THE EFFECTS OF TWO REINFORCEMENT STRATEGIES ON THE ROTE LEARNING ABILITY OF EDUCABLE MENTALLY HANDICAPPED CHILDREN

By

WILLIAM HENRY SHIPMAN ALLEN II

Bachelor of Arts

Oklahoma State University

1972

Submitted to the Faculty of the Graduate College
of the Oklahoma State University
in partial fulfillment of the requirements
for the Degree of
MASTER OF SCIENCE
July, 1977

THE EFFECTS OF TWO REINFORCEMENT STRATEGIES ON THE ROTE LEARNING ABILITY OF EDUCABLE MENTALLY HANDICAPPED CHILDREN

Thesis Approved:

Bill F Elsom
Thesis Adviser

Joseph Pearl

Paul G Ward

Norman N Durham
Dean of the Graduate College

PREFACE

This study is concerned with a comparison of the effects of non-tangible reinforcement strategies, i. e. verbal praise verses self monitoring of performance, and their cumulative effect on the rote learning ability of educable mentally handicapped children. The primary objective is to explore new methods (non-tangible reinforcers) for reinforcing and motivating mentally handicapped children to perform better academically which do not rely strictly on tangible reinforcers and external control agents.

Because of my decision to work with educable mentally handicapped children, this study was quite difficult to organize and run. Students had to be randomly selected from many special education classrooms in a number of school districts. Problems were manifest in scheduling, selection of examiners, cooperation from school districts, and the financial cost of running this study.

The author wishes to point out that without the help and cooperation of a number of dedicated individuals the pursuit of this particular project would have been impossible. Appreciation is extended to Dr. Bill F. Elsom, my major adviser, for his guidance and insistence on the best possible study design. Appreciation is also extended to committee members, Dr. Paul Warden and Dr. Joseph Pearl, for their assistance and support throughout the preparation of this manuscript.

A note of thanks is extended to Ann Downey, Peggy Meyers, and July Berry, all of whom worked very diligently and professionally in carrying

out the actual study. And a very special thank you to Linda Voelkers for her unselfish contribution as an examiner. And thanks to my friend Steve Grissom.

Appreciation is also extended to the school administrators and special class teachers who cooperated in this study, and to the school children who participated.

Sincere gratitude is extended to my parents, Dr. Robert Allen and Dr. Virginia Allen, without whose financial support this study could not have been undertaken.

Finally, affectionate gratitude is expressed to my wife, Linda, for her considerable effort in preparing most of the materials used in the study, and for her moral support and encouragement as well.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

THE RESEARCH PROBLEM

Introduction

Society's general attitude towards and subsequent treatment of handicapped individuals has undergone significant change throughout the history of mankind. Until well into the nineteenth century there was no scientific basis upon which realistic notions about the handicapped individual could be developed. Notions regarding disabilities were closely linked with mysticism, spirits, and the occult (Cruickshank, 1967). People generally regarded the handicapped with morbid curiosity and fear. The mentally defective, insane, and physically crippled were regarded as outcasts of society, and they were often incarcerated in pitifully maintained prison like "mental hospitals". In all aspects, the handicapped, particularly the mentally handicapped, were considered to be totally different from the "normal" populace. The advent of residential schools and institutions in the United States for the handicapped during the late nineteenth and early part of the twentieth century reflected our society's growing awareness of the needs of the handicapped individual. Such a development was indeed a vast improvement over former practices, but the handicapped were still regarded as being so different that they had to be maintained apart from the community and the mainstream of society. Until very recently the accepted school of thought was that almost all mentally handicapped individuals should be placed in residential institutions.

The general public took little responsibility for or had even the slightest awareness of the training and educational needs of the mentally handicapped. But today less than five percent of the estimated six million mentally handicapped individuals in the United States live in institutions (Mainord & Love, 1973). Most live and many work in their local communities and are educated in the public schools. This trend of "normalization" for the mentally handicapped, however, extends beyond the realm of their living environment and occupational opportunities. This process is slowly moving towards the systematic exploration of more natural techniques for reinforcing and motivating mentally handicapped children to learn in the schools.

The application of behavior modification techniques in classrooms of the mentally handicapped has increased greatly over the past one-and-one half decades (Bijou, Birnbrauer, Kidder, & Taque, 1966). Initially these studies placed a great deal of emphasis on tangible reinforcement systems and external control agents to shape academic and social behaviors. It was apparently assumed by many that the mentally handicapped could effectively respond to only concrete primary or secondary reinforcers such as food, privileges, or tokens which could in turn be later exchanged for tangibles. In effect, it appears in retrospect that the mentally handicapped were thought to be unable to respond to or be motivated by personal accomplishments, nontangible reinforcers such as social praise, the achievement of externally or internally set goals, or the need for a feeling of competence and self-worth. But as the trend towards normalization for the mentally handicapped continues, attitudes in this regard are changing. Consider the following statement by Blake (1974) concerning motivation and the mentally handicapped:

> Retarded pupils show about the same motivational patterns as nonretarded pupils. That is, they react in about the same ways to goal setting, success and failure, material incentives and rewards, social reinforcement, and other conditions like competition (p. 19).

No longer can professionals involved with teaching the mentally handicapped embrace the view that motivation is exclusively extrinsic in nature. Such a view may be the crux of the behavioristic movement. There is nothing wrong with the belief that desire or motivation can be manipulated by simply applying consequences when the individual behaves appropriately. But if the statement by Blake concerning motivation and the retarded is to be accepted, current theories on the nature of motivation cannot be ignored. According to Piaget we possess an innate desire to explore and understand our environment. As the child attempts to build upon existing mental structures (schemata) through the process of assimilation and accommodation, he actively explores and manipulates his environment. Learning and growth naturally take place in the absence of external rewards. The task is inherently interesting, the only "pay off" being an apparent sense of mastery and personal growth. Harlow (1949) suggests that we all possess an innate drive of curiosity, and White (1965) contends that the child is concerned with achieving mastery over his environment. The only reward appears to be a sense or feeling of competence. According to White (1965, p. 15) a child's play behavior is "directed, selective, and persistent, and it is continued not because it serves primary drives, but because it satisfies an intrinsic need to deal with environment."

There is a growing awareness by many professionals involved with exceptional children that new methods for reinforcing and motivating mentally handicapped children which do not rely strictly on tangible

reinforcers and external control agents must be explored. According to Forness and MacMillan (1972):

> The blanket use of checkmarks, tokens, or other forms of tangible reinforcement for mildly retarded children in the public schools may well represent reinforcement over-kill, i. e., a situation in which teachers use more primitive and pervasive reinforcement systems than are necessary for optimum performance. Teachers, school psychologists, and others, particularly those who deal with the mentally retarded in the public schools, should be familiar with more natural ways to shape behavior, notably contingent uses of social reinforcement (p. 222).

