The use of territory as a natural reinforcer in the modification of academic performance and disruptive classroom behaviors

Sherwin Lynnwood Davis

Follow this and additional works at: http://scholarship.richmond.edu/masters-theses

Recommended Citation
THE USE OF TERRITORY AS A NATURAL REINFORCER IN THE MODIFICATION OF ACADEMIC PERFORMANCE AND DISRUPTIVE CLASSROOM BEHAVIORS

BY

SHERWIN LYNNWOOD DAVIS

A THESIS
SUBMITTED TO THE GRADUATE FACULTY
OF THE UNIVERSITY OF RICHMOND
IN CANDIDACY
FOR THE DEGREE OF
MASTER OF ARTS
IN PSYCHOLOGY

MAY 1976
ACCEPTANCE

This thesis has been accepted in partial fulfillment of the requirements for the Degree of Master of Arts in Psychology in the Graduate School of the University of Richmond.

Date 4/26/66

Chairman

Barbara E. Shalley
Member

Jean N. Dickinson
Member
ACKNOWLEDGEMENTS

The author gratefully acknowledges the assistance of members of his thesis committee, Dr. Barbara Sholley, Mrs. Jean Dickenson, and Dr. Edward Tiller. Special acknowledgement is given Dr. Tiller, committee chairman, whose guidance during the past three years has been invaluable educationally and for career planning. Thanks also to Diane whose patient assistance in writing and typing--and re-typing--made the completion of this project possible. The author wishes to thank the principal, teacher, and observers who were instrumental in the study. And finally, the author wishes to thank his parents for their constant and continuing support.
Emphasis is currently being placed upon the use of low-cost, naturally occurring reinforcers in classroom behavior modification programs. The effectiveness of students' territorial space as a natural reinforcer for social and academic classroom behaviors was investigated. Using the multiple baseline technique, student access to territorial space was systematically manipulated in an attempt to decelerate out-of-seat behaviors and to increase the percentage of assignments completed and graded either satisfactory or excellent. Student vocalization was also monitored; it was predicted that increases in desired academic behaviors would produce reciprocal decreases in vocalization. Finally, a fading procedure was utilized to remove gross territorial markings from the classroom; the locus of territorial reinforcement was shifted to a large wall map. A decrease was noted in the frequency of occurrence of out-of-seat behaviors and the percentage of assignments which were graded satisfactory and excellent increased. Vocalization and task completion remained at near-baseline rates. It was concluded that territorial space is available to teachers as a potentially effective reinforcer for desirable student behaviors.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF TABLES</td>
<td>vi</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>vii</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>METHOD</td>
<td>8</td>
</tr>
<tr>
<td>RESULTS</td>
<td>16</td>
</tr>
<tr>
<td>DISCUSSION</td>
<td>22</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>29</td>
</tr>
<tr>
<td>APPENDIX</td>
<td>31</td>
</tr>
<tr>
<td>VITA</td>
<td>32</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Baseline instability measures.</td>
<td>17</td>
</tr>
<tr>
<td>2</td>
<td>Dates and raw data by phase and session for academic and social behaviors.</td>
<td>31</td>
</tr>
</tbody>
</table>
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Average frequency of &quot;Out-of-Seat&quot; behaviors per phase.</td>
<td>18</td>
</tr>
<tr>
<td>2</td>
<td>Average percentage of assignments graded &quot;E&quot; and &quot;S&quot;, &quot;U&quot; and &quot;O&quot;.</td>
<td>18</td>
</tr>
<tr>
<td>3</td>
<td>Average frequency of &quot;Vocalization&quot; behaviors per phase.</td>
<td>21</td>
</tr>
<tr>
<td>4</td>
<td>Average percentage of assignments completed per phase.</td>
<td>21</td>
</tr>
</tbody>
</table>
INTRODUCTION

Token reinforcement programs have seen increasingly frequent use in the classroom during the past decade (O'Leary and Drabman, 1971). While they have proven effective in modifying academic and social target behaviors, the extensive use of candy, trinkets, and other back-up reinforcers not naturally found in schools has given rise to a number of practical problems and ethical issues. Commonly cited among these are the monetary costs involved (Osborne, 1969), objections to "paying children to learn" (Ulrich, Wolf, and Bluhm, 1968), and the difficulty of shifting from extrinsic to natural contingencies of reinforcement when token systems are withdrawn. Consequently, many writers currently recommend reliance on naturally occurring reinforcers in classroom token programs. Axelrod (1971) has summarized this opinion stating:

"... future token experiments should employ reinforcers already available in the classroom ... Most special education teachers permit their students to have free play time, field trips and games. Rather than permitting the students to engage in such activities independent of classroom performance, the privileges could be used as reinforcers in the token program."

It is apparent that many potential sources of reinforcement are inherent in the ordinary classroom environment and that the use
of these makes it possible for teachers to avoid the complications involved in the establishment of token systems which are dependent upon extrinsic back-up reinforcers.

The goal of the present research was to investigate the use of an intriguing source of natural classroom reinforcers recently suggested by Nay, Schulman, Bailey, and Huntsinger (1974). This source is 'human spatial behavior', or more specifically, that aspect of spatial behavior referred to as territoriality.

The most widely cited definition of the concept of 'territory' is zoologist H. Hediger's (1950) statement that a territory "is an area which is first rendered distinctive by its owner and second, is defended by its owner." In most cases the authors of human territorial research have also cited the demarcation of geographic space and its subsequent defense as key elements. Most recently, F. D. Becker (1973) defined territory as a spatial area which may be identified as belonging to someone on a permanent basis which is marked and actively defended.

