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Increased Rate of Response in Programmed Reading Through Contingent Peer Tutoring

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INCREASED RATE OF RESPONSE IN PROGRAMMED

READING THROUGH CONTINGENT PEER TUTORING

(TITLE)

BY

Nancy Lynn Grimes

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

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IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

1974

YEAR

I HEREBY RECOMMEND THIS THESIS BE ACCEPTED AS FULFILLING
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CHAPTER I

HISTORICAL BACKGROUND

During the last decade, behavior modification has moved from the laboratory into the classroom. Educators have applied the results of behavioral contingencies to bring about changes in a variety of student's academic and social problems.

Research has demonstrated the practicability of the use of operant procedures to bring about changes of behavior in individual children. Morice (1971) showed the efficacy of the use of the behavior modification model in a public school setting. Isolation behavior by a nursery school child was decreased significantly through teacher reinforcement (Allen, Hart, Buell, Harris and Wolf, 1964). Patterson (1965) used the combination of a mechanical device attached to the chair and reinforcement for sitting still to control movements of a hyperactive school child. School phobia in a nine-year-old-girl was successfully alleviated by Allyn, Smith and Rogers (1970).

Temper tantrums, irrelevant verbal behavior and baby talk were handled by withholding teacher attention. Contingent social reinforcement was given by the teacher when the child showed desirable

social behavior (Zimmerman and Zimmerman, 1962). Chadwick and Day (1971) combined tangible and social reinforcement to increase the work time, rate of output, and the accuracy of school work in thirty elementary underachieving students. Increasing math, reading and social studies performance, talking out and inattentiveness were manipulated through sending notes home to the parents telling of the child's progress during the day (Hawkins, Sluyter and Smith, 1972). A token economy system was used to increase academic skills of school dropouts (Clark, Lachowitz and Wolf, 1968) and a culturally-deprived juvenile delinquent (Staats and Butterfield, 1965). Hart, Allen, Buell, Harris and Wolf (1964) were able to reduce crying in an elementary school child by controlling social contingencies. Contingency contracting procedures, which included written behavioral contracts, were used to increase appropriate school behavior by Cantrell, Cantrell, Huddleston and Woolridge (1969).

Behavioral procedures were also utilized to bring about changes of children in groups within the classroom. Homme, deBaca, Devine, Steinhorst and Rickert (1963) demonstrated the Premack Principle with three-year-olds by allowing them a high-priority-behavior which was running and screaming if they first completed a low-priority-behavior such as staying in their seats. Aggressive responses of 27 boys in a nursery school class were decreased through extinction procedures and contingent social reinforcement for positive behaviors (Brown and Elliott, 1965). Group contingencies and tokens

were employed to increase study behaviors in preschool children (Bushell, Wrobel and Michaelis, 1968).

In 1965, Birnbrauer, Wolf, Kidder and Tague designed a classroom which was completely controlled through the use of programmed instruction for all academic areas and a token economy system. The usefulness of teacher attention and praise on disruptive behavior in a primary classroom was studied by Becker, Madsen, Arnold and Thomas (1967). Inappropriate talking out and turning around were decreased in a group of secondary students through teacher praise for appropriate behavior (McAllister, Stachowiak, Baer, and Conderman, 1969). Osborne (1969) used free time as a reinforcer to maintain deaf students staying in their seats. In another study, early dismissal was given to the entire class, contingent upon target children spelling words correctly (Evans and Oswalt, 1968). Grades and allowances as back-up reinforcers were combined to bring about a modification of academic behaviors of students in a learning disability class (McKensie, Clark, Wolf, Kothera and Benson, 1968).

The single organism design was also used to show how loud reprimands to the whole class increased students' disruptive behavior. Treatment procedures consisted of the teacher using soft reprimands to the individual child. This brought about a lower frequency of disruptive behavior (O'Leary, Kaufman, Kass, and Drabman, 1970). Wilson and Hopkins (1973) demonstrated that contingent music could maintain a low noise level in seventh and eighth grade Home Economics

classes. When the music was not contingent on a low amount of noise, the students exhibited a high amount of noise. A good behavior game was the technique utilized to eliminate out-of-seat behaviors and talking out. In this study, the whole class lost privileges for inappropriate behavior of individuals (Barrish, Saunders and Wolf, 1968).

Browning and Stover (1971) in their book, Behavior Modification in Child Treatment, discuss the advantages of the single-organism design for the treatment of individual problems. In the single organism type of experimental design, the variables that maintain the behavior can be isolated; relevant interdependent variables controlled; and between subject variance avoided. The data of a single organism can be carefully monitored and altered. This allows the experimenter to note under what conditions the behavior changes. If the behavior does not change, a different plan of treatment must be investigated. Single-subject research provides an objective method for the experimenter to alter behavior. Browning and Stover state that single-subject research design is more practical to use than the control group design in terms of time and money spent. They feel that the single organism design will be used more by teachers and psychologists to test their techniques.

ABACD type designs have been used to study comparative effects of different types of treatment. This design is a combination of the best features of the ABA design and BCD design (Browning and Stover, 1971). With the ABA design, it can be demonstrated that the treatment variable controls the behavior under investigation if the B

condition changes the rate of behavior from the rate found in the original baseline; and if, during the return to baseline, the original behavioral rate is reinstated. A stands for the baseline conditions under which the child is operating with his own behavioral contingencies. B represents the first treatment procedure. The treatment period is taken away during the second A. One criticism of this method is that in the reversal to baseline, the treatment program may have successfully changed the target behavior so that it is difficult to return to the same conditions that were operating under the first baseline.

The BCD design is a comparison of the differences in behavior rate when three successively administered treatment techniques are given. This design is lacking in that it does not compare behavioral rate with an uncontrolled baseline.

The ABACD design is effective when an unknown variable is compared with the probe technique. Sidman (1960) describes the probe technique of systematic replication as a process to investigate a variable by comparing it with a variable whose properties are known and which have been previously demonstrated to bring about a high degree of experimental control. In the ABACD design, C and D could be the probes or previously proven variables such as candy and money against which B, the new treatment variable can be compared. Candy and money are probes against which the effectiveness of a potential reinforcer can be tested. There has been considerable research showing that candy and money are powerful reinforcers capable of accelerating

behavioral rates of school children (Staats, Staats, Shultz and Wolf, 1962), (Patterson, 1965), (Birnbrauer, Wolf, Kidder and Tague, 1965), (Staats and Butterfield, 1965), and (McKenzie, Clark, Wolf, Kothera and Benson, 1965).

Ferster and Skinner (1957) used the probe technique to determine under what conditions time out after reinforcement would consistently eliminate the pause usually observed in a fixed ratio performance. Ferster and Skinner (1957) also developed the tandom schedule technique which involved the use of probes. Known properties of the differential reinforcement of low response rates were utilized as probes on a variable interval schedule. By imposing the conditions for a low rate schedule on a variable interval schedule, a fast responding animal changed its rate to become slow responding.

Long (1959) demonstrated multiple schedule techniques in children by combining different types of schedules. In a laboratory setting, he used fixed interval and fixed ratio schedules and reinforcements of pennies and trinkets. Some children were reinforced with a penny plus a highly valued trinket under a fixed ratio schedule, but with a less valued trinket under a fixed interval schedule. In other children, the reverse was given. The subjects discriminated not only the difference in schedules, but also the different reinforcements associated with each schedule.

