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A Treatment Package to Improve Academic Performance

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Western Michigan University

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A TREATMENT PACKAGE TO IMPROVE ACADEMIC PERFORMANCE

by

Lynn Daniel Larrow

A Thesis Submitted to the Faculty of The Graduate College in partial fulfillment of the requirements for the Degree of Masters of Arts Department of Psychology

Western Michigan University
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A TREATMENT PACKAGE TO IMPROVE
ACADEMIC PERFORMANCE

Lynn Daniel Larrow, M.A.
Western Michigan University, 1980

Six high school students volunteered to participate in a research project to improve their academic grades. Of these six subjects, it was found that subjects with low grade point averages (GPA) were the main beneficiaries of a behavior treatment package consisting of contingency contracting, graphing, and a self-management lecture. In addition, this study demonstrated that a contingency contract, employing a weekly consequence, and graphing can control an academic behavior, note taking. Finally, it was shown that a cost effective treatment package could produce GPA increases comparable to more expensive and time consuming treatments. It is hoped that the findings of this study can aid in the development of both an effective and economical behavior technology to improve academic behavior.
ACKNOWLEDGEMENTS

The author wishes to thank the following persons for the valuable assistance they provided: John LaSotta, principal of Lawton High School; Paul T. Mountjoy, my thesis committee chairman; R. Wayne Fuqua, Psychological Services Component; and Steve Wong, Psychological Services Component.

Lynn Daniel Larrow, M.A.
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CHAPTER I
INTRODUCTION

In the past twelve years, applied behavior analysts have been successful in controlling a wide range of academic behavior at the pre-college level by the use of operant methods. The most common academic behaviors to be controlled are: study rate (Hall, Lund, & Jackson, 1968; Broden, Hall, & Mitts, 1971), disruptive behavior (Hall, Cristler, Cranston, & Tucker, 1970; Ramp, Ulrich, & Dulaney, 1971, Harris & Sherman, 1973; Drabman, Spitalnik, & Spitalnik, 1974), attendance, (MacDonald, Gallimore, & MacDonald, 1970; Alexander, Corbett, Smigel, 1976; Barber & Kagey, 1977), standardized test performance (Ayllon & Kelly, 1972, Clingman, & Fowler, 1975; Hartman, 1975), and homework completions (Phillips, 1968; Harris & Sherman, 1974). Most of the research by applied behavior analysts has focused on the demonstration of a functional relationship between an independent variable and some specific academic behavior or product. Little of this research, however, has determined the effects of treatment on the grade point average (GPA) of students. In fact, the only study reported in the Journal of Applied Behavior Analysis on grade point averages was Schumaker,
Hovell, and Sherman (1977). It would seem then that this important measure of academic performance should be reported in more studies to further assess the social validity and generality of applied behavioral interventions.

Another issue confronting the applied behavior analyst is the cost of intervention. Most research takes place in the communities surrounding universities where students can be utilized at a low cost and where expert supervision is abundant. In non-university settings, however, extra staff must be hired or receive extensive training, and behavioral supervision or consultation must be obtained to design and analyze interventions. Both of these realities of non-university settings can make applied behavior analysis an expensive process indeed. What is needed then is a simple procedure that could be implemented by non-experts at a low cost that would improve academic performance.

Several techniques have been developed recently that could be implemented by most school systems which are both simple to employ and cost effective. A widely employed technique is contingency contracting which has been found to be effective for controlling academic behavior (Bristol and Sloane, 1974; White-Blackburn, Semb, and Semb, 1977). The process of contingency contracting involves a written agreement between two parties to perform certain behaviors
(DeRisi and Butz, 1977; Homme, 1976). The first step in this process involves specifying the behaviors to be changed. Secondly, the contract needs to be negotiated with the involvement of both parties, and finally, the contract is written in language that is understandable to all parties. A complex feature in this process is the completion of daily objectives which must be consequated by a parent or staff. Little research has been done on the effectiveness of weekly consequences on academic behavior which could make contingency contracting, if effective, even more economical.