During the last decade there has been some research dealing with the application of behavior modification techniques for the mentally handicapped which has focused on the effects of social reinforcement (verbal praise and approval) in altering a variety of behaviors (this research is cited in Chapter II). The results of this research have been generally positive, but social reinforcement may not be the only form of "natural" reinforcement available to effectively alter behaviors of the mentally handicapped. Kurtz and Neisworth (1976) point out that there has been an increased interest in having the person control his own behavior. With the growing emphasis on normalization for handicapped children, self control techniques may be especially pertinent and applicable to them. According to Kurtz and Neisworth (1976, p. 212), "there are three self control strategies that appear to have immediate implication for exceptional children: (a) cue regulation, (b) self reinforcement, and (c) self observation."

Thoresen and Mahoney (1974, p. 129) offer an applicable description of self control in saying that "self control represents a dynamic continuum wherein the person alters the external environment as well as his own internal environment to promote meaningful change."

At this point, the question might be raised "to what extent or degree

can we expect the mentally handicapped to control or alter their external and internal environments?" Obviously this question is dependent on a number of variables, such as the ability or intelligence level of the handicapped individual involved, the nature of the behavior being altered, and the type of self control technique which is employed. To this effect Thoresen and Mahoney (1974) state:

> Degrees of self control exist: Sometimes the external environment arranged by others exercises considerable control over one's actions, at other times it is the individual who primarily influences what he does through self-management, cues, and consequences (p. 129).

It may be unrealistic in most instances to expect the mentally handicapped to exert complete self control in the altering of academic and social behaviors. But because degrees of self control do exist, these approaches should not be ignored as we explore new techniques for reinforcing behaviors of the mentally handicapped. Such an approach is certainly congruous with the trend towards "normalization" of the handicapped and should therefore be considered as one of the priorities of behavioral research for the mentally handicapped.

Statement of the Problem

The problem of this study is how to improve upon reinforcement techniques to aid the academic performance of educable mentally handicapped children. As was stated earlier, the great majority of research dealing with altering behaviors of the mentally handicapped has focused on external change agents such as food, prizes, privileges, and tokens. More research is needed to examine the efficacy of reinforcers which more closely resemble the reinforcements of the child's natural environment. This is important because a mentally handicapped individual cannot count

on a tangible prize each time he emits an appropriate behavior once he has left his school or institution to enter into the mainstream of his community.

Additionally, it is not known if the non-tangible reinforcers proposed in this study positively affect the learning performance of educable mentally handicapped children.

Purpose of the Study

The purpose of this study is to determine which of the reinforcement contingencies advanced here are the most effective in improving the rote learning performance of educable mentally handicapped children.

The following research questions are advanced relative to this study:

1. Is verbal praise an effective non-tangible reinforcer for improving the rote learning skills of educable mentally handicapped children?

2. Is the self monitoring and self observation of performance data an effective non-tangible reinforcer for improving the rote learning skills of educable mentally handicapped children?

3. Is there a difference in the effectiveness of verbal praise verses the self monitoring and self observation of performance data as a means of reinforcing the rote learning performance of educable mentally handicapped children?

4. Will the combination of verbal praise and the self monitoring and self observation of performance data prove to be more effective in improving the rote learning skills of educable mentally handicapped children than the use of verbal praise only or self monitoring and self observation only?

In reference to the above stated research questions the null hypothesis is stated as follows:

No significant difference in the rote learning performance of educable mentally handicapped children will be found as a result of varying reinforcement strategies.

Definition of Terms

1. Behavior modification is the application of the results of learning theory and experimental psychology to the problem of altering behavior. It focuses on overt behavior and deemphasizes intrapsychic conflicts and similar conceptualizations. Attention is focused directly upon specific problems and the manipulation of environmental contingencies.

2. Educable mentally handicapped are defined as those children with I.Q. scores ranging from 50 to 75 who can be taught some academic work, but who are mentally retarded to the extent that their development is hindered in a regular classroom.

3. Self control is a process through which a person becomes the principle agent for regulating his own behavior.

4. Self monitoring is the self recording or monitoring and subsequent visual display of behavioral data which may serve as an intrinsically controlled motivating reinforcer for the individual.

5. Rote learning is memorization in which the task is to commit the various components of the material to memory with little or no understanding, requiring only the ability to later reproduce what has been learned in the exact form in which it was presented.

CHAPTER II

REVIEW OF THE LITERATURE

As was stated in Chapter I, there has been a recent trend towards the application of behavior modification techniques with the mentally handicapped which focus on more "natural" reinforcers - that is, reinforcers which more closely resemble the reinforcements of the child's natural environment. Research in this area has primarily dealt with a documentation of the mentally handicapped individual's responsiveness to social reinforcement (verbal praise and approval) and the contingent application of social reinforcement to alter social and academic behaviors of the mentally handicapped. Initial research by Zigler, Hodgden, and Stevenson (1958) revealed that the behavior of the mentally handicapped is more affected by interaction with an approving adult than is the behavior of intellectually normal subjects. Zigler and his colleagues presented satiation tasks to retardeds and normals under two conditions of reinforcement. In one condition, the experimenter maintained a nonsupportive role. In the other, the experimenter maintained a supportive role whereby positive comments were made contingent upon the subjects' performance. The retarded children were much more persistent under the social reinforcement condition than were the normal subjects. Further research in this regard documented that mentally handicapped individuals have a great need for social approval and verbal praise, and respond favorably to it (Zigler, 1966; Holder, 1972). All

the research cited thus far was done with institutionalized mentally handicapped individuals. Zigler and his colleagues hypothesized that the institutionalized mentally handicapped individuals' need for adult approval and their subsequent responsiveness to praise was a result of the amount of social deprivation they experienced prior to and during institutionalization (Zigler et. al., 1958; Zigler, 1961). Subsequent research indicates that the social deprivation phenomenon is not limited to the institutionalized mentally handicapped but also applies to the mentally handicapped living in the community (Zigler, 1968; Zigler and Butterfield, 1968). The classic study by Hurley (1969) shows that the majority of mildly retarded children come from disadvantaged backgrounds, and aspects of social deprivation and the lack of meaningful interaction with their peers is analogous to those found in institutions. This phenomenon is born out in a study by Noonan and Barry (1967) which indicates that with non-institutionalized mentally handicapped individuals the need for praise and social acceptance is at least as important to them as tangible reinforcers such as candy. In this study, normals, institutionalized retardates and non-institutionalized retardates were matched on mental age and tested on a simple performance task under social and tangible reinforcement conditions. The non-institutionalized retardates performed significantly longer than the other two groups and significantly faster than the institutionalized retardate group under the social reinforcement condition. The authors explain their results as follows:

> The fact that the non-institutionalized retardates came from a population where they are considered "slow" or "different" is very probably an important aspect of their extended performances on the task. Unlike the other two groups, who came from populations where everyone had grossly similar abilities, the Ss in this group, because they cannot adequately compete with the majority of children in their environment, probably experience more frustration and failure than do those in the other two groups.