Browning and Stover (1971) used the ABACD design to test successive treatment conditions for autistic and schizophrenic children.

This schedule was used to eliminate the return to baseline between successive treatment conditions. They studied the effects of one-, two-, and five-minute time-out contingencies on the noncompliant responses to verbal requests made to a seven-year-old boy. The baseline conditions of 28 noncompliant responses per day fell sharply to seven responses with the return to baseline conditions. Two-minute time-out contingencies reduced the rate of noncompliance, but the rate still leveled off at an unacceptable level. The five-minute time-out treatment procedure was an effective step in decelerating the response rate.

Although developed for normal and gifted students, the use of programmed instruction has been suggested as a means to provide individualized material for the remedial or exceptional student. Price (1965) demonstrated that retarded children could learn arithmetic from programmed materials. In his study, no differences were found between the control group who was taught through conventional methods and the experimental group who used the programmed materials. Several other studies showed similar results.

Blackman and Capobiano (1965) used teaching machines and programmed instruction in beginning reading and math with institutionalized retarded children. They found no statistical differences between the experimental group and the control group who were taught through teacher lecture and basal workbooks.

Malpass, Hardy, Gilmore and Williams (1964) compared groups of retarded children using programmed instruction in reading

and spelling with groups that were taught through conventional classroom methods. They concluded that programmed instruction was superior to the conventional method of teaching to help retarded children acquire word recognition skills and learn spelling words. Follow-up tests indicated that programmed materials helped the child to retain the words learned. In their ability to spell words, children who received programmed instruction were comparable to those given individual tutoring.

Rainey and Kelly (1967) also compared programmed materials with teacher-taught rote procedures and with an understanding math concepts approach. Their findings were similar to those of Price (1965) and Blackman and Capobiano (1965).

Hewett, Mayhew, and Rabb (1967) designed an experimental classroom which utilized programmed instruction, token reinforcement and errorless learning for brain-damaged, retarded children. Their structured environment brought about increased work behavior and decreased inappropriate behavior.

Teacher-designed programmed materials and token reinforcement were used by Vernon (1972) with ten fourth-grade slow learners who were removed from the regular classroom because of their behavior problems. The students earned their lunches and desserts, recess, field trips and the opportunity to help the teacher by appropriate behavior and completion of programmed materials. Disruptive behavior decreased sharply. All ten students finished fifth-grade-

level materials, five finished sixth grade materials, and two finished seventh grade materials in a seven-and-a-half-month period.

Williams, Gilmore, and Malpass (1968) used second-grade slow learners who had IQ scores that ranged from 76 to 90, who were six months behind in reading achievement and who came from culturally deprived homes. They compared two types of programmed instruction. Teaching machines and programmed workbooks were contrasted to the conventional classroom methods. The subjects using the teaching machine and the programmed textbooks gained significantly in word recognition and paragraph reading. The classroom group showed only slight gain in these two areas. They noted that the teaching machines were initially more appealing to the children than the programmed workbooks, yet post tests showed the results of these two groups to be similar. Thirty-day follow up tests showed a high retention rate of words for the subjects who used the two types of programmed materials.

Gomes (1970) tested the effectiveness of programmed instruction with students under varied conditions. He used 77 students ranging in IQ from 42 to 95. He found that the correlations between sex, age, and intelligence of the subjects and post-test scores were not significant. School achievement was positively related to post-test scores. Significant positive correlations were found between the number of errors the subjects made on the programmed materials and the post-test scores. Subjects who made the least number of errors on the daily programmed materials made the highest post-test scores.

The subjects with better developed perceptual skills and auditory discrimination skills made higher scores on post tests than those with poor visual and auditory skills. This study suggests that children who will work in programmed materials should be screened for severe perceptual deficiencies. The study also suggests that programmed instruction would be more effective if the error rate of the subjects could be reduced.

Haring and Hauck (1969) studied the combination of programmed instruction and token reinforcement during different experimental conditions for four elementary reading disabled students with average intelligence. The students were one to five years behind in reading skills and grade level. The experimental conditions were (a) no feedback on whether answers were right or not, (b) feedback on answers, (c) tally of the correct answers, (d) continuous reinforcement for correct answers, (e) reinforcement for correct answers with a variable ratio (VR) schedule of VR2 to VR25 and (f) transfer to word lists, basal readers and library books with no reinforcement. There were no differences in the response rates in the feedback and no-feedback conditions. High rates of responding were accelerated at condition "c" and continued through "d" and "e". The number of minutes spent avoiding reading greatly decreased. The reading levels of the four students increased from 1 1/2 to 4 years over a five-month period. An important consideration of this study is that when reading stimuli are paired with events which are reinforcing to the child, then the reading stimuli become motivating to the child.

In an article that surveyed the literature, Brown and L'Abate (1969) gave their opinion of the advantages of using programmed instruction for remedial students. The teacher can save time by using programmed material for students at all achievement levels. The students are not dependent upon the teacher and learn individual responsibility. Immediate knowledge of the accuracy of the response does not perpetuate errors. Hostile reactions against the teacher as an authority figure may be reduced through the individual work. The constancy of the format of the programmed materials makes it easy for the teacher to provide reinforcers for work finished. One of the biggest limitations of programmed instruction is the loss of social interaction between teacher and the child and the other children. Brown and L'Abate asked for research to back up these statements.

In the same article, Brown and L'Abate note that the central problem in programmed materials is motivating the student. Motivation difficulties are compounded in students who need remedial help. Students who have failed in reading in the past may not be motivated enough to finish daily reading assignments. Brown and L'Abate state that research needs to be conducted for the use of programmed materials with different age groups, social classes, different kinds of handicapped children and different types of reading problems. Different types of motivational techniques need to be developed.

Agreeing with Brown and L'Abate, Crist (1966) also finds that the novelty effects of programmed instruction last only a short time.

There appears to be an initial outburst of completion of pages, then there is a leveling off of work finished. He says that there is an apparent failure of the programmed texts to maintain the student's attention and effort. He feels that this is particularly true of students who are not motivated towards academic learning. Thelan and Ginther (1964) state that they found programmed materials to be boring for some students. They suggested a need for increasing the amount of reward for lessons finished.

In discussing programmed learning, Thompson (1963) suggests that with some populations, more learning would take place if students were reinforced for performance. He suggests that pictures, tokens and special privileges be given as rewards. He feels that it is the responsibility of the schools to build in reinforcing properties for success and mastery of programmed instruction.

In 1962, Staats, Staats, Shultz and Wolf considered reading an operant response which was subject to the laws of reinforcement. In their study, they discovered that verbal social reinforcement for reading responses was not effective very long. They gave edibles and tokens which were exchangeable for many types of toys. Reinforcements of an extrinsic nature brought about higher rates of reading responses. Staats, Finley, Minke, and Wolf (1964) demonstrated that reading responses were higher under fixed and variable ratio schedules than under a continuous ratio schedule.