Another technique that has been used increasingly in applied behavior analysis is graphing and feedback. This process involves the use of a simple graph which displays daily information to a performer on some aspect of performance and has been found to be effective in controlling study behavior in combination with contingency contracting (Bristol & Sloane, 1974). This procedure is most cost effective when used as a self-monitoring device for students who graph their own academic performances, e.g., study time.

A final technique that this study will employ will be self-management. Usually self-management packages involve either instruction or training in the following procedures:
self-reinforcement, self-monitoring, systematic planning (self-shaping), and self-assessment. Various self-management interventions have also been shown to be effective for controlling study behavior (Lovitt and Curtis, 1960; Ballard and Glynn, 1975; Glynn and Thomas, 1974; Greiner and Karoly, 1976; White-Blackburn, Semb, and Semb, 1977). Although most of these studies involved training, Greiner and Karoly (1976) found that academic performance could be improved by the use of a lecture and outline alone on self-management. This later finding, which reflects a goal of this study, can be efficiently employed by non-experts and will be utilized in this study.

A final issue that this study will concern itself with is the type of student who is most likely to benefit from applied behavior treatments. Bristol and Sloane (1974) found in their study on contingency contracting and graphing and feedback to improve academic performance that only low GPA subjects improved as a result of treatment. If this finding is correct, then perhaps only low GPA students should be targeted for such treatment. High GPA students then, who have little to gain, should be screened from such treatment packages for it would be a waste of their time.

In summary, this pilot study will have the following objectives: A) to develop a cost-effective treatment package
aimed at increasing the grade point averages of high school students; B) to make such a treatment package simple enough so that it can be employed easily by non-experts; C) to determine if a weekly delivered consequence can control an academic behavior, note taking; and D) to assess if low performing students are the main beneficiaries of such a treatment package.
Subjects and Setting

Six high students participated in this research. The research took place in an open space high school in a rural community. The subjects were recruited by the use of flyers in the high school, and by an article which appeared in the community newspaper.

Weekly meetings took place in the home economics area which was part of the open space feature of the high school. It was in this area that all procedures were carried out, e.g., reliability checks, negotiation of contracts, refunding of deposits, etc. The only exception to the above were the reliability checks, phone calls, which were made to parents to determine if graphs were up in a family area, e.g., on the refrigerator.

Dependent Variables

Notes. Notes are defined as: the product of the in class behavior of note taking. Notes are hand written, contain at least fifty words, and must be dated.
**Grade Point Averages.** A grade point average represents a cumulative semester or final grade for two cumulative semesters for all student classes. These cumulative grades are the result of teachers' judgemental evaluation of an individual student's academic performance, i.e., quiz, test, and homework scores. Differences between pre-treatment semester and final GPA will be presented as bar graphs as a pre and post test measure of academic performance.

**Independent Variables**

**Contingency Contracting.** The contingency contracts used in this study were designed to accomplish two events: A) to act as an establishing operation for students bringing in completed daily report cards to weekly meeting; and B) to act as a prompt and reinforcement contingency for note taking and the putting up of graphs. Additional information on contingency contracting can be obtained from the following instructional manuals: Homme (1976) and DeRisi & Butz (1977).

**Graphing.** Graphs contained data which were taken from the teachers' record books. This data represented all quiz, test, and homework scores for one class. On the vertical axis were the dates on which the scores were earned. Below
this later axis was the actual ratio of points earned for every data point displayed. Directly above the graphed data were the captions "Before Skills" and "After Skills". These later captions were separated by a hatched vertical line. On the day these graphs were given to the students two criterion lines were added: a red criterion line labeled: "Minimum Standard"; and a green criterion line labeled: "Student Goal". These graphs were given to the subjects to post in their homes where their parents could see them, e.g., on the refrigerator.

**Self-management Lecture and Handout.** On the first day of intervention, subjects were given a lecture and handout on the following topics: time management, systematic planning, self-control, and methods for effective study. The lecture lasted for fifty minutes.

A) Time Management. Time management is the process in which a person sets a goal, prioritizes time, and then keeps on a schedule to achieve the goal and establish the priorities (Lakein, 1973).