An additional aspect of territory is frequently overlooked; this is the positive value which reserved space holds for its owner. Becker and Mayo (1971) have written:

"Territoriality implies that some space is of more value than others, or at least that this particular space has some value for the occupant whether because of economic, biological, or social reasons, and that to give up this particular space is to incur meaningful loss."

Similarly, Roos (1968) has stated that territorial behavior "maximizes control over space in order to enhance its positive value" (p. 82). Finally, Nay et al. (1974) have translated this
concept of value into behavioral terms defining territory as "a reinforcing place to be (p. 3).

In recent years human territoriality has been investigated in a wide variety of research settings. These studies indicate the potency of geographic space as a valuable commodity for human subjects. However, only three of these studies are relevant to the thesis that territory may be manipulated as a natural reinforcer for classroom behaviors.

The first of these studies illustrates a common classroom management technique which bears resemblance to the procedure to be employed in the present research. In a treatment program which successfully decreased the frequency with which 15 retarded students left their seats, Newman and Daniel (1974) marked a square space--or territory--around each students desk by placing strips of masking tape on the floor. The squares were called "yards"; students were instructed to remain in their seats and not to trespass in another persons "yard".

A second study was conducted by Kurtzberg (1973) to test the hypothesis that when they perceive a threat toward a territory they are occupying, children who have developed "territorial identification" will exhibit more aggressive behaviors than those who have not. One-hundred sixteen kindergarten and first grade children participated as either control or experimental subjects. Each child was led into a playroom and asked to construct a miniature village on a piece of colored paper. Experimental subjects purchased their territories, labeled them with their names, and were reinforced for doing a "good job" of building
"on their property". Control subjects were simply assigned territories and were not asked to label them; they also received social reinforcers but without reference to property. After a period of time each subject was asked to leave the room. While the subject was out, a naive classmate was led into the playroom and instructed to continue building where the departed subject had stopped. Instances of direct physical or verbal aggression were recorded throughout a ten minute interval immediately following each of the subjects return to the room; children were rated for overall aggressiveness based on this data. As predicted, the experimental subjects were found more aggressive than control subjects. Kurtzberg concluded that territorial threat could produce accelerated frequencies of aggressive behaviors in children who had developed territorial identification.

An important sidelight to Kurtzberg's (1973) main experiment was a pilot study undertaken to assess the effectiveness of the procedure utilized to develop territorial identification in experimental subjects. Thirty-two children were taken to the playroom and subjected to either the control or experimental play activities described above. Two days after their initial experience in the playroom, the subjects were returned and asked to select work areas. A significantly greater number of experimental subjects chose their territories from the previous session than did controls. On the basis of this pilot research the author concluded that asking children to purchase, name, and build upon spatial areas did induce territorial identification.

The first study to investigate the use of territory as a
reinforcer for student behaviors was conducted by Nay, et al. (1974). Citing the "importance of spacing variables in interpersonal settings" (p. 1), these investigators proceeded on the assumption that "the child identifies with and values his own area, and is likely to perform or not perform certain actions in order to remain there" (p. 2). Out-of-Seat and inappropriate vocal responses were selected as target behaviors and a response-cost system was developed whereby students retained contact with their territories by avoiding the performance of disruptive responses. This multiple baseline study consisted of three phases including baseline and treatment conditions for out-of-seat and inappropriate vocal behaviors. The subjects were 24 fourth grade children having a mean age of ten years, two months. Following a fifteen day baseline period, the out-of-seat intervention was initiated. As a first step a number of individual territories were marked in the classroom by putting taped boundaries on the floor around students' desks. Next, students chose the general area of the room they preferred and were assigned territories in accordance with these preferences. Once assigned a space, the student named it and drew a travel poster depicting a scene from his territory; travel posters were hung on the backs of the students' desks. In addition to territory preparations during this phase, a color-coded discriminator in the form of a traffic signal and a set of rules were introduced into the classroom environment. Under the "Territorial Rules of Order", when the red light was showing, no student could leave his seat or his territory. Those who violated the rule were sent to "No Man's Land"
for a minimum period of twenty minutes. "No Mans Land" consisted of several unmarked chairs located at the side of the classroom. Results of this initial phase indicated a decrease in the frequency of out-of-seat behaviors to the zero level; inappropriate vocal behaviors remained at baseline levels.

The treatment phase for inappropriate vocal behaviors began with the introduction of a new discriminative signal—a poster featuring open versus closed lips on alternate sides—and a rule instructing students to remain silent when the closed lips were showing. Predictably, no rate changes in inappropriate talking were noted following the introduction of the poster and new rule. However, after one week the "No Mans Land" contingency was added to the talk-out rule—students talking when the closed lips were showing were sent to "No Mans Land"—and, in support of the author's hypothesis, inappropriate vocal behaviors dropped quickly to near zero frequency levels.

Nay et al. (1974), like Kurtzberg (1973), were able to induce "territorial identification" in a group of children by assigning a clearly marked space as their personal territory and instructing them to name and build on it. Furthermore, a response-cost system based on the contingent withdrawal of territory was shown to be an effective means of decelerating disruptive behaviors. As Nay et al. (1974) predicted, the students were willing to "... not perform certain activities in order to remain" (p.2) in their territories. Apparently, as Becker and Mayo (1971) wrote "... to give up this particular space is to incur meaningful
loss" (p. 380).