Bijou, Birnbrauer, Kidder and Tague (1968) used institution-

alized retarded children to demonstrate the effectiveness of applying a token reinforcement system for programmed lessons finished in reading, writing and arithmetic. Extra tokens were given for reduction in the number of errors and reduction of the time required for the assignments. They engineered the classroom to provide for appropriate arrangement of stimuli, contingencies and reinforcing events. The rate of reading in programmed materials increased significantly when reinforcement was applied.

Holt (1971) used contingency management and reinforcing menus to increase the rate of reading and the completion of arithmetic problems using programmed materials. Using two trainable mentally retarded subjects, Holt faded the menu to reinforcers that simulated academic tasks without a loss in response rate. The reinforcers gradually acquired properties of the response until the reinforcers approximated academic tasks. In another study, Holt (1971) used first graders as subjects to demonstrate that contingency management and reinforcing menus produce a high response rate in reading and math programmed materials. This study used fixed ratio schedules of FR 10, FR 15, FR 20, FR 30 and FR 40 pages per day. Holt's findings were consistent with those of Bijou, Birnbrauer, Kidder and Tague (1968) and Haring and Hauck (1969). Higher rates of reading were produced through the application of reinforcement contingencies.

The search for durable reinforcers for the elementary school child has met many problems. Most reinforcers such as candy, food,

and water are subject to satiation. Staats et. al. (1962) attempted to solve this problem by giving tokens which could be exchanged for toys. Yet many common reinforcers mentioned in the literature such as toys and trinkets are of no value to the child except they bring about the desired change in behavior. Many school administrators and teachers object to paying a student in tangible rewards. Although attitudes are changing concerning this practice, some teachers still regard this as bribery.

O'Leary and O'Leary (1972) state that natural reinforcers should be tried in the classroom before resorting to reinforcers which must be purchased. Natural reinforcers are those which are available from within the existing school framework such as free time, privileges, extra recess and special activities. These natural reinforcers are considered reinforcing events by Homme (1970). A reward which enables a student to engage in some desired behavior is called a reinforcing event. The most important events for the student are those which are directly related to the educational objectives. These reinforcing events should be high priority in contingency contracting. Contingency contracting, as described by Homme (1970), is an agreement or contract between a teacher and his students under which the teacher promises rewards in return for the desired learning behavior by the students. Homme states that a student is more likely to perform a relatively boring task if the payoff is the opportunity to do something more interesting and entertaining.

Much research has been concerned with the use of social attention

from adults to bring about changes in children's behavior. Just recently, studies concerning the use of peers to bring about changes in students' behavior have appeared in the literature. In a study involving disruptive children, Solomon and Wahler (1973) indicate that peer influence is a source of social contingency that has not been researched thoroughly.

Patterson, Shaw and Ebner (1969) trained a peer to reinforce classroom work behavior in an inattentive child. Surratt, Ulrich and Hawkins (1969) gave data that indicated that elementary students could increase study behavior of younger children through reinforcement. Dill and Gotts (1971) found that arithmetic performance in elementary underachievers increased using peer group reinforcement. In an unpublished study, Hamblin (1970) discovered that medium to high IQ children read to criterion when tutored by adults and their amount of reading doubled when the adults gave the children tokens. However, when they were given tokens by their peers, the subjects' amount of reading quadrupled.

These findings all indicate that peer influence may be a powerful determiner in motivating students with poor academic achievement. The rate of learning might be increased with the manipulation of the peer environment.

Yet to date, all studies have been concerned with the child who has been helped. With the exception of peer tutoring research, few studies have been conducted on the changes in behavior of the child who is providing the assistance. Although not researched strictly, Allyon and

Azrin (1968) discussed the probable changes in a mental institution patient who assisted in reinforcing positive behaviors of other patients. They thought that the patient might adopt the objectives of the treatment staff and thus bring about a change in her own behavior. There would be a change of role from patient to facilitator and reinforcer of appropriate behavior in others. They mentioned that the economic advantages are apparent, but that the therapeutic or educational advantages might be more important.

This principle has been successfully demonstrated by a wide variety of self-help programs such as Alcoholics Anonymous and Synanon. Traditionally, much attention has been given to the recipient of the help being given. Reissman (1965) suggests that more research needs to be focused on the person who is providing the assistance, that he may profit as much, if not more, than the person he is helping.

In 1965, Lippitt and Lohman published results of a study in which kindergartners were tutored in basic skills by sixth graders from a social science class. Tutoring was defined as one child helping another child in the areas in which he was deficient. The kindergarten children made significant gains in readiness activities on post tests while the control group did not show gains. Other studies, Niedermeyer and Ellis (1971), Willis, Morris and Crowder (1972), and Snapp, Oakland and Thomas (1972) have supported the research of Lippitt and Lohman. Elementary students made gains in reading achievement through the use of older children as tutors. Although not researched

carefully, anecdotal reports from these studies indicated that the tutors gained in reading ability also.

New studies were developed which tested the changes made in the tutors. Cloward (1967) found that the tutors made a 3.4 year gain in reading achievement for seven months of tutoring in comparison with 1.7 months for the control group. Landrum and Martin (1970) showed gains in tutor reading achievement during a summer program to be 8 months for 3 months of tutoring. A positive improvement significant at the 1% level in reading and 5% level in math was shown for the experimental students over the control students in the Ontario-Montclair, California School District (Gartner, Kohler and Reissman, 1971).

These studies also indicated that tutoring younger children could be used as a motivational device for underachievers, students who were failing, and potential dropouts. These programs were initially developed in the ghetto schools for Black and Puerto Rican children and in the southwest for Mexican-American children. Most studies took into account Neidermeyer and Ellis' (1971) findings that trained tutors were more effective than non-trained tutors. Training programs were organized using learning theory principles of modeling, shaping, and positive reinforcement (Weinstein, Ungerleider, Preston and Osborn, 1970).

By the 1970's, peer tutoring programs were being introduced in some form in many of the schools in the nation. These programs were usually designed with two objectives in mind: (1) individualization

of reading or math for the younger student through a one-to-one relationship; and (2) changing the learning environment to motivate the underachiever or failing older student.

Peer tutoring might be considered a reinforcing event by some children. If this were effective as a reinforcer, this would provide a cost-free reinforcer that would actually be of benefit to the student.

In a pilot study which involved four sixth grade boys and girls, Grimes (1973) found that two out of the four students considered tutoring to be a reinforcing event. The two students were willing to complete on a fixed ratio schedule, 10 to 30 pages of programmed reading each day for the opportunity to tutor a second grader. These two subjects completed the contingency for 60 and 65 out of 84 days completely on their own initiative. The classroom teacher did not remind the students to work on the reading. These subjects, who had IQ scores of 62 and 72, made six and four months in gains in reading achievement respectively, as measured by the Stanford Diagnostic Reading Test, for a three month treatment period. Another subject who dropped out of the programmed reading and tutoring during the first week, stayed at exactly the same level in reading achievement. The fourth subject refused to complete the programmed instruction but was allowed to continue the tutoring because it was the only part of school that he enjoyed and would participate in. Post test results showed a gain of two years and three months. This large gain might be attributed to the private tutoring that he was receiving plus the change in attitude towards school

and himself. He experienced much success and attention from his teachers and peers from the tutoring.