Noonan and Barry go on to say (1967):

> It appears that the motivational system of non-institutionalized retardates can be differentiated from that of normals and institutionalized retardates on the basis of their performance under the two reinforcement conditions. This is believed to be a result of the stress which the non-institutionalized retardate experiences in his relations with the environment. The need for praise, support, and acceptance becomes at least as important to these Ss as tangible reinforcement, such as candy (p. 110).

The literature is somewhat conflicting with respect to the effectiveness of praise to facilitate specific learning skills in mentally handicapped subjects. Reproof was found to be superior to praise in facilitating pair-associates learning and recall (Lingren, 1967; DeRiet, 1964), concept formation (Panda, 1970), and discrimination learning (Paris and Carnes, 1972). And a tangible reinforcer proved more effective than praise with mentally handicapped children on a pair-associates learning task (DeCsipkes, Smouse, and Hudson, 1970).

Although the contingent use of verbal praise is a more "natural", less primitive form of reinforcement than token systems and other tangible reinforcers, the locus of control remains exclusively an external change agent. There is some research in the area of internalizing reinforcement contingencies to alter a variety of behaviors. Generally, this means placing the subject in a position where he has a certain degree of self control over his own behavior. So called "self control strategies", such as self administered reinforcement and self monitoring of one's own behavior, have been found effective in increasing or decreasing a variety of behaviors in intellectually normal subjects (Bandura and Perloff, 1966; McFall, 1970; Broden, Hall, and Mitts, 1971). As was pointed out in Chapter I, self control techniques may be applicable to handicapped children in view of the trend towards normalization for them.

The literature is sparse concerning research investigating the efficacy of self control strategies with mentally handicapped individuals. In one study the work performance of trainable mentally handicapped adolescents in a workshop setting was increased by having the subjects record their daily work performance by placing stars on a chart (Jens and Shores, 1969). In a special education classroom setting, elementary school age children with a variety of exceptional conditions performed better on individualized academic tasks when they recorded their own progress on a counter maze than when rewarded with teacher praise or food (Gaynor and Johnson, 1974). And the self charting of performance has been shown to be an effective independent variable for increasing the rate of word recognition with learning disability children (Jenkins et. al., 1974). But it appears that no research has been published investigating the effectiveness of self control strategies (such as self monitoring and self observations) to help improve specific academic skills of mentally handicapped children.

The rational for conducting this research rests upon (1) the need to validate more "natural" forms of reinforcement to promote academic learning of mentally handicapped children which do not rely exclusively on externally imposed tangibles; (2) to determine if mentally handicapped children can indeed exert some degree of self control over reinforcement contingencies; and (3) to specifically determine if the daily self monitoring and observing of one's own academic progress by means of graphic display is in itself an intrinsically motivating form of reinforcement for mentally handicapped children.

CHAPTER III

METHOD AND PROCEDURE

Subjects

A master list of 90 educable mentally handicapped elementary school age children placed in special education classes on the basis of the Wechsler Intelligence Scale for Children - Revised Edition and the Stanford - Binet Intelligence Scale form L-M was compiled from seven school systems in central Oklahoma. Their names were selected from the respective school's official educable mentally handicapped class roll. No Ss with severe gross motor handicaps or severe visual impairments which were not correctable were included on the master list. In addition, no Ss were included on the master list who could not read and write the letters of the alphabet. Forty-five children were then randomly selected from the master list to constitute the Ss involved in this study.

Procedure

The 45 Ss were randomly assigned to one of three treatment conditions (15 Ss assigned to each treatment level). All Ss in the three treatment groups were administered the same academic task - learning to spell the 12 months of the year by a flash card technique. Four examiners participated in this study. All had degrees in psychology or education. Each E administered an equal number of all three treatment conditions to help eliminate possible experimenter bias. Treatment

group 2 received no verbal praise during the drill and after the spelling test, but they charted their daily progress in terms of the number of months or parts of months spelled correctly on a chart. Treatment group 3 received both the verbal praise and the charting condition. All of the subjects underwent ten treatment sessions - one 20 minute session (15 minutes for the non-charting group) each day for ten consecutive school days (two weeks). The Ss were drilled and tested individually. The E was introduced to the child by the teacher on the first day and escorted by the E to the experimental room. The child was then seated at a table across from E and given the following instructions.

> Each day for the next two weeks I am going to teach you how to spell the months of the year. I have each month written on these cards (E shows the child each card as he speaks - 5" by 8" flash cards with one month boldly printed on each card) and we are going to study them each day and then see how many of them you can spell correctly on the page (E shows the child a piece of paper with 12 horizontal lines numbered one through twelve).

Up to this point the procedure was the same for all the Ss in the three treatment groups. For the Ss in treatment groups 2 and 3, however, a chart had been propped up in full view of the child but not restricting the exchange between E and S. The chart was a 20" by 16" heavy duty poster board with the horizontal axis representing the ten treatment sessions and the vertical axis representing the 12 months of the year. The child's name appeared at the top of the chart. The S (with the help of E when needed) charted his or her daily progress by pasting a piece of red construction paper over all or part of the proper axis when a month or part of a month was spelled properly. For instance, if after the first treatment session a child spelled only January and May correctly, he would cover the one by January axis and the one by May axis with a piece of construction paper which had already been cut to fit the box.

If the same S was to spell January and May correctly and also spell part of February correctly after the second treatment session, he would cover the two by January and May boxes and half of the two by February box with the paper. All of the months with more than one syllable were arbitrarily divided into two parts in order that increments in improvement could be displayed on the chart even if the S did not spell the entire month correctly. The months with two or more syllables were divided as follows: Jan-uary, Feb-ruary, Ap-ril, Ju-ly, Au-gust, Sept-ember, October, Nov-ember, Dec-ember. For example, if the S spelled Jan or Januare for January, he covered half of the January box for that treatment day. The use of construction paper to fill in the chart is used because the paper was thought to be much more manipulative and concrete than simply filling in the boxes with a pen or marker. Immediately following the initial instructions cited above, the E familiarized the Ss in treatment groups 2 and 3 concerning the chart with the following instructions.