The present study was designed to investigate the utilization of territorial space as a reinforcer. Two general classes of school behavior were considered. First, changes in "academic performance" during the study were measured in terms of task completion rates and teacher ratings or grades earned. As emphasized in current literature (Winett and Winkler, 1972; O'Leary, 1972; Azrin and Roberts, 1974) behavioral techniques are of value in educational settings only to the degree that they facilitate learning. While territory has been manipulated in the successful reduction of disruptive behaviors (Nay et al., 1974) its value as a reinforcer for academic performance must also be demonstrated.

The second class of behaviors considered in the study were the "social behaviors" which are important as targets for intervention primarily because they interfere with academic work. Out-of-Seat and inappropriate vocalization were selected as target behaviors from this response class. Students who are "unable" to remain in their seats do little class work. Teachers who are constantly involved with the control of disruptive behaviors have little time for teaching. As shown by Hops and Cob (1972) and Greenwood, Hops, Delquadri, and Guild (1974) "academic survival behaviors", such as being in-seat, attending to the teacher, listening, and compliance are related to the student's ability to learn in school. These authors stated, "All children regardless of ability must first be taught the prerequisite skills that will enable them to take advantage of educational opportunities
offered them in the classroom."

It was hypothesized that:

1) The removal of students from their territory for a temporary period contingent upon the occurrence of inappropriate out-of-seat behavior would result in a decrease in the rate of out-of-seat behavior as compared to baseline.

2) If the opportunity for students to expand their territories was made contingent upon the completion of assigned academic tasks and earning either superior or average teacher ratings, then the frequency with which students completed tasks and received average or superior ratings would increase as compared to baseline.

3) An increase in task completion and average or superior teacher ratings would be accompanied by a simultaneous decrease in the frequency of inappropriate vocalization from baseline levels.

4) A fading procedure could be used to shift the locus of reinforcement for academic behaviors from "real" territory as marked by tape on the classroom floor to more "abstract" territory on a large wall map. Territory reinforcers provided by the map would maintain academic behaviors at the frequency levels reached during treatment and just prior to the initiation of the fading procedure.

METHOD

Subjects

Subjects were male and female members of a third grade class in a Richmond area public elementary school. The teacher was a volunteer who had experienced management difficulties with her class.

Target Behaviors

The following behaviors served as academic and social target behaviors:

Out-of-Seat: Movement of the child from his seat without permission of the teacher. The student's weight is not supported by his chair or his contact with the
chair is limited to the bottoms of his feet and/or one or both hands. Standing or squatting on the chair is recorded as "out-of-seat".

Vocalization: Talking to other students, calling out to the teacher, screaming, laughing, coughing loudly, singing, whistling, or other vocal noises not approved by the teacher.

Task Completion: All items on a student's assignment are completed. While it is not required that all items be correct, all must bear evidence of the student's work.

Teacher Ratings: Evaluations of the quality of each student's performance on assignments made by the teacher. All assignments are rated either "E" (excellent), "S" (satisfactory), "U" (unsatisfactory), or "O" (no work done).

Data Collection

Two methods of data collection were utilized. Information relating to task completion and task ratings was taken from the teacher's records. An interval recording procedure was used to obtain data on out-of-seat and inappropriate vocalization. Twenty minute observation sessions were scheduled to coincide with academic work periods. Each observation session consisted of 40 thirty second intervals; observers watched the students for 20 seconds and recorded their observations during the following 10 seconds.

Observer/Recorders. Five individuals participated in the study as observers. Each observer was trained with the interval recording system but was kept naive as to the hypotheses of the study. Training consisted of detailed instruction and role-played practice followed by several sessions of in-class practice.

Observer reliability. Observer reliability is the degree to which two or more data collectors agree on their simultaneous observations of a single subject. In the present study reliability was determined by comparing the data obtained by pairs of independent
observers during 20 minute observation sessions in the study classroom. Reliability scores for pairs of observers were computed as follows:

\[ \frac{\text{agreements}}{\text{agreements} + \text{disagreements}} \times 100 = \% \text{ of agreement.} \]

One "agreement" was tallied for each 20 second interval in which both observers recorded either the occurrence or non-occurrence of a given behavior. Baseline recording began after observers achieved reliability scores in excess of 90% agreement in three consecutive observation sessions.

**Baseline stability.** The evaluation of treatment effects in studies employing operant designs is accomplished through the comparison of post-treatment data with that collected during the baseline phase. Baseline data must provide a stable standard against which changes may be assessed. While variability around the grand mean is expected for separate baseline data points, this mean should not be characterized by a significant degree of slope. If the baseline mean for a target behavior indicates an upward or downward trend, the comparison of baseline with post-treatment data is confounded and any statement made as to the effectiveness of the experimental manipulation is weakened. The use of a baseline stability criterion allows an experimenter to objectively determine the maximum variability which will be tolerated in a "stable" baseline before beginning a study. The baseline stability criterion described by Tiller (1973) was adopted for the present study. The baseline phase was considered complete after six observation sessions when the stability criterion of .20 was met. Baseline stability was calculated as follows:
\[
\frac{M_1 - M_2}{M_g} = \text{baseline stability level, where:}
\]

\[
M_1 = \text{mean of the first three sessions;}
M_2 = \text{mean of the final three sessions;}
M_g = \text{overall or grand mean.}
\]

**Treatment effectiveness.** Treatment effectiveness is the degree to which a treatment intervention achieves the behavioral outcome goals for which it is designed and initiated. The effectiveness of a behavioral treatment procedure can be fairly assessed only if the amount of behavior change needed or desired has been determined. If slight changes are necessary and slight changes are produced, a treatment procedure may be judged "effective"; however, where massive behavior change is imperative, procedures which produce slight changes are "ineffective". Setting clear goals prior to the initiation of treatment permits the meaningful assessment of treatment effectiveness. In the present study, results were evaluated in terms of the following treatment outcome goals:

- **Out-of-Seat:** Occur in 10% or less of all observation intervals.
- **Inappropriate vocalization:** Occur in 20% or less of all observation intervals.
- **Task completion:** 90% of all assignments will be completed.
- **Ratings:** 90% of all papers will receive superior or average ratings.