B) Systematic Planning. Systematic planning is the process in which a person sets short-term objectives to achieve a long-term goal. This process is similar to shaping in that these short-term objects are like successive approx-
imations to a specified target response (Greiner & Karoly, 1976).

C) Self-control. This is the process where a person attempts to establish contingencies and rules which will govern his/her own behavior to achieve a desired outcome (William & Long, 1979).

D) Study methods. This process involves the breaking down of large study units, i.e., text chapter study questions and answers into smaller objectives, e.g., 40 questions into four 10 question objectives. These objectives are then gone over until the answers to all the questions in a single objective are memorized. Subjects are instructed to enjoy a reward, e.g., listen to ten minutes of rock and roll, eat a muffin, etc. Subjects are then told to continue the above sequence until all the smaller units are completed. This process is also similar to shaping (Williams & Long, 1979). Subjects were also told how to use mnemonic devices, e.g., the colors of the rainbow can be remembered easily by the use of the mnemonic ROY G. BIV. Subjects were told that such devices could aid them in memorizing questions with compound answers.

Reliability

Reliability checks were taken on one dependent variable
and on one independent variable. The dependance variable, notes taken, had to meet three specific criteria: a) notes must be dated and correspond with the dates on the daily report card, b) notes must contain a minimum of fifty words each, and c) notes must be checked on dialy report card and signed by the appropriate teacher. The only days that notes were not required were on quiz and test days, when guest speakers were at classes, or when movies were shown. All of the later had to be specified on the daily report card and signed by the instructor. The data in this study were taken from the daily report card in the first three weeks of baseline. From the fourth week on, reliability was taken for all but two sets (weeks) of data.

Reliability on the independent variable, graphs, and feedback was assessed in the following manner: A) original graphs which consisted of baseline grades from teachers' record books were distributed to subjects on the first day of intervention; B) parents of students were called by experimenter to insure that graphs were in a area observable to others, e.g., color of criterion lines, type of class, etc.

Procedure

Weekly Meetings

Throughout the study, subjects met weekly with the ex-
perimenter. During the initial meeting: A) subjects were told the basic of contracting; B) told about the basics of feedback and graphing; C) given a brief description of the self-management components: and D) told of the possible risks and benefits of this research, i.e., nonimprovement vs. better grades. In addition to the above, students were told that they could withdraw from the research at any time without the risks of reprisals or the forfeiture of the remainder of their deposits (excluded from this was money already lost through contracting). The subjects were told to bring their deposits, $30 dollars or 12 items of equal value, to the next meeting. Subsequent meetings were devoted to the following activities: determining weekly contract objectives, distribution and collection of data sheets, signing contracts, returning or withholding weekly deposits, i.e., $2.50 or one item, and the checking of notes and homework assignments.

Baseline

During baseline subjects were given daily report cards which contained boxes for the following items to be checked by teachers: assignment completions, notes taken, assignment given, assignment due date, and test-quiz, or assignment score. The students were also told to have their teachers
sign the report card for each set of items checked. The above data were taken only for classes that the students wanted to work on the most, i.e., target classes. The subjects also had to fill out a daily time sheet to record the amount of time they spent on studies at home. This later sheet had to be signed during the first week by an observer, a parent or relative. The rationale of the time sheet was to give students feedback on how they were spending their non-class time. To insure that students were compliant during baseline in the taking of these data, contracting was employed, that is, deposits were refunded ($2.50 or one item) for completing the above activities.

**Lecture**

On the first day of intervention, subjects were given a lecture on the following skills: time management, systematic planning, self-management, and methods for effective study. At the end of this fifty minute lecture, subjects were given a summary of each component and told to contact the experimenter if they had any questions over the material.

**Contracting and Graphing**

During this treatment phase subjects were asked which single class they would like to start working on to improve
their GPA. Based on student preference for this selected target class, subjects were told to place a graph of their grades for this class in an area at home where other persons in their family could see it. In addition, if it was found that a student was not taking notes in a targeted class, and if taking notes in this class was considered important by the teacher of that class, the subject was then contracted to take notes. After the first week of this treatment phase, criteria were established to insure that subjects were taking notes when they ought to be, and to further clarify the instructions for note taking. The criteria for taking notes was that notes should be taken everyday except for the following conditions: quiz or test days, when movies were shown, or when guest speakers talked in class. Deposits in this phase were only refunded if the above criteria were met (if they applied to that subject); the graph was confirmed to be up in the house; and all daily report cards were turned in.