> Look at this chart. It belongs to you, and each day after the spelling test you are going to chart how many months or parts of months you spelled correctly. That way you can see for yourself how you are doing. Look at this row of letters running up and down this side of your chart (E runs her finger along the letters J through D which represent the months). This row is for January, this one for February, (etc.) (E runs finger across each row for every month). Now look at these numbers (E runs finger horizontally along the numbers one through ten). They represent the days that we will work together. Number one is today, two is tomorrow, and so on. Here is how you will chart your daily progress. For instance, if you were to spell January (E points to J) and May (E points to M) correctly on the first day (E runs finger down the one column) which is today, you would paste one of these squares of construction paper over the one by J box and the one by M box (E demonstrates by pointing to each axis as she explains and placing the paper square over the proper box). If you were to spell January, May, and part of December correctly on the second day, or tomorrow (E points to the second column), you would cover up the two by J box, the two by M box, and half of the two by D box (E demonstrates as before). You will do this for ten days after your spelling test. Each square that you cover with the construction paper means that you have spelled a month correctly.

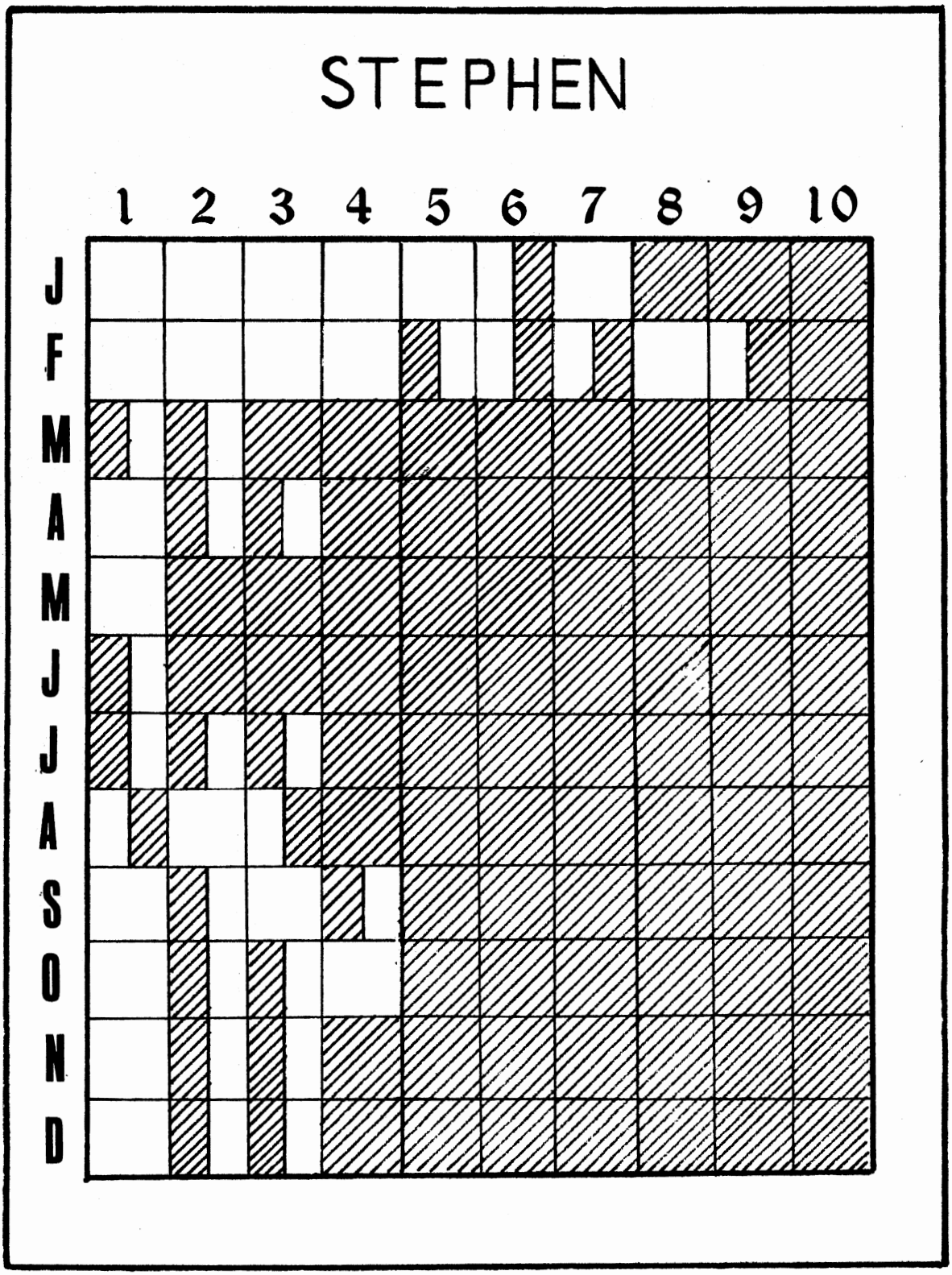

Figure 1. Example of a Subject's Chart

> If you learn how to spell more and more months correctly each day, your chart will have more squares filled in each day.

During the first treatment session an additional five minutes was allowed to explain the charting procedure to the Ss in treatment groups 2 and 3. It was not anticipated that all the children in the charting groups would fully understand the exact function of the chart after the above explanation was given. But as the study progressed, most of the Ss appeared to have an adequate understanding of what the chart represented.

The flash card drill procedure was basically the same for all the Ss in all treatment levels. The E showed the child one card at a time, beginning with January and always being presented in the proper order through December. The E said the month ("This month is January") and then asked the child to say it. If the child could not pronounce it, E said it again, accenting the proper syllabication while she ran her finger under the word. The child was not told to say it again, although some did spontaneously repeat it. The E then said to the S, "I am going to point to each letter and you read the letter when I point to it." Prompts such as "Read this letter". . ."What is this letter?" were allowed if the S did not respond. If the S did not read the letter within five seconds the E would say the letter and proceed to the next one. After the letters had been read, E again said and spelled the month, saying "This month is called January. It is spelled J-A-N-U-A-R-Y." The E then immediately proceeded to the next month. The same procedure was repeated for each month. This procedure was followed for each word every day, regardless of the child's previous mastery. A total of nine minutes was allowed for this drill procedure, or an average of 45 seconds for each month. The months with the most letters required up to 60

seconds of drill, whereas the months with the fewest letters required only 30 seconds of drill. The E used a stop watch to monitor the time. Immediately following the spelling drill procedure, E gave the child a pencil and the paper with 12 lines numbered one through twelve. The E then said, "Now you try to spell as many of the months as you can. Spell January on line one," etc. If the S did not begin to write the word immediately or proceeded too slowly, prompts such as "Go ahead and spell it now if you can", "Spell as much of it as you can", or "Try to spell them as quickly as you can" were made. A total of six minutes was allowed for the spelling test, or an average of thirty seconds per month. Most of the Ss were able to complete the months with the fewest letters in ten to twenty seconds, but were allowed no more than 50 seconds on any one month before E proceeded to the next month. This, of course, was closely monitored by E. Immediately following the spelling test, E scored the test in view of the child by circling the months or parts of months that the child spelled correctly.