Treatment effectiveness, a numerical statement of the percentage of desired change which actually occurred, was calculated by dividing the actual amount of change in target behaviors by the desired amount of change (Tiller, 1974), or,

\[
\frac{a - b}{a - c} \times 100 = \% \text{ of treatment effectiveness, where:}
\]

- \(a\) = target behaviors' baseline average;
- \(b\) = target behaviors' treatment average;
- \(c\) = target behaviors' treatment outcome goal.
Design

The design of the study conformed to the multiple baseline technique frequently used in operant research. In this design, baseline measures are taken on several target behaviors simultaneously. Then, during successive phases of a study, treatment procedures are applied to target behaviors one at a time. It is expected that each target behavior will remain at its measured baseline level—demonstrating stability in uncontrolled variables—until treatment is applied. As target behaviors change following successive applications of the experimental treatment procedure evidence that modifications are a result of treatment rather than coincidence increases.

Baseline. Several pre-baseline observation sessions were conducted for observer training and to allow the teacher and students to become acclimated to the presence of observers in the classroom.

During the baseline phase of the study, observers recorded occurrences of out-of-seat and inappropriate vocalization under pre-treatment conditions. Baseline recording was terminated after 6 observation sessions—6 school days—when the stability criterion of .20 was attained.

Phase 1: Territory demarcation. This phase of the study was in effect for 4 days. During Phase 1 students took "ownership" of individual territories around the classroom. Each student territory was clearly marked by taped boundaries on the classroom floor. Territorial boundaries enclosed areas measuring approximately one square yard each and contained one desk and chair.
Territory assignments were based upon the expressed seating preferences of individual students to the extent that this was possible. Each student proprietor received a "property deed". In order to enhance "territorial identification", students were asked to name their territories, to draw travel posters, and to design territorial flags. Each student was asked to write the name of his territory on his deed and hang the posters and flags on his chair or desk.

**Phase 2: Out-of-Seat I.** This phase of the study consisted of 6 observation sessions--14 school days including spring break--during which a color-coded discriminator and two simple rules were added to the classroom environment. The discriminator--a large poster having one red side and one green side--was hung in the front of the classroom and was used to make the teacher's wishes with regard to seating clear at all times. During work periods, when students were not to be out of their seats without permission, the red side was turned outwards. At all other times, the teacher signaled that free movement was permissible by displaying the green side of the poster.

Two rules governing out-of-seat behaviors were introduced in conjunction with the color-coded discriminator. These territorial rules were posted in the front of the classroom throughout the study and were read daily by a student volunteer. During Phase 2 the rules appeared as follows:

**Territorial Rules**

1) When the **red** signal is showing, remain in your seat.

2) When the **green** signal is showing, if you wish you may leave your territory.
Phase 3: Out-of-Seat II. This phase of the study consisted of 6 sessions—7 school days—during which each student's right to remain in his territory was made contingent upon his behavior. Several unassigned desks located along one wall in the classroom were designated as "No Man's Land"—no territorial markings of any kind were added to this area. Students who left their seats without permission when the red signal was up were sent to "No Man's Land". Following revision during this phase to include the "No Man's Land" contingency, the class rules appeared as follows:

1) When the red signal is showing, remain in your seat. If you do not you will be sent to NO MAN'S LAND. Once there, you must remain seated for twenty minutes, regardless of the color showing.

2) When the green signal is showing, if you wish you may leave your territory.

Phase 4: Academic I. This phase of the study consisted of 4 observation sessions—4 school days—during which an academic rating scale, a third rule, and the territorial map were presented to the class. The rating scale used permitted the assessment of two aspects of task performance. First, the teacher checked each student's work for quality and rated his performance as excellent—"E"—satisfactory—"S"—or unsatisfactory—"U". The second aspect of each student's academic performance rated was task completion. Students who worked on all parts of an assignment received a star (★).

The quality and completeness rating scale was presented to the students as a territorial rule in the following form:

3) Do your work as best you can. The teacher will check your paper when you have finished and give you an "E", "S", or a "U" depending on how well
you do. If you complete all of your work, you will also get a star (⭐).

The final change in the classroom environment made during Phase 4 was the addition of the "territorial map." This map—which was hung on a side wall in the classroom—showed the locations of each student territory, the teacher's desk, extra tables, bookshelves, and "No Man's Land".

**Phase 5: Academic II.** This phase of the study consisted of 6 observation sessions—6 school days—during which the opportunity for students to enlarge their own territories was made contingent upon point earning for task completion and average or superior teacher ratings on assignments. Students received points as follows:

Ratings: Excellent (E) = 8; Satisfactory (S) = 6; and, Unsatisfactory (U) = 2.

Task completion: (⭐) = 2.

Students were able to purchase extra space with the points they earned on academic tasks in order to enlarge their territories. Increases in individual territories were represented by the movement outward of taped boundaries and the addition of colored squares to the territorial map.

The point system and territory prices were added to the posted list of territorial rules as follows:

4) You will receive 8 points for each "E", 6 points for each "S", and 2 points for each "U" you earn on your work. You will also receive 2 extra points if you finish your work and earn a star (⭐).