Follow-up

At the end of the semester, the experimenter made copies of the subjects' report cards to assess the maintenance of treatment on semester grades.
Experimental Design

A multiple-baseline design (Baer, Wolf, and Risley, 1968) across blocks of classes and groups of subjects was used to assess the effects of contracting, graphing and the lecture on the note taking behavior. During baseline subjects were asked to choose two target classes that they would like to work on. Based on their decisions, intervention began after either three weeks of baseline, or six weeks of baseline on targeted classes. Group one contained five subjects, and group two contained four subjects. Three of the subjects in group one were also in group two. These are subject S1, S2, and S3. The other subjects S4, S5, and S6 were only required to take notes in only one of the two targeted classes. This study lasted a total of eleven weeks.
CHAPTER III

RESULTS

The mean number of notes taken per group by Groups I and II appears in Figure 1. For Group I the mean number of notes taken per week in baseline was one note, compared with 12.5 notes per week during treatment. In Group II the mean number of notes taken per week was 4.8 in baseline, and 7.8 during treatment. These results indicate that a weekly delivered consequence and graphing could indeed control note taking behavior for a group of subjects. Individual data of the number of notes taken per week for each subject appears in Table I. Below the weekly number of notes taken per subject are the criteria subjects had to meet weekly to earn a refund. As indicated by these data, subjects met 81% of all treatment criteria. Most of the failed to reach criteria were reported by S3, who after the ninth week no longer contracted for notes in Group I by mutual agreement. The experimenter thought it was meaningless for the subject to keep losing refunds. This subject continued to contract for notes in Group II.

The mean GPA's for all subjects for both targeted and non-targeted classes for pre-treatment semester and final
Figure 1. The number of weekly notes taken by Groups I and II in baseline, lecture, and contracting and graphing phases.
FIGURE 1

CONTRACTING & GRAPHING

BASELINE

NUMBER OF NOTES TAKEN PER WEEK

WEEKS
Table 1. Number of notes taken per week for each subject and the criterion (in parenthesis) for each week.
<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Contracting and Graphing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S1</td>
<td>0 0 0</td>
<td>2 4 4 1 3 3 3 3 3 3</td>
</tr>
<tr>
<td></td>
<td>(-) (-) (-)</td>
<td>(-) (4) (4) (1) (3) (3) (3) (3)</td>
</tr>
<tr>
<td>S2</td>
<td>2 1 0</td>
<td>3 5 4 1 3 3 0 3</td>
</tr>
<tr>
<td></td>
<td>(-) (-) (-)</td>
<td>(-) (5) (4) (2) (3) (3) (3) (3)</td>
</tr>
<tr>
<td>S3</td>
<td>1 1 0</td>
<td>2 5 3 1 0 0 0 0</td>
</tr>
<tr>
<td></td>
<td>(-) (-) (-)</td>
<td>(-) (5) (3) (3) (3) (3) (3) (3)</td>
</tr>
<tr>
<td>S4</td>
<td>0 0 0</td>
<td>0 3 3 3 3 4 3 3</td>
</tr>
<tr>
<td></td>
<td>(-) (-) (-)</td>
<td>(-) (3) (3) (3) (3) (3) (3) (3)</td>
</tr>
<tr>
<td>S5</td>
<td>0 0 0</td>
<td>1 4 2 4 3 3 3 2</td>
</tr>
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<td></td>
<td>(-) (-) (-)</td>
<td>(-) (4) (2) (4) (3) (3) (3) (2)</td>
</tr>
<tr>
<td>Group II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S1</td>
<td>1 1 1</td>
<td>2 1 1 2 3 3 3 3 3 3</td>
</tr>
<tr>
<td></td>
<td>(-) (-) (-)</td>
<td>(-) (-) (2) (3) (3) (3) (3)</td>
</tr>
<tr>
<td>S2</td>
<td>0 2 2</td>
<td>1 1 0 4 1 2 0 0 3</td>
</tr>
<tr>
<td></td>
<td>(-) (-) (-)</td>
<td>(-) (-) (4) (1) (2) (0) (3)</td>
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<td>2 0 1</td>
<td>3 2 0 3 2 1 0 3</td>
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<tr>
<td></td>
<td>(-) (-) (-)</td>
<td>(-) (-) (3) (2) (2) (3) (3)</td>
</tr>
<tr>
<td>S6</td>
<td>2 3 2</td>
<td>1 1 0 2 0 1 3 ND*</td>
</tr>
<tr>
<td></td>
<td>(-) (-) (-)</td>
<td>(-) (-) (2) (3) (1) (3)</td>
</tr>
</tbody>
</table>