For the Ss in the praise condition (treatment groups 1 and 3), verbal praise and support were given in the following manner. During the flash card drill a supportive statement was made immediately after the S had correctly read the letters of each month. No reinforcement was administered if all the letters were not correctly read. One or two supportive statements were also made after E scored the spelling test. For example - "You spelled January, May and part of December correctly. That was very good! You are doing very well!" The following reinforcement statements were used in random order during the drill and after the spelling test: "That was very good!", "You are doing very well!", "I can tell that you are going to learn very fast.", "That's fine!", and

"Good for you!". The E was sure to smile and nod if the child glanced at E. For the Ss in group 3, one or two of the above statements were made after the construction paper had been pasted to the chart (Your chart shows that you spelled January, May, and part of December correctly. You did very well!"). If a child in a praise group attempted but was not able to spell a month or part of a month correctly during the spelling test, the following statements were made after each attempt: "That's alright. You are trying hard and I am proud of you.", and "Don't worry. Everybody has trouble with that one. You are doing just fine." If a S did not attempt to spell a month, no reinforcement was administered. E would then proceed to the next month.

As was stated above, after the spelling test was administered, E scored the test in view of the child and circled the months or parts of months spelled correctly. For the Ss in the charting groups, E placed a piece of the construction paper in front of the child as she read and circled each month or part of the month that the child correctly spelled. E then helped the child paste the paper squares on the chart (as the study progressed the children learned to do this with little or no help). The E had a box with the construction paper already cut into squares and half squares, and a bottle of paste.

For the Ss in the charting only condition (treatment group 2), the procedure was the same as for group 3 except that contingent supportive statements or praise were not made. E avoided smiling, nodding, or giving other types of non-verbal support during the treatment session. Neutral statements which simply point out performance level were made. For example, "You spelled January, May, and part of December correctly", and "Your chart shows that you spelled two and one-half months correctly

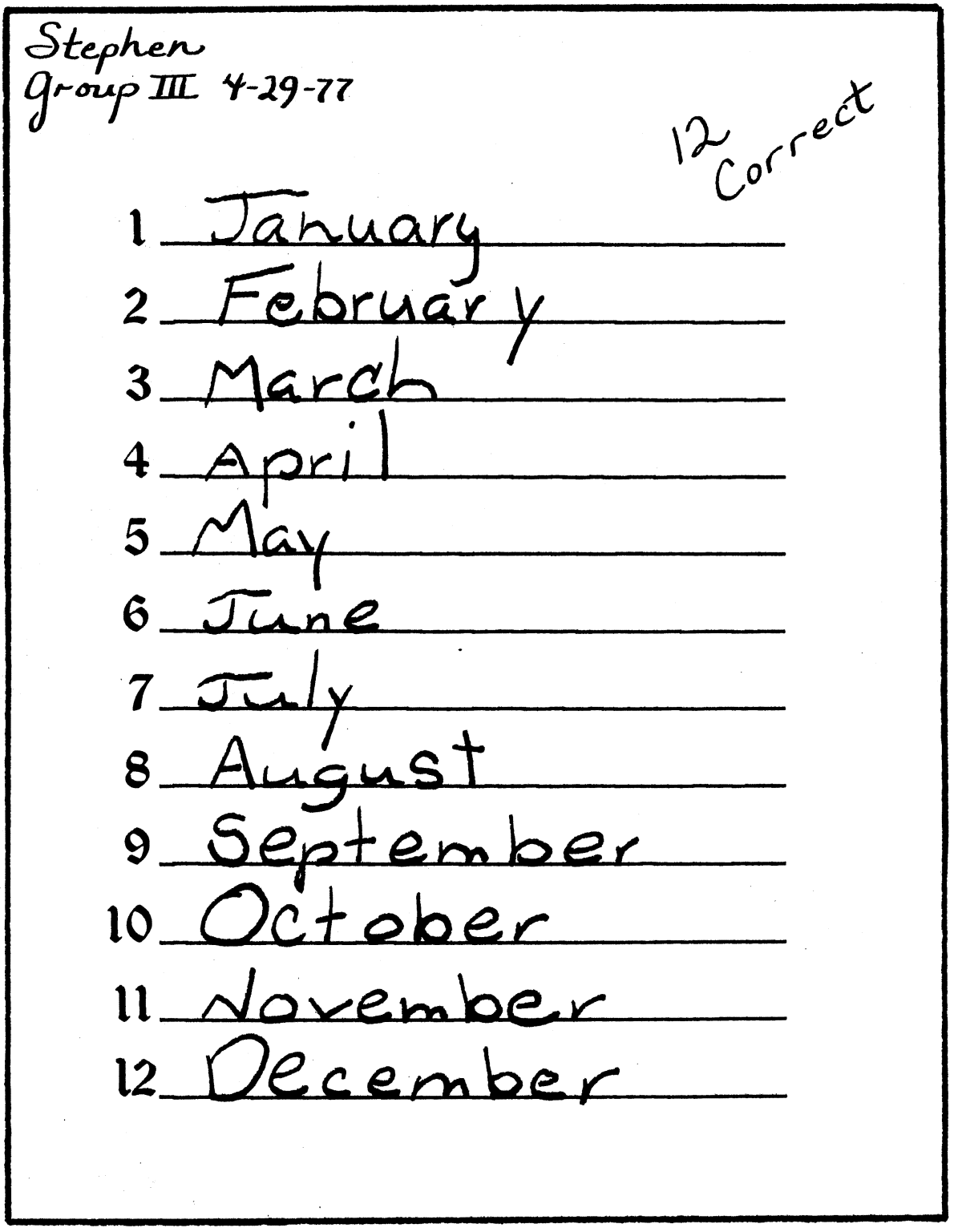

Figure 2. Example of a Subject's Spelling Test Form

today".) If the S asked E how he was doing in reference to the treatment or his progress on the chart, neutral statements which simply point out performance level were made ("You spelled five months today", "Your chart shows that you spelled five months today"), etc.