CHAPTER II

EXPERIMENTAL DESIGN AND PROCEDURE

Subjects

The subjects were five fifth and sixth grade students from Jefferson Elementary School, Charleston, Illinois. The subjects who were included in the study had intelligence scores between a range of 60 and 91. Children who had not been tested within the last two years were tested using the Slosson Intelligence Test for Children and Adults. Another criteria for selections of subjects was students whose reading grade level was 2 or more grades below grade level in reading. This was determined by the use of the learning expectancy formula, $EA = \frac{MA + CA + GA}{3}$. In this formula EA stands for the expected level of reading achievement, MA stands for mental age, CA stands for chronological age and GA stands for grade age. The Gray Oral Reading Test was used to measure reading achievement. Students selected also were those who were not enrolled in Remedial Reading, or Learning Disability classes or who were receiving private tutoring help. Efforts were made to choose students who had a low absentee rate.

The Bender Gestalt Test and the Wepman Auditory Discrimina-

tion Test were administered to the subjects to determine perceptual abilities.

The subjects received their regular classroom reading groups each day. This study supplemented the normal classroom reading period. Parental permission was obtained and the students were asked to volunteer for the study.

Apparatus

The Sullivan Programmed Reading Series, I, II, and III, produced by the McGraw-Hill Book Company was used. Series I consists of seven books and is equivalent to the average first grade program. Series II, books 8-15, is equivalent to the average second grade program. Series III, books 16-23, is equivalent to the average third and fourth grade programs. Each book contained a linear programmed reading format.

A response was defined in terms of each page read and completed. Each page contained an average of four to five frames requiring from two to twelve written answers. The students wrote their answers on a worksheet to be handed in each day. The number of pages completed each day was recorded. The accuracy level of the programmed instruction was set at 100 per cent. Criteria for placing the students at a workbook level was determined through the use of pre-diagnostic tests furnished by the Sullivan Series.

During the tutoring sessions, the Sullivan Series was used at

the level of the younger child (tutee). The tutors encouraged the tutees to complete ten written pages in the workbooks each day. The tutors and tutees then chose flashcards, library books and educational games for the remainder of the session. The sessions were held in an empty classroom at Jefferson School for a twenty-minute period each day. They were held before school each morning for fifty-two school days.

Procedure

The subjects were given two twenty-minute sessions on the programmed readers to show them how to write their answers on the worksheets and check them. They were timed on a page to demonstrate how quickly they could finish a page. They were urged to work as many pages a day as they could on their own free time during the school day or after school. Emphasis was placed on the fact that the subjects would take the responsibility for teaching themselves to read.

The subjects were trained by the experimenter and two assistants to be tutors using materials from the National Commission of Resources for Youth. The training sessions of fifteen twenty-minute periods before the tutoring began. Use of the problem solving approach, role playing, cueing and how to give verbal reinforcement were stressed to the tutors.

The tutors were matched to first grade children who were referred by their teachers for individualized help in reading. They were matched in terms of reading level and same sex. In all cases,

the tutor had a higher reading level than the tutee.

Many failing students avoid reading tests and when faced with difficult tasks, refuse to try. To control for this factor of test resentment and because there were four forms of the Gray Oral Reading Test to be given, candy reinforcement was used. Before each alternate form of the reading test, the subjects were told that they would receive a candy bar if they did their best on the test.

Baseline I

The subjects were asked to work as many pages a day as they could during seat work time or their free time. They operated under their own contingencies and were left completely on their own initiative as to how many pages a day they could complete. The classroom teachers did not remind them to work on the programmed reading.

The behavioral rate of the number of pages read per day was recorded as baseline data. The baseline continued until a steady state was reached. This took twenty-three days to reach a steady state. Sidman (1960) defined a stable state as one in which the target behavior does not fluctuate or change over an extended period of time. A stable rate for this experiment had been previously defined as no more than ten per cent variance on either side of the mean.

Form A of the Gray Oral Reading Test was administered. This test was given by the Remedial Reading teacher from the school, who was unaware of the design and purpose of the study.

Reinforcement--Fixed Ratio

The contingency of FR 10 pages per day was introduced. The subjects were allowed to tutor only if they had finished the required number of pages with 100% accuracy. Tutoring was the reinforcer. The tutoring sessions lasted twenty minutes each morning and were held five days a week. The sessions were supervised by the experimenter and two assistants.

The fixed-ratio schedule for pages completed per day was increased from FR 10 to FR 15. The length of the two fixed-ratio sessions was the same number of days that it took to stabilize the baseline. The second form of the Gray Oral Reading Test was given.

Baseline II

Baseline, nonreinforcement conditions was put into effect. To bring about a reversal to baseline, programmed instruction was completed by the subjects without the tutoring reinforcer. The third form of the Gray Oral was given.

Probes

Probes of candy and money were used as reinforcement to compare the effects of known reinforcers for school children with tutoring as a reinforcer. Probe I was the second treatment period. The students were given a nickel candy bar for completion of the FR 15 pages of programmed reading. Probe II was the third treatment procedure. The students were reinforced with a nickel for the completion

of FR 15 pages of programmed reading. A post test, the fourth form of the Gray Oral, was given.

The data was collected over an approximate fifty-two day period. The students served as their own controls in two ways. Each student had an academic history of failure in reading and a history of one to four years with low reading rates. For an approximate two-week baseline period, no reinforcement was given except the feedback from the programmed reading.

CHAPTER III

RESULTS

Per Cent of Students Finding Tutoring To Be Reinforcing

Of the five students who qualified for the study and were asked to volunteer, 60% were willing to give up their free time before school started in the morning and to complete pages in programmed readers in order to tutor younger students. This is comparable to the pilot study (Grimes, 1973) where 50% of the students completed the programmed reading assignments. Of the other two students, one was disinterested in tutoring and the other refused to complete the pages in programmed readers in order to tutor.

Rate of Response

Figure I shows the mean number of pages read by the three subjects who participated in the tutoring and programmed reading as a function of repeated baseline and reinforcement condition changes. The mean number of pages read during Baseline I varied from 31 pages per day at the beginning of the experiment to a stable rate of zero pages per day for five days. The average number of pages read

per day during Baseline I was seven pages.

Under the fixed ratio schedules, the mean number of pages per day was eleven pages under FR 10 and fourteen pages under FR 15. During the nonreinforcement stage of Baseline II, the mean number of pages fell sharply to two pages per day. During the probe periods of candy and money, the mean rates were also three and two pages per day. Figures II through VI give the individual rates of the subjects.

Changes in Achievement Scores

Table I summarizes the changes in the oral reading level of the subjects during the three months of the study as measured by the Gray Oral Reading Test. Of the three subjects who participated in the tutoring and programmed reading, one made a gain of eight months and one made a gain of five months in oral reading. The third subject declined in oral reading level by two months. The two subjects who did not participate in the tutoring or programmed reading gained five months and 1.1 years in oral reading.

Per Cent of Days That the Contingency Was Completed

Table II gives the percentage of days that the subjects completed ten or more pages of programmed reading per day under different reinforcement conditions. Of the three subjects who participated, tutoring was considered to be a much stronger reinforcer than candy or money. The two subjects who did not participate in the tutoring completed their pages for candy and money only one time each.

Figure I. -- Mean number of pages read by subjects as a function of repeated baseline-nonreinforcement, reinforcement and probes.