*Subject did not participate in last week.
grades appear in Figure 2. In order to compute grades, they had to be transferred into numerical equivalents, i.e., $1 = D-, 2 = D$, to $A+ = 12$. Each of these numerical units equals approximately .34 of a traditional grade point, e.g., $A = 4.0, D = 1.0$, etc. In order for a grade change to be considered significant at least a one point grade unit change was required. Targeted classes in baseline were 3.92, and final grades were 4.33, which represents a .41 unit increase. Non-targeted classes in baseline were 5.16, with final grades of 5.78. Although grades did improve somewhat, the change between GPA's cannot be considered significant based on the above criteria for significance. Individual student GPA's for both treatment semester and final grade appears in Table 2. These data indicate that three of the subjects had significant GPA increases; two of the subjects showed no significant change in GPA; and one subject had a decreased GPA.

Although the effect of the intervention on the GPA mean for all subjects was not significant, the effect on low GPA subjects was significant as predicted, see Figure 3. A low GPA subject is defined as a student with a D+ or below GPA average. This distinction is made on the basis that a letter grade of C is considered as average, and a D+ is two
Figure 2. GPA's for all subjects for both targeted and non-targeted classes.
FIGURE 2

PRE-TREATMENT □
FINAL ■

TARGETED

NON-TARGETED

GPA

N=6  N=6

3.92  4.33
5.16  5.78

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Table 2. Individual GPA's for all classes and subjects for pre-treatment and final grades. Letter grade equivalents are in brackets ( ).

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Table 2

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Pre-Treatment</th>
<th>Final</th>
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<tbody>
<tr>
<td>S1</td>
<td>5.50 (C)</td>
<td>7.00 (B)</td>
</tr>
<tr>
<td>S2</td>
<td>2.25 (D)</td>
<td>3.00 (D+)</td>
</tr>
<tr>
<td>S3</td>
<td>0.50 (E)</td>
<td>2.25 (D)</td>
</tr>
<tr>
<td>S4</td>
<td>6.00 (C+)</td>
<td>6.00 (C+)</td>
</tr>
<tr>
<td>S5</td>
<td>6.25 (C+)</td>
<td>6.75 (C+)</td>
</tr>
<tr>
<td>S6</td>
<td>6.60 (C+)</td>
<td>5.20 (C)</td>
</tr>
</tbody>
</table>
Figure 3. GPA's for both targeted and non-targeted classes for low and average GPA subjects.
letter grades below average or low GPA. The mean GPA for low GPA subjects for targeted classes in the pre-treatment semester was 1.25, and the mean GPA for the treatment semester was 2.75, a 1.5 grade unit increase. Average GPA subjects, on the other hand, had a pre-treatment semester average of 5.25 and a treatment semester average of 5.13 which represents a slight decrease of .13 grade units for targeted classes. This significant effect for low GPA subjects was not confined to targeted classes alone. The pre-treatment semester average of low GPA subjects for non-targeted classes was 1.5, and the treatment semester average was 2.50 which represents a 1.00 grade unit increase. This GPA increase is substantially higher than average GPA subjects whose pre-treatment semester average was 7.42 which represents an increase of only .42 grade units. This is consistent with the previous finding that low GPA subjects perform better as a result of treatment for academic behavior than average GPA subjects.