5) You may make your territory larger by purchasing extra space with points you have earned. Territory prices: To move one boundary line outward one inch costs 10 points.

**Phase 6: Territory Map Game.** This phase of the study consisted of 6 observation sessions—7 school days—during which all
gross territorial markings—taped boundaries, posters, flags, deeds—were gradually removed from the classroom. The objective of this fading procedure, was to shift territory reinforcers to the wall map. Students continued to earn points for academic performance but territory purchases were reflected only by the expansion of map spaces.

Follow-up. Once all gross territorial markings were removed from the classroom, the formal study was considered complete. In order to assess the durability of acquired academic and social behaviors, observers returned to the classroom for 4 follow-up recording sessions over a two week period—10 school days.

RESULTS

Observer Reliability

Observers met the reliability criterion of 90% agreement without difficulty. Baseline recording was begun following two consecutive sessions in which observers attained 97.5% agreement.

Baseline Stability

Stability data is recorded in Table 1. Calculations indicate that the variability of baseline data for each target behavior was within acceptable limits.

Out-of-Seat

The average frequency of occurrence for out-of-seat behaviors during each phase is illustrated by Figure 1. During baseline sessions out-of-seat averaged 89.6%. No change in this rate is indicated by Phase 1 data. The frequency of out-of-seat behaviors did decrease following the introduction of rules and the color-coded discriminator during Phase 2; data collected indicated that
Table 1

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Instability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Out-of-Seat</td>
<td>.06</td>
</tr>
<tr>
<td>Vocalization</td>
<td>.13</td>
</tr>
<tr>
<td>&quot;E&quot;'s and &quot;S&quot;'s earned</td>
<td>.13</td>
</tr>
<tr>
<td>Completion</td>
<td>.04</td>
</tr>
</tbody>
</table>

Maximum acceptable instability = .20.
Figure 1. Average frequency of "Cut-of-Seat" behaviors per phase.

Figure 2. Average percentage of assignments graded "E" and "S", "U", and "O".
out-of-seat averaged 77% during this phase.

A marked treatment effect is reflected by Phase 3 data. Following the addition of the "No Man's Land" contingency to the Territorial Rule 1 the frequency of out-of-seat behaviors decreased to an average of 22.5%. This modified level of behavior was maintained throughout Phases 4, 5, and 6. Across these three phases out-of-seat behaviors were recorded at an average rate of 19.5%. Treatment effectiveness calculations based upon this rate reveal that 88% of the treatment outcome goal for out-of-seat, a decrease to 10% (see page 11) was achieved during the study.

Follow-up data collected in four sessions between three and fourteen days after the completion of Phase 6 indicates an increase in out-of-seat behaviors to an average of 41%. However, it should be noted that this increase was primarily due to the unauthorized use of a seat at a reading table by a single student (see page 23). The adjusted average shown in Figure 1 reflects class behavior excluding data generated by this individual. Based on the adjusted average, effectiveness calculations indicate that 100% of the treatment outcome goal for out-of-seat behaviors was achieved.

Grades Earned

Figure 2 shows the average frequency with which grades were earned during each phase of the study. Baseline data was collected on grade earning prior to the initiation of Phase 4. During this baseline period 62% of the teacher's assignments were graded either Excellent ("E") or Satisfactory ("S"). 4% were graded Unsatisfactory ("U"), and 34% were graded Zero ("0") when no work was submitted.
Phase 4 data indicates that no changes occurred in the percentage of assignments receiving each grade following the addition of Rule 3. During Phase 5 the percentage of "E"'s and "S"'s earned remained at near-baseline levels. However, the percentage of assignments left undone decreased to an average of 25%.

During Phase 6, 74% of the teacher's assignments were graded either "E" or "S". Treatment effectiveness calculations based on this data indicate that 41% of the outcome goal for "E"'s and "S"'s earned was achieved. The average rate of "O"'s earned decreased to 16% and 9% of student assignments were graded "U".

Follow-up data indicates a further increase in the percentage of "E"'s and "S"'s earned to an average level of 78%. Treatment effectiveness calculations based upon follow-up data indicate that 59% of the outcome goal for "E"'s and "S"'s earned was achieved. The frequency with which assignments were not initiated--"O"'s--remained unchanged at 16% and the frequency of "U"'s decreased to an average of 6% of all assignments.

Vocalization

Figure 3 illustrates the rate of vocalization throughout the study. This target behavior occurred during an average of 92.5% of observation intervals in baseline recording sessions. No treatment effects are indicated by data collected during Phase 1. Data from Phases 2, 3, and 4 indicate slight decreases; vocalization was recorded during an average of 83% of observation intervals across these 3 phases.

During Phases 5 and 6 vocalization occurred at average rates of 66% and 73% respectively--an average rate of 70% for sessions
Figure 3. Average frequency of "Vocalization" behaviors per phase.

Figure 4. Average percentage of assignments completed per phase.
in these phases. Treatment effectiveness calculations based on a decrease to 70% indicate that 31% of the outcome goal for vocalization—decrease to 20%—was achieved by the end of Phase 6.

Follow-up data reflect a further decrease in vocalization to 51%. Treatment effectiveness calculations based upon follow-up data indicate that 57% of the outcome goal for vocalization was achieved.

Completion

Figure 4 illustrates the rate of completion for academic tasks during the study. Baseline data collected prior to the initiation of Phase 4 indicates that students completed an average of 54% of their assignments. Data collected during subsequent phases show no changes in the percentage of assignments completed.