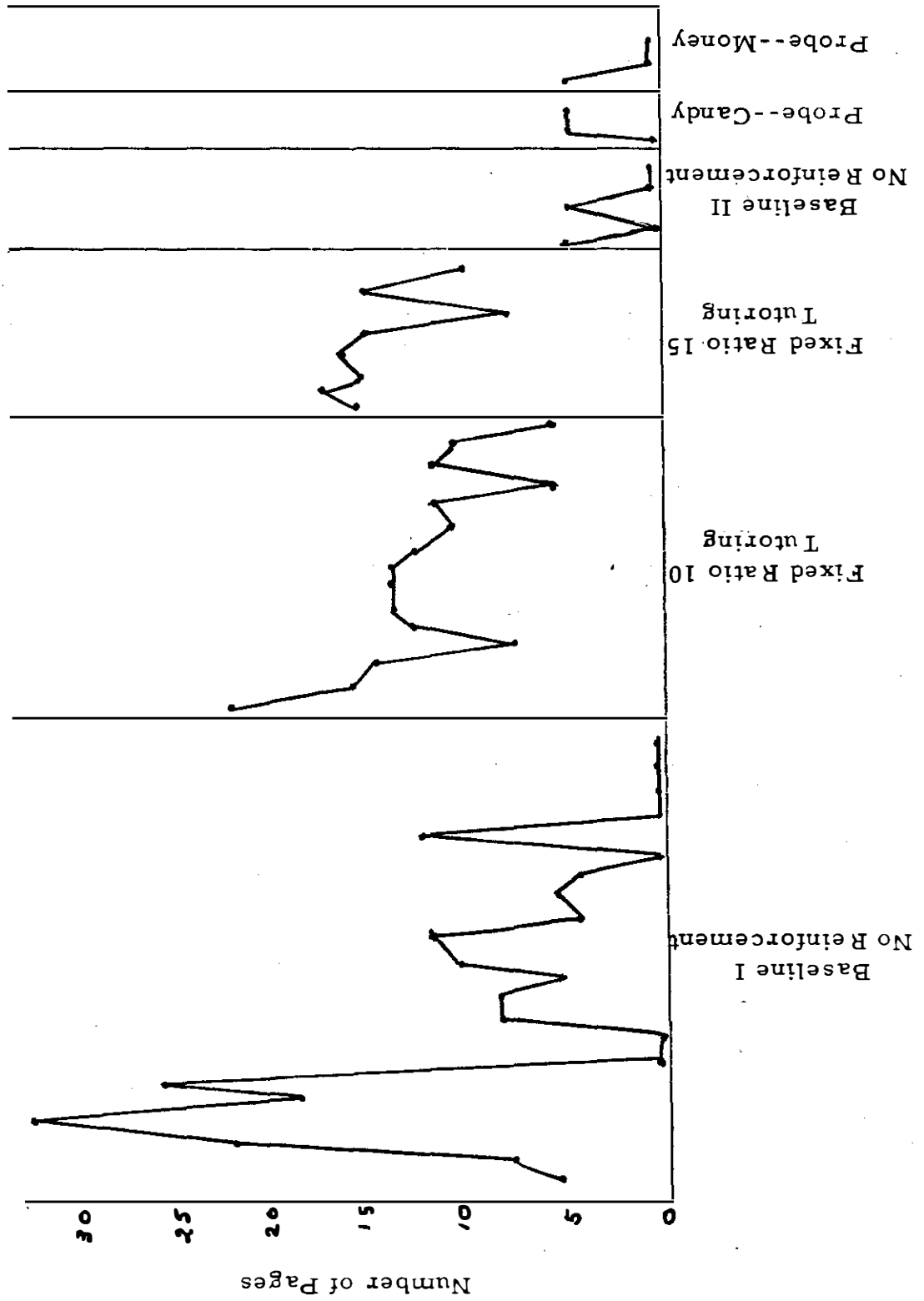
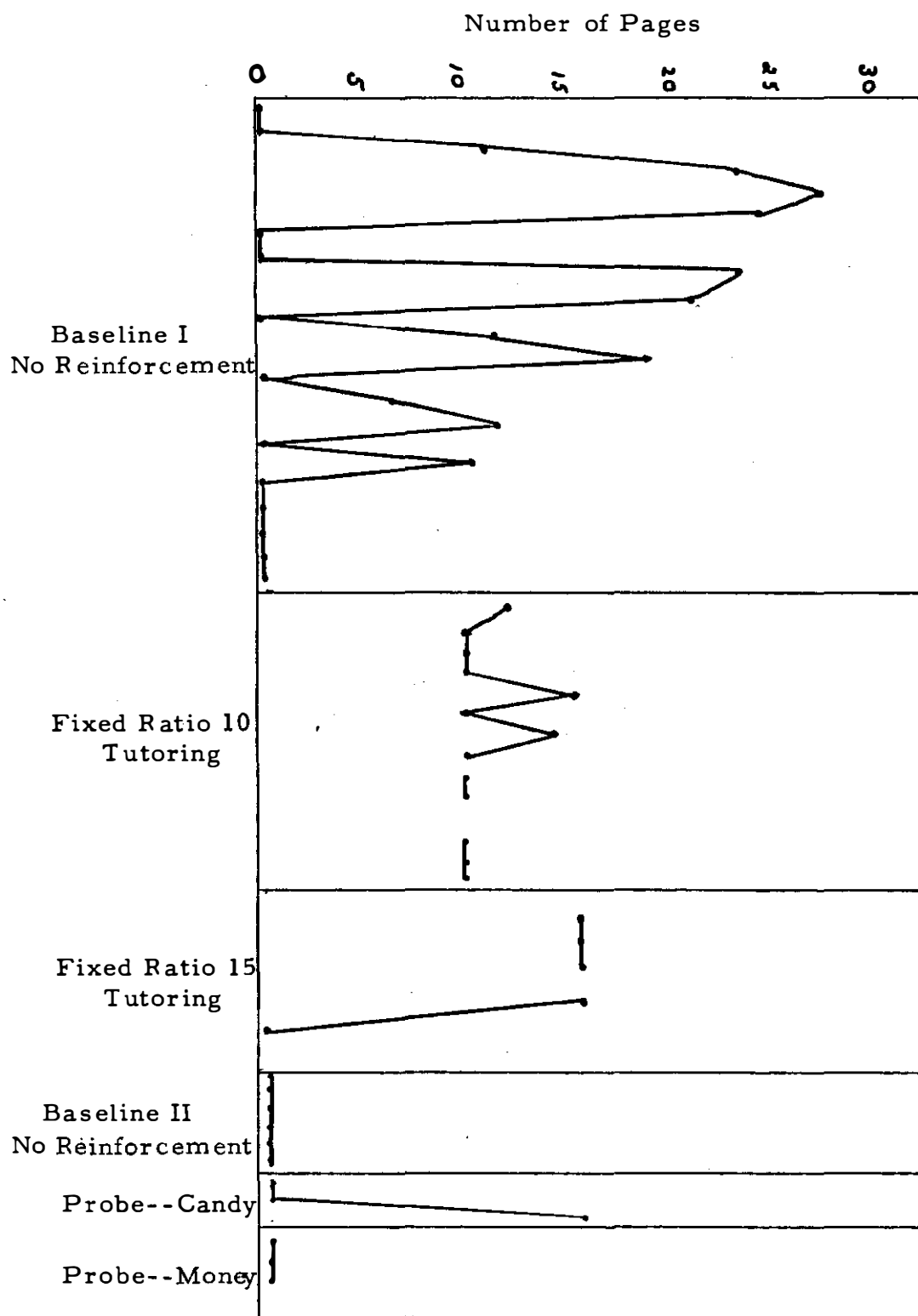


Figure II. -- Number of pages read daily by Subject A as a function of different reinforcement-nonreinforcement conditions.