A closer look at targeted classes reveals an interesting finding (See Table 3). Table 3 shows that no increases in GPA were made in English classes, and that only one math class showed improvement. All other classes showed improvement. The data indicates that classes of a cumulative na-
Table 3. Showing target classes, pre and post grades for each class, and the grade unit net increase for each class. *These are targeted classes in which note taking was not required.
Table 3

<table>
<thead>
<tr>
<th>Subject</th>
<th>Target Classes</th>
<th>Pre-grade</th>
<th>Post-grade</th>
<th>Unit Increase</th>
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</thead>
<tbody>
<tr>
<td>S1</td>
<td>Algebra</td>
<td>C-</td>
<td>D+</td>
<td>-1</td>
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<tr>
<td></td>
<td>Science</td>
<td>C</td>
<td>C+</td>
<td>.+1</td>
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<tr>
<td>S2</td>
<td>Geometry</td>
<td>D</td>
<td>C-</td>
<td>+2</td>
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<td>C-</td>
<td>D+</td>
<td>-1</td>
</tr>
<tr>
<td></td>
<td>English</td>
<td>B</td>
<td>C+</td>
<td>-2</td>
</tr>
</tbody>
</table>
ture, those which rely heavily on skills acquired on previous units, e.g., principles, rules, etc. which characterizes English and math classes, were insensitive, in all but one case, to this treatment package. The reason for this insensitivity could be that behavior repertoires which are deficit in basic skills would not be effected by reinforcement contingencies until that skill was acquired. Other classes such as introductory biology, history, etc. do not rely as much on the acquisition of basic skills and would be sensitive to reinforcement because the students had the necessary prerequisite behaviors in their repertoires.

If this above interpretation is true, than this treatment package would be limited in effectiveness for average GPA subjects and to only their classes which are not of a cumulative nature.

In all of the above reported GPA data, physical education scores were not included because it was felt by the experimenter that such scores would have introduced unnecessary variability. The reason being that physical sports performance is not evaluated by the same methods as other academic classes, e.g., tests, quizzes, notes, or homework scores which this study aimed to improve.
CHAPTER IV

DISCUSSION

The results of this study showed: that contingency contracting, employing a weekly consequence, and graphing could indeed increase the number of notes taken for groups of subjects; and that low GPA subjects were the main beneficiaries of this treatment package. The contracting and graphing components of this package were effective in increasing notes taken for all subjects in Group I, and was effective in maintaining these increases for all but one subject. In Group II contracting and graphing were effective in increasing the amount of notes taken for this group, but increases were modest because of the higher frequency of taking notes in baseline. One subject in this later group showed no change over baseline which also contributed to this modest effect. The self-management lecture alone did not appear to contribute to these increases in notes taken as evidence by the decline of notes taken by Group II during the lecture phase only.

The main effect of this treatment procedure was on the low GPA subjects who showed improvements in GPA for both targeted and non-targeted classes. In fact, one of these
subjects who was in danger of not graduating from high school raised his GPA sufficiently to graduate. These subjects averaged a GPA increase for all classes a 1.25 grade unit, or an actual .43 grade point increase. Although these GPA increases are modest they are comparable to those reported by Schumaker, Hovel, & Sherman (1977). In experiment I of the above study, in which GPA's were presented for three low GPA subjects, subjects increased their GPA's approximately .5 of a standard grade point which is close to the results obtained in this study. This finding is significant because the present study was less restrictive than the home based reinforcement project used in the above study, e.g., parent training, delivery of daily consequences, etc.

Regarding the finding that low GPA subjects are the main beneficiaries of this treatment package, it could be that the reason average GPA subjects did not benefit was due to the types of class targeted. Average GPA subjects could fail to improve in classes of a cumulative nature, because they lacked prerequisite skills often required in such classes. This later state of affairs could make them less sensitive to reinforcement. Low GPA students may improve their scores in these cumulative classes by merely completing homework and increased study activities despite
some skill deficits. Average students could, however, gain from this and other treatment packages in non-cumulative classes, as was evidence by Table 3. Perhaps this fact was obscured in a previous study (Greiner & Karoly, 1976) because such increases through GPA averaging were washed out by decreases in cumulative type classes. It is not unthinkable that higher rates of behavior which could have been emitted initially by average GPA students could have resulted in ration strain because the rate of reinforcement remained constant, which could result in a decrease in study behaviors.