DISCUSSION

The results reported demonstrate that modifications in student behaviors can be produced through the manipulation of classroom territory as a reinforcer. In support of hypothesis one, the establishment of a cost contingency between out-of-seat behavior and the removal of students from their territories did result in a decrease in the frequency of this behavior. However, the outcome goal for out-of-seat behaviors was not reached; two factors should be considered in explanation for this failure. First, is the high operant level of out-of-seat behavior recorded during sessions 1 through 10. One or more students were out of their seats during an average of 90% of the observation intervals in each session. Baseline levels of 40% to 50% were expected when the outcome goal was set at 10%.

A second important factor was the extreme sensitivity of the
recording procedure used in the study. "Out-of-Seat" was recorded in an observation interval if any one student was out of his seat for any fraction of the interval. Qualitative changes in the numbers of students who were identified as being out-of-seat per observation interval during the various phases were not recorded. However, the subjective reports of observers and the teacher indicate that during initial observation sessions, out-of-seat recordings were produced by five or more persons exhibiting the behavior in each interval; during final phases most out-of-seat recordings were produced by a single student. As an example, the high percentage of out-of-seat behaviors shown in Figure 2 for the follow-up phase resulted from a single student's inappropriate use of a seat at a reading table. The student was working quietly at the reading table but, by definition, was "Out-of-Seat". The adjusted average which appears on this graph shows the follow-up data averaged without the inclusion of "Out-of-Seats" generated by this student. This adjusted average exceeds the treatment outcome goal and provides a more accurate reflection of behavior in the classroom during the two weeks immediately following Phase 6.

Phase 2 data indicate that a decrease in the frequency of out-of-seat behaviors followed the addition of the color-coded discriminator and Rules 1 and 2 to the classroom environment. While it has been shown that the introduction of rules alone is not likely to produce significant behavior changes (Madsen, Becker, and Thomas, 1968), Legum and Nay (1972) have reported finding that the use of an unambiguous visual stimulus in conjunction with rules can produce modifications in student behavior. These
authors have attributed such treatment effects to the increased clarity which the discriminative stimulus gives to the teacher's expectations for student behavior at any given time. In the present study the addition of rules in conjunction with a visual discriminative stimulus also lead to a marginal change in student behavior. In light of the extreme confusion existing in the study classroom during baseline sessions—as reflected by out-of-seat and vocalization rates exceeding 90%—it is reasonable to conclude that the concise statement of rules and the use of the discriminator did clarify the teacher's expectations for students' behavior and that this clarification resulted in a decrease in out-of-seat behaviors.

Hypothesis 2 asserted that incremental increases in the size of student territories could be manipulated in order to reinforce the quality and frequency of completion of academic work. The frequency with which students earned satisfactory or excellent ratings on assignments did increase during the study—though the treatment outcome goal set at 90% of all assignments was not attained. Task completion did not vary significantly from baseline levels. These seemingly contradictory treatment effects are easily explained. The point system in use was weighted toward the reinforcement of performance quality. Students could earn 6 to 8 points by doing their work accurately, while the completion of an assignment earned only 2 points. Students quickly determined the least effort necessary for maximal point earning. Consequently the percentages of "E"'s and "S"'s increased while the rate of completion remained unchanged. Several factors may have contri-
buted to the failure to reach the outcome goal of 90% "E"'s and "S"'s earned. First, this treatment goal was set before the collection of data began and was not adjusted when it was found that fully one-third of the assignments made during baseline were not even initiated by students. It is unrealistic to expect twenty-five students to go from doing no work on 33% of their assignments to earning satisfactory or excellent ratings on 90% of their assignments in 6 to 10 days. Second, a number of practical problems interfered with the consistent and immediate exchange of points for backup reinforcers during Phase 5. The time and effort involved in moving tape boundaries alone was a major source of such delays. Initially the teacher found it difficult to grade papers and award points earned within less than 24 hours. Finally, several students encountered difficulties in using the point recording sheets and lost points temporarily due to their own errors. Together these problems served to weaken the reinforcing potential of points and territory expansion during early sessions of Phase 5.

The frequency with which students earned "E"'s and "S"'s during Phase 5 remained near baseline levels and the percentage of assignments graded "U" increased. As the percentage of assignments graded "U" increased, "O"'s decreased; apparently, students began to make a minimum effort, earning "U"'s on assignments that previously would not have been attempted. The reinforcing effect of points and territorial expansion became more clear in Phase 6. The frequency of "O"'s continued to decrease, the percentage of assignments graded "U" dropped slightly, and the percentage of "E"'s and "S"'s increased. Thus when Phase 5 began, students began turning in more work than
earlier in the school year; however, this work was of unsatisfactory quality. During Phase 6 as point reinforcement continued percentages of "O"'s and "U"'s decreased while "E"'s and "S"'s increased.