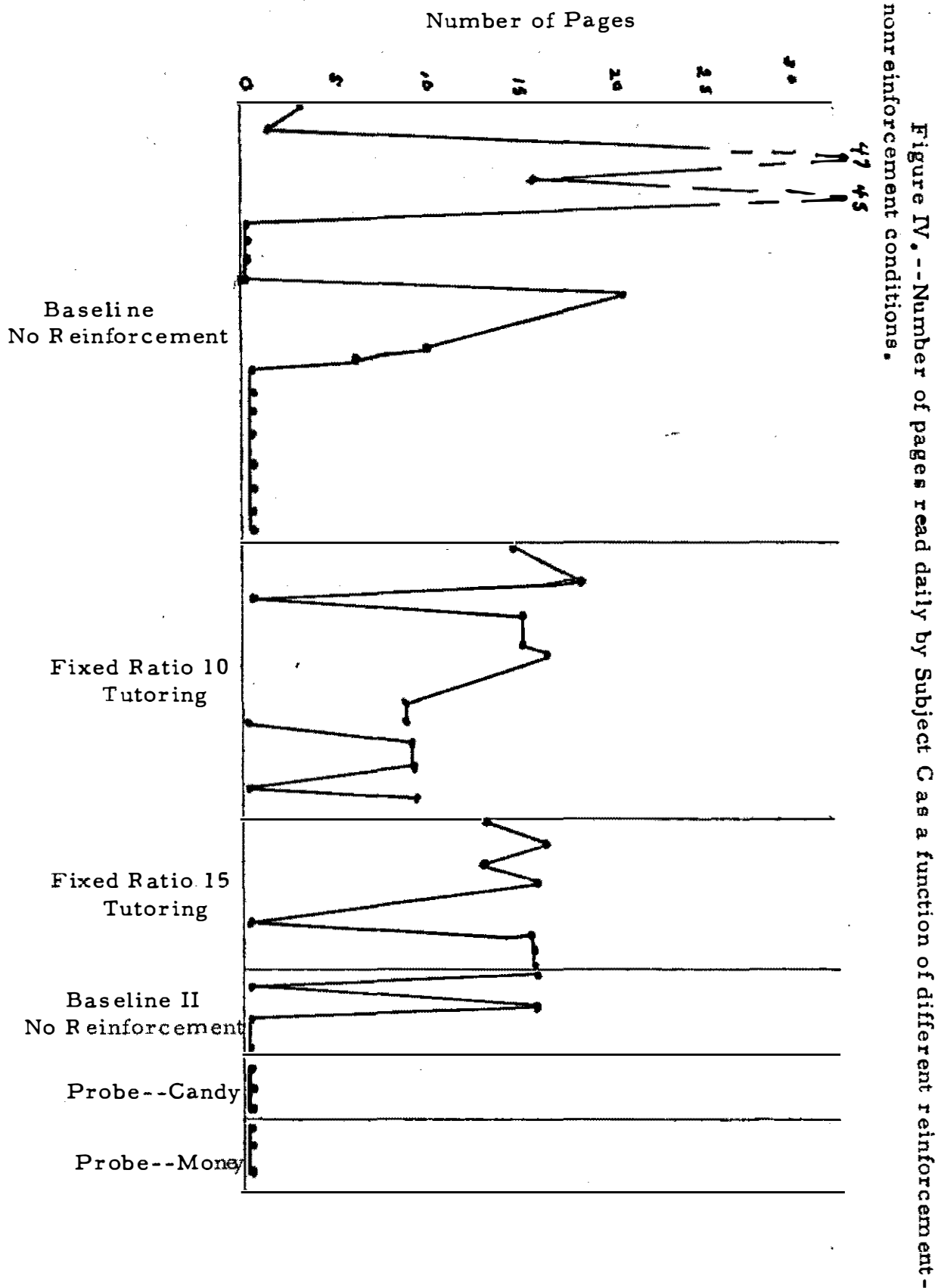


Figure V.--Number of pages read daily by Subject D as a function of different reinforcement - nonreinforcement conditions.