Another aim of this study was the development of a cost effective treatment procedure. The main costs of most applied behavior treatment procedures is the hiring of extra staff to carry out the intervention, the cost of training parents or teachers in behavior principles and/or the cost of consultation. In this study, no extra staff or training were necessary, except for research purposes. The average time spend weekly with each student was ten minutes. The lecture lasted only one hour. Prep time, the amount of time to compile data from report cards, averaged about ten minutes per subject each week. The total estimated time for this project to be carried out by others is twenty three
man hours or about one hundred and fifteen dollars (based on an estimated part time wage of five dollars per hour) for the implementation of this treatment procedure. This procedure then is considered quite cost effective when one considers the cost of consulting, training, and the delivery of daily consequences employed by most treatment procedures.

Despite the positive findings of this study, the question of treatment effectiveness still remains (Baer, Wolf, & Risley, 1968). In the case of low GPA subjects, does a .42 traditional grade point increase represent a valuable change? For one of these subjects the answer is yes, for this GPA increase enabled him to graduate from high school. For the other low GPA subject, the increase in GPA was only a change in GPA from a D to a D+. Does this later increase represent a valuable improvement? The answer is probably, no. This change would not help to get this subject into college; and it would not matter to a future employer whether a perspective employee had a D or D+ GPA average in high school. The next problem dealing with the effectiveness of this treatment procedure is the quality of notes taken. Do increases in the amount of notes taken which satisfy only quantitative requirements, e.g., fifty words, etc., represent a valuable social accomplishment? Although
the qualitative aspects of the notes taken in this study were not measured, the general content of the notes were perceived by the experimenter as not being of a high value, usually notes were unstructured summaries of events. The conclusion to be drawn from this later observation is that the increases in notes presented in this study did not represent, in most cases, a valuable or an effective change. This conclusion, however, is consistent with the results of many applied behavior procedures in academic and other settings as well (Larrow & Peterson, 1980). A final question relating to the effectiveness of this procedure is: overall, is this study meaningless? If one is referring to high social validity the answer is no. If on the other hand, one is referring to the potential research value of this procedure; the answer is yes. Because in the later case, this study showed that: contingency contracting employing a weekly consequence and graphing could control an academic behavior; and that low GPA subjects are the main beneficiaries of applied behavior procedures for academic behavior. Those are findings that could lead to socially significant results in future studies.

Although this study showed that contracting and graphing were able to increase the amount of notes taken for a
group of subjects, and that low GPA subjects were the main beneficiaries of this treatment package, certain methodological limitations with current study should be pointed out. First, because no analysis of the individual treatment components of this study were made, it is not clear which components were more effective than others, or vice versa. For instance, was graphing necessary for increasing notes? Secondly, because there was not a reversal on the contracting and graphing phases, no information was obtained on whether note taking maintained in the absence of the intervention. Thirdly, although GPA's are a primary measure of academic performance, GPA is really a poor quantitative measure of performance, because it fails to detect subtle differences in performance, and because scoring is based on different criteria for different teachers. A better measure would be a breakdown of the percentage of total points earned into various categories, e.g., test scores, homework, etc., for each individual class in addition to GPA. Finally, this study failed to analyze the basic principles that were operating in each component of this treatment package (Pierce, Epling, & Frank, 1980). An example of this problem is exemplified by the process of contingency contracting. This process at the minimum involves two complex phenomena, stimulus
control and reinforcement contingencies both of which have not been analyzed by most, if not all, researchers who employ this procedure.

In summary, this study found that a weekly delivered consequence, via contingency contracting, and graphing could increase the amount of notes taken for groups of subjects. This study also confirmed the findings of Bristol and Sloane (1974) that low performing (GPA) subjects are the main beneficiaries of applied behavior treatments in non-university settings. Finally, this study showed that a cost effective treatment could have an effect comparable to more expensive treatments. In addition, limitations with this study and others were pointed out. In closing, it is hoped that the findings of this study will lead to more socially effective treatment procedures for controlling academic behavior.