Analysis of the Data

A *t* test for related measures (Bruning and Kintz, 1977) was initially used on pre and post test mean scores for each treatment group to determine if there was significant improvement in rote spelling ability within each group.

A simple analysis of covariance (Bruning and Kintz, 1977) was employed to determine if the overall differences in the spelling performance of the three treatment groups were significant. The analysis of covariance was selected because the three groups differed in initial spelling ability (after the first treatment session). The covariate (initial ability level) of the three groups is statistically equated in the analysis of covariance, thus yielding greater validity to the final day variance between the treatment groups. In order to determine if the group regressions were homogeneous, an F test on homogeneity of group regressions was run. A significance level of .05 was selected as the criterion for difference.

Tukey's HSD test (Kirk, 1968) was used to test the differences between the final day adjusted group means.

CHAPTER IV

RESULTS

The *t* test for related measures revealed significant *t* values of 5.56 for group 1 ($p < .001$, 14 df), 5.80 for group 2 ($p < .001$, df), and 7.66 for group 3 ($p < .001$, 14 df). It is therefore concluded that all three groups experienced significant improvement in rote spelling ability.

TABLE I

PRE - POST DIFFERENCES BETWEEN MEANS

	t
Group 1	5.56 * * *
Group 2	5.80 * * *
Group 3	7.66 * * *

*	$p < .05$
* *	$p < .01$
* * *	$p < .001$

The results of the analysis of covariance revealed a significant F of 4.79 ($p < .05$, 2,41 df). Additionally, the F test on homogeneity of group regressions revealed a non-significant F of 2,59 (df = 2,39). This small F value indicates that the relationship between the covariate

and the dependent variable is essentially the same for all three groups. One can therefore assume that the group regressions are homogeneous and the results of the analysis of covariance valid. These results failed to support the null hypothesis that no significant difference in the rote learning ability of these subjects would be found as a result of the varying reinforcement strategies. One must conclude that when the covariance analysis was used to statistically equate the groups according to initial ability level, (the Ss spelling performance after the first treatment day) the varying methods of reinforcement produced significantly different results between the groups in terms of spelling performance.

TABLE II

SUMMARY OF ANALYSIS OF COVARIANCE

Source	SS (After Adjustment)	df	ms	F*
Total	336.30	44		
Between Ss	63.73	2	31.87	4.79
Within Ss	272.57	41	6.65	

*p < .05

Table III presents the mean scores for the treatment groups in terms of initial and final ability level and adjusted final ability level. Figure 3 presents the same data displayed graphically.

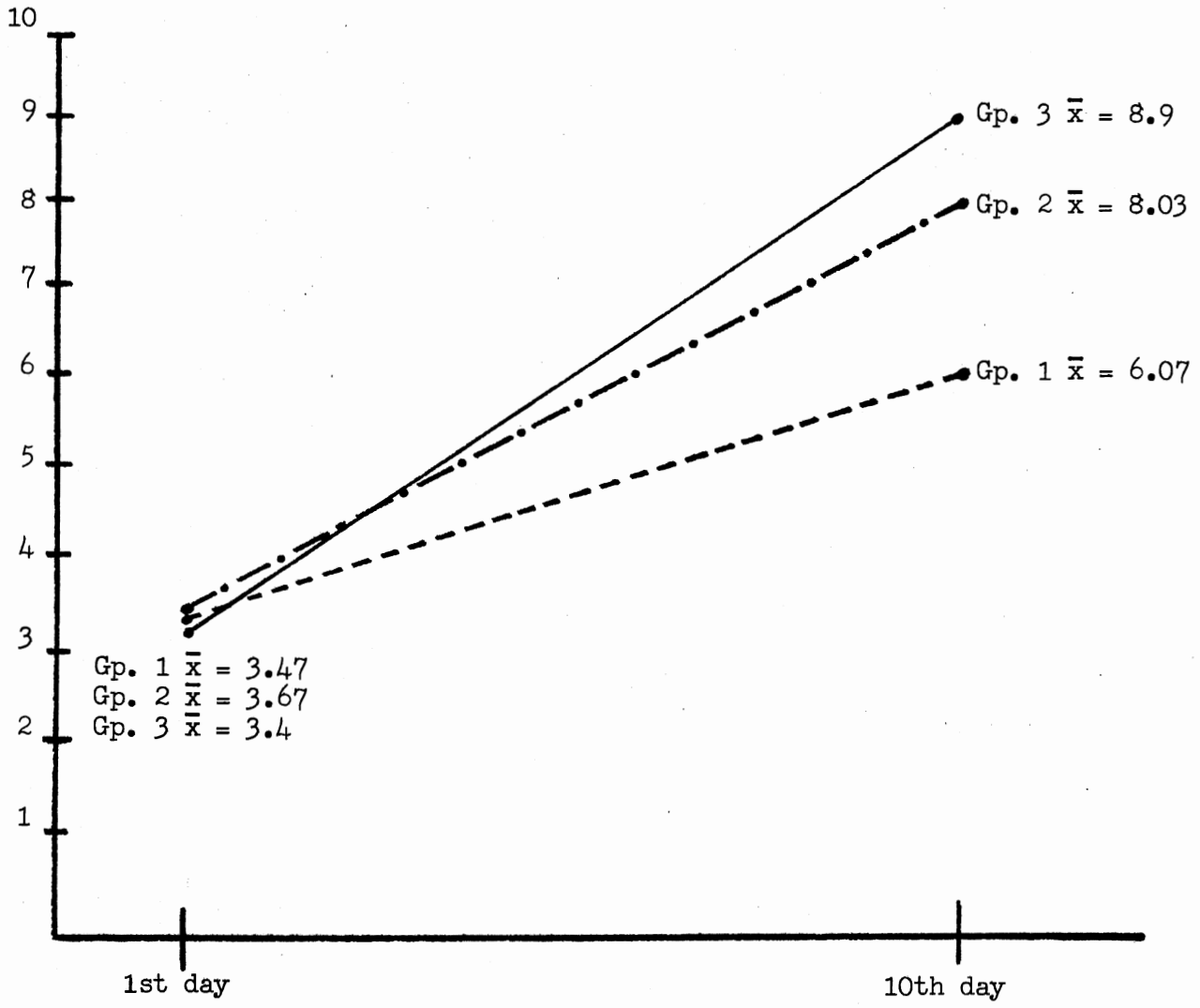

Figure 3. Graphic Representation of Initial and Final Group Ability Levels

TABLE III

MEAN SCORES FOR TREATMENT GROUPS

Treatment Groups	I	II	III
Initial Ability Level	3.47	3.67	3.40
Final Ability Level	6.07	8.03	8.90
Final Ability Level (Adjusted)	6.11	7.88	9.01

A post-hoc comparison of adjusted cell means using the Tukey HSD test (Kirk, 1968) provided a critical difference of 2.289 ($\alpha = .05$). Only the difference between the adjusted means for groups 1 and 3 exceeded this value. It is therefore concluded that there is a significant difference between the effectiveness of verbal praise and the combination of verbal praise and self monitoring of performance data in facilitating rote spelling performance, the latter being superior.