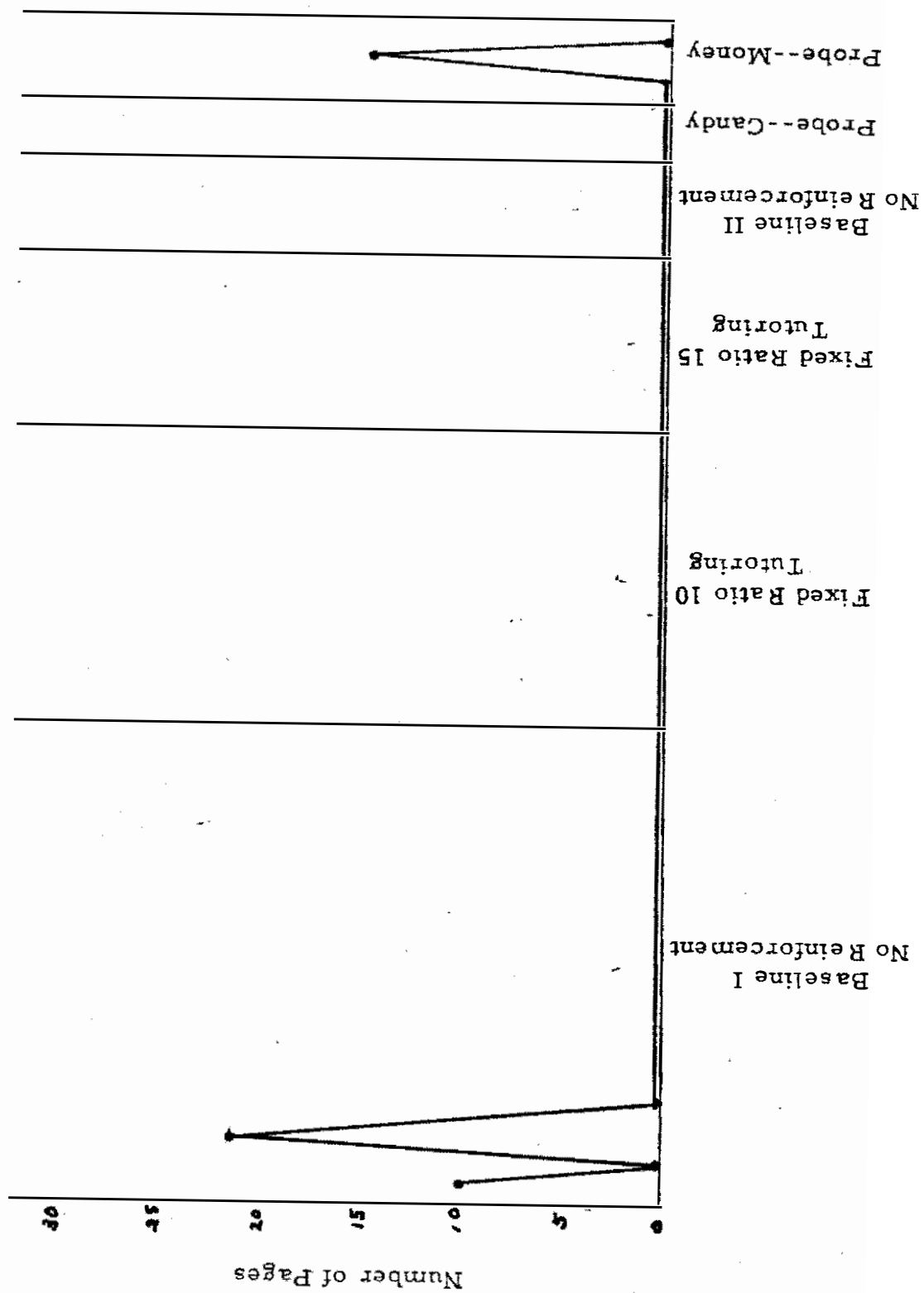


Figure VI. -- Number of pages read daily by Subject E as a function of different reinforcement-nonreinforcement conditions.

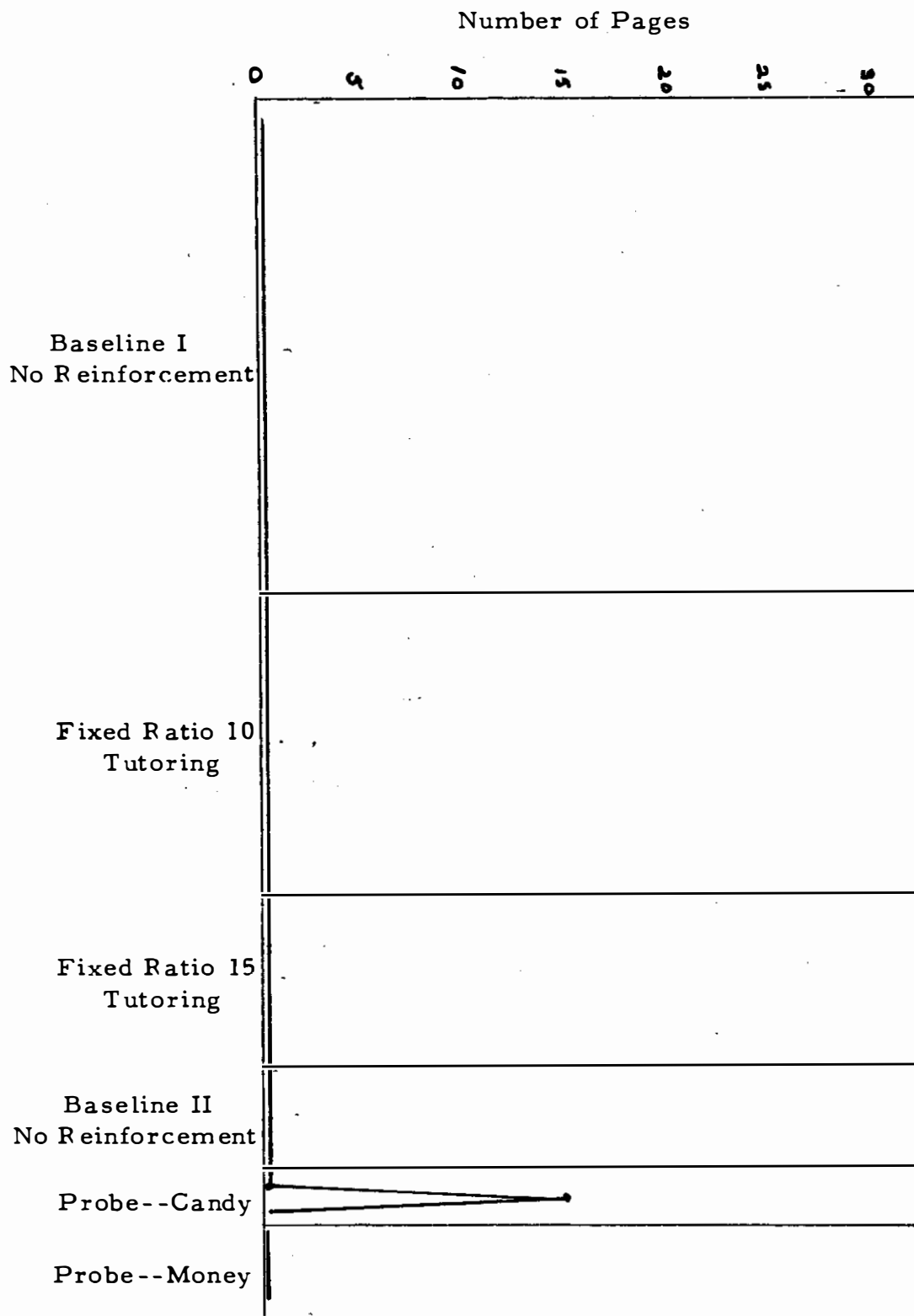


TABLE I
ACHIEVEMENT SCORES OF SUBJECTS AS MEASURED BY THE
GRAY ORAL READING TEST, FORMS A, B, C AND D

	Form A Pretest	Form B After Baseline I	Form C After Tutoring Reinforcement	Form D After Probes (Posttest)
Participating				
Ss A	3.5	3.8	4.1	4.3
Ss B	3.9	4.2	4.2	4.4
Ss C	<u>1.8</u>	<u>1.7</u>	<u>1.6</u>	<u>1.6</u>
Average	3.1	3.2	3.3	3.4
Non-participating				
Ss D	2.1	4.0	3.8	3.2
Ss E	<u>2.1</u>	<u>2.2</u>	<u>2.7</u>	<u>2.6</u>
Average	2.1	3.1	3.2	2.9

TABLE II

THE PERCENTAGE OF DAYS THE SUBJECTS COMPLETED 10 OR MORE PAGES
OF PROGRAMMED READING PER DAY UNDER DIFFERENT BASELINE--NO
REINFORCEMENT AND REINFORCEMENT WITH TUTORING,
CANDY AND MONEY CONDITIONS

	Non-reinforcement	Tutoring Reinforcement		Non-reinforcement	Probes	
	Baseline I	FR 10	FR 15	Baseline II	Candy	Money
Ss A	41%	100%	80%	0%	33%	0%
Ss B	26	100	100	0	33	0
Ss C	41	79	87	33	0	0
Ss D	1	0	0	0	0	33
Ss E	0	0	0	0	33	0

CHAPTER IV

DISCUSSION

The results from Baseline I are supported by the research literature (Brown and L'Abate, 1969), (Crist, 1966), and (Holt, 1971) that the novelty effects of programmed instruction last only a short time. Under baseline-nonreinforcement conditions, there was an initial high rate of response. The response rates fell on the 14th to the 18th day to a stable rate of zero pages per day during the last five to nine days of Baseline I.