Hypothesis three predicted that as the quantity and quality of academic behaviors increased, reciprocal decreases in the frequency of occurrence of vocalization would be recorded. This prediction was based upon an assumption of behavioral incompatibility between these target behaviors; it was assumed that high frequencies of task completion and superior task performance could not occur simultaneously with high frequencies of vocalization. Hypothesis three in not supported by the results obtained. The percentage of assignments graded either "E" or "S" increased during Phases 5 and 6. While a slight decline in the rate of vocalization was observed in Phase 5, this deceleration did not continue into Phase 6. The decrease in vocalization indicated by follow-up data must be viewed cautiously. Observers report that the teacher began using an uncontrolled group contingency program following Phase 6 which was designed to reduce the frequency of vocalization. In short, task performance quality increased while the rate of vocalization was maintained at near baseline levels. Qualitative changes in vocalization behaviors were noted by observers during Phases 4, 5, and 6. Early in the study, student's vocalization was very loud. Noise from the classroom could often be heard in other parts of the school building. In later sessions, however, "vocalization" typically consisted of "quiet" interactions between pairs of students. Thus, while qualitative changes in vocalization were observed, no significant decrease in the rate of vocalization was recorded.
The increasing quality of academic performance—"E"'s and "S"'s earned—in the absence of notable decreases in the rate of vocalization supports an important assertion made by Winett and Winkler (1972). These authors emphasized the point that many classroom management studies have been designed to reduce "inappropriate behaviors" but that little thought has been given to the actual need for such reductions. These authors question the validity of the assumption that students must be "quiet, still and docile" in order to satisfactorily perform academic assignments and "learn". While observer reports indicating qualitative changes in vocalization lend marginal support to the notion that the reinforcement of academic work has the reciprocal effect of decreasing inappropriate talking, results of the present study suggest that the quality of academic performance, as measured by grades earned, can increase even though vocalization remains at a relatively high frequency level.

Hypothesis 4 states that a fading procedure could be utilized to remove gross territorial markings from the classroom while maintaining any desirable behavior changes produced during the study. This hypothesis is supported by data on grades earned. As illustrated by Figure 2, the average percentage of assignments graded "E" and "S" increased to 73% during Phase 6 as territory boundaries, flags and posters were gradually being removed from the classroom. The improving trend continued through the four follow-up sessions and "E"'s and "S"'s were earned on 73% of students' assignments even though all points earned during this period were exchangeable for increases in map territory only. Utilization of the map eliminated
the time-consuming job of overseeing the movement of taped boundaries, etc., while it provided sufficient reinforcement to maintain the increased rate of assignments graded satisfactory or excellent.

In summary, the manipulation of territory as a low cost reinforcer produced a decrease in the frequency of out-of-seat behaviors and an increase in the number of students' assignments graded satisfactory or excellent. While the rate of vocalization remained stable throughout the study, the quality of this behavior shifted from loud and disruptive calling-out to more acceptable interactions between students. The results support the premise that territory is available as an effective reinforcer for academic and social behaviors. Further, the study demonstrates that the utilization of territorial space as a reinforcer eliminates potentially prohibitive costs and philosophical objections commonly raised against classroom programs which rely on non-natural reinforcers for desired student behaviors.
REFERENCES