TABLE IV

DIFFERENCES AMONG FINAL DAY MEANS

	$\bar{x}_1$	$\bar{x}_2$	$\bar{x}_3$
$\bar{x}_1$		1.77	2.9*
$\bar{x}_2$			1.13
$\bar{x}_3$			

*$p < .05$

In reference to the research questions advanced in Chapter I, one and two are answered in the affirmitive. Both the verbal praise condition and the self monitoring condition resulted in significant rote learning improvement with these educable mentally handicapped children. Question three, however, was not answered affirmitively. Although there was an observed difference between the improvement of the praise group verses the self monitoring group, this difference did not prove to be significant. In reference to question four, the combination condition group performed significantly better than the praise group, but not the self monitoring group.

CHAPTER V

DISCUSSION

The results of the statistical analysis failed to support the null hypothesis. Significant differences in the rote learning performance of educable mentally handicapped children did occur as a result of the varying reinforcement strategies. The superior results obtained from the combination condition were certainly not surprising, but the fact that the self-charting condition alone did produce significant learning is quite interesting in view of the documented effectiveness of verbal praise in altering behaviors of the educable mentally handicapped. Despite the Positive Reaction Tendency reported by Zigler (1968), which is the mentally handicapped child's desire to positively interact with an approving adult as a result of social deprivation, it has been believed that the Negative Reaction Tendency (Zigler 1968) might have dominated the Ss in group two. This was speculated because they received no social reinforcement during the treatment sessions. According to Zigler, while the mentally handicapped individual has a high desire for social interaction, he is nevertheless initially wary of such interaction because of past experiences of negative, disapproving social interaction. But apparently the lack of social approval during the treatment sessions was overcome by the motivating qualities of the chart. It should also be pointed out that the examiners interacted with the subjects in a normal, friendly manner prior to and following each treatment session. But this

does not detract from the fact that the subjects in group two received no positive verbal feedback for their efforts.

This study is the first empirical evidence this author is familiar with which indicates that mentally handicapped children can, at least to a degree, control their own behavior to facilitate academic learning. The study by Jens and Shores (1969) indicated that the mentally handicapped are motivated by the graphic presentation of their work performance in a workshop setting. But what is the exact function of the self-charting procedure which motivates these mentally handicapped individuals? Did the daily visual display of these subjects' spelling performance create a goal incentive condition? Was the main effect of the chart the fact that it may have served as an external reinforcer with tangible properties (particularly the childrens' acquisition of the paper squares and half-squares)? Or was the general interaction with the adult, whether positive or neutral, the main effect of the treatment? It cannot be ignored that the display of self observation data served to some extent as a form of external reinforcement. So it appears that the self-monitoring technique may have served a dual reinforcement role - as a form of external, tangible reinforcement and as a reinforcer with intrinsically motivating properties. That is, the act of seeing his performance displayed was internally stimulating to the child. Educators and others dealing with the mentally handicapped can no longer assume that these individuals cannot respond to goals which are not directly precipitated by tangible reinforcers. The subjects in this study appeared to respond like anyone else to a sense of satisfaction with a job well done.

It was the intention of this study to contingently reinforce effort on the part of the subjects in treatment groups one and three who received

verbal praise. Therefore, supportive statements were made to these subjects during the spelling test if they attempted to spell but were unable to write enough letters correctly to receive credit as is specified in Chapter III. In retrospect, such a procedure may have actually reinforced failure for these subjects, although the intention was to successively approximate mastery and avoid frustration. The results of this study do not indicate that the subjects who attempted to spell a month or part of a month and failed responded to the reinforcement with continued or increased failure. Nevertheless, this statement is deemed necessary as a possible limitation to this study.

In applying the results of this study to the classroom, educators should be inclined not only to make use of contingent social reinforcement, but should use social reinforcement in combination with self-control strategies. The systematic application of tangible reinforcers, whether it be prizes or tokens which can be exchanged for prizes, may indeed represent reinforcement overkill. They may not be worth the money and time involved. Furthermore, they may be detrimental to the student in the long run because they may teach him to rely on, or come to expect, a tangible reward for any type of effort or performance.

Further research in the area of "natural" reinforcers such as self-control strategies is in order for the mentally handicapped. This study and variations of it with more subjects and possibly a learning task more applicable to statistical control would be helpful. Because of the confusion as to just what extent the presentation and self pasting of the construction paper squares might have served as a tangible reinforcer, a future study might have the examiner chart the child's progress for the child (out of the child's sight). In this manner, it could be deter-

mined if the visual display of performance data in itself was motivating to the child. The subject would be able to view the chart each day but would not have participated in making it. Another study might compare a tangible reinforcer (such as food or tokens) to the self-monitoring of academic performance with mentally handicapped students. Such research would help to answer the questions which were proposed earlier in this chapter.

SELECTED REFERENCES

Bandura, A., and Perloff, B. Relative efficacy of self-monitored and externally imposed reinforcement systems. Journal of Personality and Social Psychology, 1967, 1, (2), 111-116.

Bijou, S. W., Birnbrauer, J. S., Kidder, J. D., and Tague, C. E. Programmed Instruction as an approach to the teaching of reading, writing, and arithmetic to retarded children. Psychological Record, 1966, 16, 505-522.

Bijou, S. W., and Orlando, R. Rapid development of multiple-schedule performances with retarded children. Journal of Experimental Analysis of Behavior, 1961, 4, 7-16.

Birnbauer, J. S., Wolf, M. M., Kidder, J. D., and Tague, C. E. Classroom behavior of retarded pupils with token reinforcement. Journal of Experimental Child Psychology, 1965, 2, 219-235.

Blake, K. A. Teaching the retarded. Englewood Cliffs, J. J.: Prentice-Hall, Inc., 1974.

