5-16-1973

Effect of a Feedback System on Word Recognition of Primary Children in a Tutorial Project

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Effect of a Feedback System on Word Recognition of Primary Children in a Tutorial Project

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EFFECT OF A FEEDBACK SYSTEM ON WORD RECOGNITION OF PRIMARY CHILDREN IN A TUTORIAL PROJECT

BY

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B.S., The University of New Mexico, 1968

THESIS

Submitted in Partial Fulfillment of the
Requirements for the Degree of

Master of Science in Education
in the Graduate School of
The University of New Mexico
Albuquerque, New Mexico

May, 1973

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ABSTRACT OF THESIS

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ABSTRACT

The purpose of this study was to determine the effect of a feedback system on word recognition gain. The subjects were six primary students referred to the resource room for reading problems. A cross-age tutorial project was established in which the subjects were tutored, using flash cards, for two 15 minute sessions each day.

The feedback system, in the form of daily rate measures and charts, included the manager, the tutor, and the subject. In the first session, Condition A, the subjects received feedback on a one minute rate sample of reading performance and were allowed to chart the number of words read correctly and incorrectly. The charted information was made available to the tutor and the manager. On reaching 25 words read correctly per minute for a second time, the subject was given a new set of cards. In the second session, Condition B, the subject was tutored in a similar manner. A one minute rate sample of performance was taken, but the results of the performance were charted without specific feedback given to the subjects, his tutor, or the manager. Once a new set of cards was presented in Condition A, a corresponding set of cards was presented in Condition B.

A score was obtained for each session by subtracting the number of words read incorrectly from the number of words read correctly. If new cards were presented, two scores were obtained, one for the pretest (before instruction) and another for the posttest (after instruction). Gain was defined as the difference between one day's score and the next day's score ($G = Sc_2 - Sc_1$) or the difference between the pretest and posttest score ($G = Sc_{pt} - Sc_p$). The Sign Test (Siegel, 1956) was

selected to analyze the data. The hypothesis that feedback has no effect on word recognition gain was rejected. The differences between the mean number of words gained in Condition A and Condition B revealed a probability of .016. It was demonstrated that the use of the feedback system using daily rate measures and charts can accelerate word recognition gain of primary students in a tutorial project.

ACKNOWLEDGMENTS

I welcome this opportunity to thank:

Dr. Tom Chastain, Director, and all staff members of the Southwest Regional Resource Center for their full support;

Ginger Schettler, my companion teacher who offered her time and cooperation necessary for a successful project;

Dr. Jim Everett, my director at the University of New Mexico for his guidance and patience.

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CHAPTER I

Introduction

A resource room is an instructional setting to which a child comes for specified periods of time (Hammill & Wiederholt, 1972). Especially for the milder forms of handicaps, the resource room provides special education for specific disabilities on an individual basis or in small groups while the child is enrolled in the regular grade (Kirk, 1972).

An approach using cross-age tutors in a resource room has been implemented in parts of New Mexico and Arizona under the direction of the Southwest Regional Resource Center at New Mexico State University in Las Cruces, New Mexico. Inherent in this approach is a feedback system which provides direct and daily rate measures to the classroom manager, the tutor, and the student. A resource room, using cross-age tutors, provided the setting for this study.

In both regular and special education, there is an increasing demand for educational accountability (Bateman, 1971; Starlin, 1971a; Vergason, 1973). Starlin (1971a) referred to a growing need for more sensitive and frequent measures of in-class performance. Procedures for in-class measurement and accountability, using daily rate measures and charts, are discussed in this study. The influence of these procedures on reading performance, however, will be especially emphasized.

Bateman (1971) stated, "One of the real difficulties we face in our efforts to improve reading instruction is having few evaluation systems sensitive enough to provide data for daily instructional decisions [p. 385]." This study will investigate a system of daily measures on the basic skill of word recognition.

Purpose of this Study

The purpose of this study was to investigate the effect of feedback, in the form of daily rate measures and charts, on the word recognition gain of primary students in a tutorial project.

Rate measures, used in this study, were timed one minute samples for words read correctly and incorrectly from flash cards. Charts were available for each subject to mark the number of words read correctly and incorrectly in a one minute rate sample.

Word recognition skill was defined as a reader's ability to recognize words as a form he readily knows--a "sight" word (Chambers, 1971). It was measured on the basis of words gained. A single score was obtained for each session by subtracting the number of words read incorrectly from the number of words read correctly. Gain was computed as the difference between one score and the following score.

Hypothesis

For the purpose of this investigation the hypothesis has been stated in the null form. It is hypothesized that feedback, in the form of daily rate measures and charts, will have no effect on the word recognition gain of primary students in a tutorial project. Area of rejection for the null hypothesis was set at the $P \leq .05$.

