<table>
<thead>
<tr>
<th>Symbols</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td>Motor behaviors and disruptive noise which indicate inattention: Leaving desk or activity area. Additional disruptive movement such as running, or any random movements in the room. Rocking in chair, moving or tilting chair, playing with object in or near desk or work area. Tapping objects, feet, clapping hands, banging desk. Talking without permission, or other vocalizations such as crying, whistling, and singing.</td>
</tr>
<tr>
<td>-</td>
<td>Inattention: Looking away from teacher or task for more than 15 seconds.</td>
</tr>
<tr>
<td>O</td>
<td>Other: To be used when other categories are not appropriate. (Example: a child ignores teacher's question or direct command.)</td>
</tr>
<tr>
<td>✗</td>
<td>Approaching experimenter and questioning her presence or attempting to converse.</td>
</tr>
</tbody>
</table>
APPENDIX B

RECORDING SHEET SAMPLE

CLASSROOM ___________________________ DATE _______________________

SCHOOL ___________________________ Ss: BOYS _____ GIRLS _____

- [ ] INATTENTION BEHAVIOR
- [x] INAPPROPRIATE BEHAVIOR
- [ ] APPROACHING RECORDER
- [ ] OTHER

<table>
<thead>
<tr>
<th>RECORDER</th>
<th>DESIGN</th>
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<tr>
<td>1 2 3 4 5</td>
<td>5 minutes</td>
</tr>
<tr>
<td>1 2 3 4 5</td>
<td>10 minutes</td>
</tr>
<tr>
<td>1 2 3 4 5</td>
<td>15 minutes</td>
</tr>
<tr>
<td>1 2 3 4 5</td>
<td>20 minutes</td>
</tr>
<tr>
<td>1 2 3 4 5</td>
<td>25 minutes</td>
</tr>
<tr>
<td>1 2 3 4 5</td>
<td>30 minutes</td>
</tr>
</tbody>
</table>

TOTAL: _______________________

COMMENTS: 75
APPENDIX C

REWARD TRAY

M & M'S

TOKENS
(redeemable for bubble gum)

CANDY CORN

CHEETOS

BOSTON BAKED BEANS
(candy)

RAISINS
### APPENDIX D

**CHART OF RANDOMIZED TIME INTERVALS FOR EXPERIMENTAL CONDITIONS***

<table>
<thead>
<tr>
<th>Class</th>
<th>Experiment I (5 days)</th>
<th>Experiment II (5 days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB 1</td>
<td>15 13 17 12 18</td>
<td>10 18 12 19 11</td>
</tr>
<tr>
<td>AB 2</td>
<td>9 18 11 17 20</td>
<td>19 9 16 14 13</td>
</tr>
<tr>
<td>AB 3</td>
<td>11 16 15 13 9</td>
<td>18 13 14 12 19</td>
</tr>
<tr>
<td>AB 4</td>
<td>11 20 14 16 19</td>
<td>19 10 16 14 11</td>
</tr>
<tr>
<td>AB 5</td>
<td>19 14 11 17 20</td>
<td>20 17 14 12 18</td>
</tr>
<tr>
<td>AB 6</td>
<td>16 12 19 14 17</td>
<td>15 20 14 19 12</td>
</tr>
<tr>
<td>BA 2</td>
<td>9 11 13 14 12</td>
<td>18 13 16 14 12</td>
</tr>
<tr>
<td>BA 1</td>
<td>12 9 13 11 20</td>
<td>17 12 13 15 9</td>
</tr>
<tr>
<td>BA 3</td>
<td>14 18 16 15 12</td>
<td>13 16 10 17 11</td>
</tr>
<tr>
<td>BA 4</td>
<td>13 17 20 16 18</td>
<td>20 18 19 14 16</td>
</tr>
<tr>
<td>BA 5</td>
<td>10 12 17 13 9</td>
<td>20 15 10 18 13</td>
</tr>
<tr>
<td>BA 6</td>
<td>17 20 13 9 18</td>
<td>14 12 9 20 10</td>
</tr>
</tbody>
</table>

*The first interval of the half-hour time period was determined randomly by drawing numbers from 9 to 20.*
APPENDIX E

RANDOM SAMPLES OF INTER-OBSERVER RELIABILITIES

The inter-observer reliabilities were computed according to the following formula:

\[
\frac{\text{agreements}}{\text{agreements} + \text{disagreements}} = \text{inter-observer reliability}
\]

Recorded inappropriate behaviors must agree in number and category, and be registered in the same interval by both recorders in order to be counted as agreements. No consideration was given in this formula to those intervals without an entry.

<table>
<thead>
<tr>
<th>Class</th>
<th>Condition</th>
<th>Day (30-minute)</th>
<th>Inter-observer Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB 1</td>
<td>Baseline</td>
<td>2</td>
<td>80%</td>
</tr>
<tr>
<td></td>
<td>Experiment B</td>
<td>3</td>
<td>100%*</td>
</tr>
<tr>
<td>AB 2</td>
<td>Baseline</td>
<td>4</td>
<td>97%*</td>
</tr>
<tr>
<td></td>
<td>Reversal</td>
<td>5</td>
<td>80%</td>
</tr>
<tr>
<td>AB 3</td>
<td>Experiment A</td>
<td>2</td>
<td>100%*</td>
</tr>
<tr>
<td></td>
<td>Reversal</td>
<td>1</td>
<td>95%</td>
</tr>
<tr>
<td>AB 4</td>
<td>Baseline</td>
<td>1</td>
<td>88%</td>
</tr>
<tr>
<td></td>
<td>Reversal</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>AB 5</td>
<td>Experiment A</td>
<td>2</td>
<td>100%*</td>
</tr>
<tr>
<td></td>
<td>Reversal</td>
<td>5</td>
<td>98%</td>
</tr>
<tr>
<td>AB 6</td>
<td>Experiment A</td>
<td>4</td>
<td>100%*</td>
</tr>
<tr>
<td></td>
<td>Reversal</td>
<td>4</td>
<td>84%</td>
</tr>
<tr>
<td>BA 1</td>
<td>Baseline</td>
<td>1</td>
<td>97%</td>
</tr>
<tr>
<td></td>
<td>Experiment A</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>BA 2</td>
<td>Experiment B</td>
<td>3</td>
<td>94%</td>
</tr>
<tr>
<td>------</td>
<td>--------------</td>
<td>---</td>
<td>-----</td>
</tr>
<tr>
<td></td>
<td>Reversal</td>
<td>3</td>
<td>87%</td>
</tr>
<tr>
<td>BA 3</td>
<td>Baseline</td>
<td>4</td>
<td>90%</td>
</tr>
<tr>
<td></td>
<td>Experiment A</td>
<td>2</td>
<td>70%**</td>
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<td>Reversal</td>
<td>1</td>
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<td>Experiment A</td>
<td>4</td>
<td>100%*</td>
</tr>
<tr>
<td>BA 5</td>
<td>Experiment B</td>
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<td></td>
<td>Reversal</td>
<td>5</td>
<td>92%</td>
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<tr>
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<td>Baseline</td>
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<td>98%</td>
</tr>
<tr>
<td></td>
<td>Experiment B</td>
<td>1</td>
<td>100%*</td>
</tr>
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*Low totals of recorded behavior
**Interval disagreements
REFERENCES