Broden, M., Hall, R. V., and Mitts, B. The effect of self-recording on the classroom behavior of two eighth-grade students. Journal of Applied Behavior Analysis, 1971, 4, 191-199.

Bruning, J. L., and Kintz, B. L. Computational handbook of statistics. Glenview, Ill.: Scott, Foresman and Company, 1968.

Cruickshank, W. M., and Johnson, G. O., (Eds.). Education of Exceptional Children and Youth. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1967.

DeCsipkes, R. A., Smouse, A. D., and Hudson, B. A. Influence of reinforcement on the paired-associate learning of retarded and non-retarded children. American Journal of Mental Deficiency, 1975, 80, (3), 357-359.

DeRiet, H. V. Effects of praise and reproof on paired-associates learning in educationally retarded children. Journal of Educational Psychology, 1964, 55, (3), 139-143.

Forness, S. R., and MacMillan, D. L. The origins of behavior modification with exceptional children. Exceptional Children, 1970, 37, (2), 93-101.

Forness, S. R., and MacMillan, D. L. Reinforcement overkill: Implications for education of the retarded. The Journal of Special Education, 6, (3), 221-230.

Gaynor, J. F., and Johnson, S. The response maze: A counter for elementary and special education settings. Psychology in the Schools, 1974, 11, (1), 95-99.

Harlow, J. The formation of learning sets. Psychological Review, 1949, 56, 51-65.

Holder, L. The effects of praise on the use of action concepts in retarded children. Dissertation Abstracts International, 1973, 33, (9-A), 4938.

Hurley, R. Poverty and mental retardation: A causal relationship. New York: Random House, 1969.

Jenkins, J. R., Mayhall, W. F., Peschka, C., and Townsend, V. Using direct and daily measures to increase learning. Journal of Learning Disabilities, 1974, 1, 605-608.

Jens, K. G., and Shores, R. E. Behavioral graphs as reinforcers for work behavior of mentally retarded adolescents. Education and Training of the Mentally Retarded, 1969, 4 (1), 21-27.

Kirk, R. E. Experimental design: Procedures for the behavioral sciences, Belmont, Calif.: Wadsworth Publishing Co. Inc., 1968.

Kurtz, P. D., and Neisworth, J. T. Self control possibilities for exceptional children. Exceptional Children, 1967, 42, (4), 212-217.

Lingren, R. H. Anxiety, praise, and reproof: Their effects upon learning and recall of mentally retarded boys. American Journal of Mental Deficiency, 1967, 72, 468-472.

MacMillan, D. L. The problem of motivation in the education of the mentally retarded. Exceptional Children, 1971, 37 (8), 579-586.

MacMillan, D. L., and Forness, S. R. Behavior modification: Limitations and liabilities. Exceptional Children, 1970, 37, (4), 291-297.

Mainard, J. C., and Love, H. D. Teaching educable mentally retarded children. Springfield, Ill.: Charles C. Thomas, Publisher, 1973.

McFall, R. M. Effects of self-monitoring on normal smoking behavior. Journal of Consulting and Clinical Psychology, 1970, 35, (2), 135-142.

Noonan, J. R., and Barry, J. R. Differential effects of incentives among the retarded. The Journal of Educational Research, 1967, 61 (3), 108-111.

Panda, K. C. Effects of social reinforcement, locus of control, and cognitive style on concept learning among retarded children. Dissertation Abstracts International, 1971, 31, (9-A), 4557.

Paris, S. G., and Cairnes, R. B. An experimental and ethological analysis of social reinforcement with retarded children. Child Development, 1972, 43, (e), 717-729.

Stevenson, H. W., and Fahel, L. S. The effect of social reinforcement on the performance of institutionalized and non-institutionalized normal and retarded children. Journal of Personality, 1961, 29 136-147

Thoresen, C. E., and Mahoney, M. J. Behavioral self-control. New York: Holt, Rinehart and Winston, Inc., 1974.

Ullman, L. P., and Krasner, L. (Eds.) Case studies in behavior modification. New York: Holt, Rinehart and Winston, Inc., 1965.

White, R. W. Motivation reconsidered: The concept of competence. In Gordon, I. J. (Ed.), Human development: Readings in research. Glenview, Ill.: Scott, Foresman and Company, 1965.

Winer, B. J. Statistical principles in experimental design. New York: McGraw-Hill, 1962.

Zigler, E. Social deprivation and rigidity in the performance of feebleminded children. Journal of Abnormal and Social Psychology, 1961, 62, 413-421.

Zigler, E. Rigidity and social reinforcement effects in the performance of institutionalized normal and retarded children. Journal of Personality, 1963, 31, 258-269.

Zigler, E. Motivational determinants in the performance of retarded children. American Journal of Orthopsychiatry, 1966, 36, (5) 848-856

Zigler, E., and Butterfield, E. Motivational aspects of changes in I.Q. test performance of culturally deprived nursery school children. Child Development, 1968, 39, 1-14.

Zigler, E., Hodgden, L. and Stevenson, H. The effect of support on the performance of normal and feebleminded children. Journal of Personality, 1958, 26, 106-122.

Zigler, E., and Williams, J. Institutionalization and the effectiveness of social reinforcement: A three year follow up study. Journal of Abnormal Social Psychology, 1963, 66, (3), 197-205.

VITA[2]

William Henry Shipman Allen

Candidate for the Degree of

Master of Science

Thesis: THE EFFECTS OF TWO REINFORCEMENT STRATEGIES ON THE ROTE LEARNING ABILITY OF EDUCABLE MENTALLY HANDICAPPED CHILDREN

Major Field: Educational Psychology

Biographical:

Personal Data: Born in Memphis, Tennessee, June 25, 1950, the son of Dr. Robert G. and Dr. Virginia S. Allen

Education: Attended public schools in Bartlesville, Oklahoma, graduated from College High School, Bartlesville, Oklahoma, in May, 1968; received the Bachelor of Arts degree in Political Science from Oklahoma State University, December, 1972; completed the requirements for the Master of Science degree at Oklahoma State University in July, 1977.

Professional Experience: Instructor of Freshman Orientation classes in College of Arts and Sciences, Oklahoma State University, 1971-72; member of Graduate Student Council, 1973-75; graduate teaching assistant, Applied Behavioral Studies in Education Department, Oklahoma State University, 1974-75; School psychometrist at Cimarron Valley Regional Education Service Center, Cushing, Oklahoma, 1975-77; member of Phi Kappa Phi, National Honor Society; member of Oklahoma School Psychological Association, 1975-77.