<table>
<thead>
<tr>
<th>Phase</th>
<th>Session</th>
<th>Session Date</th>
<th>2 Out-of-Sight</th>
<th>2 Vocalization</th>
<th>Grades Earned</th>
<th>Assignment Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>$X_b$'s &amp; $X_m$'s</td>
<td>$X_b$'s</td>
<td>$X_m$'s</td>
<td>$X_b$ Complete</td>
</tr>
<tr>
<td>Baseline</td>
<td>1</td>
<td>4/03/75</td>
<td>92.5</td>
<td>97.5</td>
<td>1</td>
<td>24</td>
</tr>
<tr>
<td>2</td>
<td>4/03/75</td>
<td>90</td>
<td>90</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>4/05/75</td>
<td>95</td>
<td>92.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4/05/75</td>
<td>77.5</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>4/07/75</td>
<td>92.5</td>
<td>97.5</td>
<td>67</td>
<td>24</td>
<td>59</td>
</tr>
<tr>
<td>6</td>
<td>4/07/75</td>
<td>90</td>
<td>100</td>
<td>58</td>
<td>2</td>
<td>33</td>
</tr>
<tr>
<td>7</td>
<td>4/13/75</td>
<td>100</td>
<td>95</td>
<td>75</td>
<td>1</td>
<td>23</td>
</tr>
<tr>
<td>8</td>
<td>4/13/75</td>
<td>90</td>
<td>100</td>
<td>70</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>9</td>
<td>4/15/75</td>
<td>75</td>
<td>82.5</td>
<td>65</td>
<td>2</td>
<td>33</td>
</tr>
<tr>
<td>10</td>
<td>4/18/75</td>
<td>100</td>
<td>90</td>
<td>50</td>
<td>1</td>
<td>49</td>
</tr>
<tr>
<td>11</td>
<td>4/19/75</td>
<td>75</td>
<td>65</td>
<td>75</td>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td>12</td>
<td>4/20/75</td>
<td>85</td>
<td>95</td>
<td>69</td>
<td>0</td>
<td>31</td>
</tr>
<tr>
<td>13</td>
<td>4/20/75</td>
<td>75</td>
<td>90</td>
<td>62</td>
<td>0</td>
<td>37</td>
</tr>
<tr>
<td>14</td>
<td>4/25/75</td>
<td>87.5</td>
<td>92.5</td>
<td>70</td>
<td>13</td>
<td>37</td>
</tr>
<tr>
<td>15</td>
<td>4/27/75</td>
<td>97.5</td>
<td>92.5</td>
<td>69</td>
<td>14</td>
<td>37</td>
</tr>
<tr>
<td>16</td>
<td>4/30/75</td>
<td>62.5</td>
<td>92.5</td>
<td>68</td>
<td>3</td>
<td>37</td>
</tr>
<tr>
<td>Phase 5</td>
<td>17</td>
<td>4/03/75</td>
<td>77</td>
<td>82.5</td>
<td>66</td>
<td>5</td>
</tr>
<tr>
<td>18</td>
<td>4/03/75</td>
<td>70</td>
<td>95</td>
<td>66</td>
<td>5</td>
<td>28</td>
</tr>
<tr>
<td>19</td>
<td>4/03/75</td>
<td>85</td>
<td>65</td>
<td>56</td>
<td>4</td>
<td>40</td>
</tr>
<tr>
<td>20</td>
<td>4/03/75</td>
<td>85</td>
<td>95</td>
<td>69</td>
<td>0</td>
<td>31</td>
</tr>
<tr>
<td>21</td>
<td>4/03/75</td>
<td>75</td>
<td>90</td>
<td>62</td>
<td>0</td>
<td>37</td>
</tr>
<tr>
<td>22</td>
<td>4/03/75</td>
<td>87.5</td>
<td>92.5</td>
<td>70</td>
<td>13</td>
<td>37</td>
</tr>
<tr>
<td>23</td>
<td>4/03/75</td>
<td>92.5</td>
<td>97.5</td>
<td>67</td>
<td>24</td>
<td>59</td>
</tr>
<tr>
<td>24</td>
<td>4/03/75</td>
<td>90</td>
<td>100</td>
<td>58</td>
<td>2</td>
<td>33</td>
</tr>
<tr>
<td>25</td>
<td>4/03/75</td>
<td>75</td>
<td>82.5</td>
<td>65</td>
<td>2</td>
<td>33</td>
</tr>
<tr>
<td>26</td>
<td>4/03/75</td>
<td>100</td>
<td>90</td>
<td>50</td>
<td>1</td>
<td>49</td>
</tr>
<tr>
<td>27</td>
<td>4/03/75</td>
<td>77</td>
<td>82.5</td>
<td>66</td>
<td>5</td>
<td>30.5</td>
</tr>
<tr>
<td>28</td>
<td>4/03/75</td>
<td>70</td>
<td>95</td>
<td>66</td>
<td>5</td>
<td>28</td>
</tr>
<tr>
<td>29</td>
<td>4/03/75</td>
<td>85</td>
<td>65</td>
<td>56</td>
<td>4</td>
<td>40</td>
</tr>
<tr>
<td>30</td>
<td>4/03/75</td>
<td>85</td>
<td>95</td>
<td>69</td>
<td>0</td>
<td>31</td>
</tr>
<tr>
<td>31</td>
<td>4/03/75</td>
<td>75</td>
<td>90</td>
<td>62</td>
<td>0</td>
<td>37</td>
</tr>
<tr>
<td>32</td>
<td>4/03/75</td>
<td>87.5</td>
<td>92.5</td>
<td>70</td>
<td>13</td>
<td>37</td>
</tr>
<tr>
<td>33</td>
<td>4/03/75</td>
<td>92.5</td>
<td>97.5</td>
<td>67</td>
<td>24</td>
<td>59</td>
</tr>
<tr>
<td>34</td>
<td>4/03/75</td>
<td>90</td>
<td>100</td>
<td>58</td>
<td>2</td>
<td>33</td>
</tr>
<tr>
<td>35</td>
<td>4/03/75</td>
<td>75</td>
<td>82.5</td>
<td>65</td>
<td>2</td>
<td>33</td>
</tr>
<tr>
<td>36</td>
<td>4/03/75</td>
<td>100</td>
<td>90</td>
<td>50</td>
<td>1</td>
<td>49</td>
</tr>
<tr>
<td>37</td>
<td>4/03/75</td>
<td>77</td>
<td>82.5</td>
<td>66</td>
<td>5</td>
<td>30.5</td>
</tr>
<tr>
<td>38</td>
<td>4/03/75</td>
<td>70</td>
<td>95</td>
<td>66</td>
<td>5</td>
<td>28</td>
</tr>
<tr>
<td>39</td>
<td>4/03/75</td>
<td>85</td>
<td>65</td>
<td>56</td>
<td>4</td>
<td>40</td>
</tr>
<tr>
<td>40</td>
<td>4/03/75</td>
<td>85</td>
<td>95</td>
<td>69</td>
<td>0</td>
<td>31</td>
</tr>
<tr>
<td>41</td>
<td>4/03/75</td>
<td>75</td>
<td>90</td>
<td>62</td>
<td>0</td>
<td>37</td>
</tr>
<tr>
<td>42</td>
<td>4/03/75</td>
<td>87.5</td>
<td>92.5</td>
<td>70</td>
<td>13</td>
<td>37</td>
</tr>
<tr>
<td>43</td>
<td>4/03/75</td>
<td>92.5</td>
<td>97.5</td>
<td>67</td>
<td>24</td>
<td>59</td>
</tr>
</tbody>
</table>

**APPENDIX**
VITA

The author, who was born in 1949 in Washington D. C., received his B. S. in psychology at Ursinus College, Collegeville, Pennsylvania in 1971. Before entering the graduate program at the University of Richmond he worked at Norristown State Hospital, Norristown, Pennsylvania, and Chestnut Lodge Psychiatric Hospital, Rockville, Maryland. The author will receive his M. A. in psychology from the University of Richmond in May 1976; his major interest has been the application of behavior modification principles in school, home, and institutional settings. The author presented a paper at the Virginia Academy of Sciences in May 1973; discussing the design and results of a classroom behavior modification study. While enrolled in the University of Richmond graduate program, the author was employed by the Commonwealth Psychiatric Center where he assisted in the development and maintenance of a school token economy/levels program. He also consulted with the parents and teachers of problem children as a member of the staff of the Richmond Child Development Clinic. The author is currently a member of the Association for the Advancement of Behavior Therapy and employed at the Southeastern Virginia Training Center for the Mentally Retarded as an Assistant Program Coordinator.