The increase in the number of programmed reading pages completed per day under reinforcement conditions is similar to results found by Hewett, Mayhew and Rabb (1967), Vernon (1972) and Holt (1971). Research has consistently shown that higher rates of reading are produced through the application of reinforcement.

The rate of pages finished per day appeared to be affected by the variance in the number of words per page. Most of the subjects progressed through two or three workbooks during the fifty-two days of the study. The workbooks became more difficult and had more words on the pages. This means that the students were reading more words

per page on each day at the end of the study than they were at the beginning of the study. This increase in the words-per-page ratio slowed down the overall rate of pages per day near the end of the study. One method of handling this is reflected in the method used by Holt (1971), where he counted the words read per page per day as a response rate instead of the number of pages read per day.

Another compounding variable in determining the rate of pages per day appeared to be the amount of time that the subjects had available. The classroom teachers had previously agreed that the subjects would be given time to complete the programmed reading pages during school time. However, the teachers did not grant this time to the students. The subjects were forced to take their workbooks home to complete the FR schedules of pages. They reported that they spent from 30 to 60 minutes a night on the programmed reading. Sometimes they forgot to take the books home or were kept busy by family activities. Subject B, whose family drove 90 miles each night for one week to conduct a religious revival, worked on the pages during the revival. Occasionally a student would give up his free time before school or at a noon hour in order to complete the pages. These pages were completed entirely on the student's initiative. The teachers did not remind the subjects to work on the pages.

One variable that may have added to the students' desire to complete their pages was the individual attention given to them by the experimenter and the two assistants during the tutoring sessions.

During these sessions, the subjects were considered in a positive, favorable attitude in contrast to their regular classrooms where they were considered by the teachers and students to be at the bottom of the class. The subjects gained considerably in prestige with the other students through the tutoring.

The three subjects who participated in the programmed reading and tutoring showed an average of less gain on post test results in oral reading achievement than the two subjects who refused to participate. This may be explained by examining the task required and the test chosen to measure reading achievement. The task that was required of the subjects was silent reading and writing a response of one or two words in each frame of the programmed reading. The tutoring consisted of listening to the tutee read and playing educational games. The subjects did not practice oral reading. As the students were in different classrooms under different teachers, there was some variance in the amount of oral reading done daily in the classroom reading groups. Subjects A, B, and C were from different teachers, while subjects D and E had the same classroom teacher. The Gray Oral Reading Test was chosen because it was the only standardized test that had four equivalent forms. It measures growth in oral reading and aids in diagnosing oral reading difficulties. The test manual suggests that it should be given along with a silent reading test. The manual also states that the Gray Oral should not be considered to be a general overall test of reading achievement. The main purpose of the Gray

Oral is to place a child at a level in a textbook series where he will be comfortable in reading out loud.

One of the advantages of programmed reading is that it builds vocabulary (Williams, Gilmore and Malpass, 1968). A standardized reading test such as the Wide Range Achievement Test, which utilizes the word list format might show an increase in reading achievement after working in programmed readers. Another measure would be to take words from the Sullivan Series to determine changes in reading achievement as done by Haring and Hauck (1969) in their study.

In general, the subjects who agreed to participate came from families who gave support to school and academic activities. Subject A had been previously diagnosed as a slow learner with an intelligence score of 85 with poor auditory discrimination skills and mild visual perceptual difficulties. Subject B was designated as an underachiever with an intelligence score of 91. He exhibited no visual perceptual or auditory discrimination difficulties, however his auditory sequencing skills were low. Subject C, who decreased in two months of oral reading ability during the study, had been previously diagnosed as a slow learner with an intelligence quotient of 84. He exhibited a severe visual-motor perceptual problem. His error score on the Bender Gestalt Test was more than two standard deviations away from the mean for boys his age. Auditory discrimination skills were also poor. Although reading achievement did not improve for this student, his behavior in the classroom became more positive with more time spent on school work

according to reports from the classroom teacher.

Subjects D and E, who declined to participate, were cousins who were in the same classroom. They were considered by the school authorities to come from families which had values that were in opposition to the values and attitudes of the school. In their article which discusses the advantages and disadvantages of programmed reading, Brown and L'Abate (1969) suggest that research needs to be conducted for the use of programmed reading with different social classes. Subject D was designated as a slow learner with an intelligence quotient of 73 with difficulty in auditory discrimination and auditory sequencing. This student had a past history of nonproduction of school work. Subject E was considered to be an underachiever with an intelligence score of 91. He did not have any apparent perceptual problems, and his main problem in school was his lack of application.

The last two subjects might have been motivated to finish the programmed reading pages had they been allowed to get out of class to tutor instead of giving up their free time before school. Due to school policies, the experimenter could not secure released time from school for the subjects to tutor. The experiment had to be conducted before school took up in the morning. Students who are failing in school often welcome any reason for escape from the classroom which is an avoidance response to school work. O'Leary (1972) mentions that the adversiveness of the regular classroom environment may cause the student to view release from the class, for any reason, to be an escape

conditioning procedure.

Limitations of the present study include the small number of subjects involved and the lack of control for different types of perceptual problems. Another restriction was the school administration's insistence that the study could not be conducted during school hours as a part of regular school activities. Another limitation was the number of days that the study was conducted. If the candy and money probes had been extended to twenty-three days, which was the same amount of days as Baseline I and the tutoring reinforcement periods, then a statistical analysis could have been applied to the data.

Suggestions for further research include utilizing the same format with students of different social classes and perceptual abilities. Behavior check lists could be utilized by independent observers to determine if there were changes in classroom academic and social behaviors as a result of the tutoring. Groups could be matched to compare the effects of tutoring and programmed reading with a remedial reading group and a control group. A research program design could be used to determine if the younger children who are being tutored would complete programmed reading in order to be tutored by older students.

The present study was conducted to determine if peer tutoring could be used as an effective reinforcer for increased academic performance. Browning and Stover (1971) define an effective reinforcer by being demonstrable as such. The reading environment in this study

was changed to pair reading stimuli with the tutoring events which proved reinforcing to 60 per cent of the students. The students made the response of reading to reading stimuli so that in a role reversal situation they could listen to and direct a younger child in the response of reading in the presence of reading stimuli. Staats (1962) states that the more initial pairings of the reading events with stimuli that are reinforcing to the student, the more motivating the reading events become. The student acquires a history of reinforcement which motivates him to read more. Success in reading is one of the most powerful reinforcers for more activity in reading. This study demonstrated a cost-free technique that is present within the natural school environment.

With the current trend in integrating mildly mentally retarded students back into the regular classrooms, new methods must be developed to provide successful learning experiences. At present there is no Federal funding available to hire specialists to work with children who have reading problems but who fall below the normal intelligence range. These children are in the regular classroom but they do not qualify for Title I Remedial Reading or Learning Disability classes. Many of these children are reading at below grade level and have not found reading to be a rewarding activity. Without individual help in reading, they are unable to work at grade level as most subjects require reading. They continue to be passed from grade to grade until they reach the age of sixteen, when many of them drop out of school. A method such as the combination of programmed reading and peer

tutoring could provide successful reading experiences for such students. This could be provided through the use of paraprofessional help or adult volunteers. This would be economical in terms of the amount of teacher time spent and materials purchased. More important, it might provide a successful learning experience for the slow learner.

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