CHAPTER II

Review of Literature

An investigation of the literature has shown that direct and daily measures and charts not only provide procedures for educational assessment but also provide prossible techniques for accelerating pupil performance. Direct and daily measures will be discussed as they relate to (a) educational assessment and decisions, (b) the use of charts, (c) proficiency aims in education, (d) the use of tutors as behavioral engineers, and (e) word recognition skills.

Direct and Daily Measures in Educational Assessment

The term direct and daily measurement refers to an assessment process whereby data are obtained each day directly from materials the child is using in the classroom (Eaton & Lovitt, 1972). One purpose of such academic measurement is to provide information for the teacher or manager, student, and other interested persons. The following reports will present the use of academic measurement for assessing teaching techniques, educational material, and pupil performance.

Lovitt, Kunzelmann, Nolen, and Hulten (1968) described how behavior modification techniques may be employed to increase academic performance through a three phase procedure of data diagnosis, data programming, and data decisions. In this report an investigation of possible controlling classroom variables through analysis of changes in children's rate of performance constituted data diagnosis. Based on the data of the learner's responses, the programming of subject matter content was submitted to data analysis. Data decisions followed data

programming and were defined as those environmental changes that the teacher makes in the classroom to effect performance rates of pupils.

Anderson, Jones, Todd, Walter, and Gregersen (1972) described methods of recording relatively small bits of behavior exactly as they occur. These methods involved recording behaviors with some reference to length of time that the behavior occurred or an indication of how often the behavior occurred within a certain time period. They felt that recording behavior in relatively small segments with respect to time provided the teacher with a powerful technique for understanding and changing behavior. Lovitt et al (1968) were also of the opinion that time required by the child to do his academic work be incorporated into the teacher's strategy. They argued that, while a child's performance may be analyzed by percentage, it revealed little about how long the child had taken to do the work. Rate evaluation, defined as the number of responses divided by the time, was recommended for teacher use.

Teachers are generally involved with questions concerning which curriculum to choose or which teaching procedures are best for a particular child. Lovitt, Schaff, and Sayre (1970) applied direct and continuous measurement as a means of assessing reading performance and used this assessment to compare different readers and evaluate teaching procedures. The direct strategy referred to a recorded measure of a defined behavior under the specific conditions in which it occurred. The alternate approach was continuous in that many observations were obtained throughout each phase. In three studies (Lovitt et al, 1970), the authors used correct rate and error rate per minute and percent

correct to explain pupil performance. Correct and error rates were derived by first summing both rates, correct and error, then dividing the number correct by the sum.

The intent of the first project was to compare three readers. The objective was to show how a student's performance in several texts enables a teacher to evaluate and compare curricular offerings. A second grade boy read orally from two basal readers and a high-interest, low vocabulary book. The instructional procedures for all three books were the same from day to day. Both correct and error rate data from the three readers were obtained. At the conclusion of the project, the student's correct and error rate was near the same in all three readers, with a slight advantage for one text. This similar performance was noted in spite of the fact that the grade level of the readers varied, according to the publishers. Also, "interest," as defined by a publisher, was not directly related to reading performance. The student's performance, in this case, was the best assessor of various readers.

The second and third project illustrated how teaching procedures can be evaluated in terms of the effect on a student's performance. Project II provided information on the effectiveness of the use of performance data. The student involved in this project was a nine-year-old third grader. The teaching technique of previewing was evaluated in the following phases: Phase I, reading with no previewing; phase II, reading after listening to a tape recording of the reading material; phase III, reading after listening to the tape with the reading material provided; and phase IV, reading as in phase I. For each phase, correct and error rates and percent correct were obtained. The results of this

project revealed that the highest correct rates and percent correct and lowest error rates occurred in the third phase. The student's lowest and next lowest performances were in the initial and final phases. It appeared that either listening to the story or both listening to and looking at the story prior to reading it proved to be effective teaching procedures. These projects have provided evidence that as data diagnosis procedures are available, the classroom teacher need not rely on generalizations, but the data, to determine the effectiveness of his teaching techniques.

Another application of classroom data was discussed by Bradfield (1970) in an academic skills project designed to measure the effectiveness of a reading vocabulary building program. The subject was a young boy described as having a severe learning disability. In this case, the teacher felt that the boy should attain a reading rate of approximately 30 words per minute on words which had already been given. At the end of a three-week period, the boy had attained this rate fairly consistently, and a change was initiated in which new words were added to his list. Rate immediately dropped to approximately 10 words per minute and then gradually began to accelerate again to the desired level. Bradfield's study provided an example of a curriculum project in which the teacher allowed the child's behavior to determine when changes should be made in the curriculum.

Cohen and Martin (1971) also used rate data to change a learning situation. In their study, an eight-year-old boy was given a goal of reaching 20 addition combinations in one minute. Each day there were 30 minutes instruction in addition combinations and a one minute

practice sheet. During all work sessions the teacher recorded correct and incorrect frequencies. In the initial recording phase, almost all problems were worked incorrectly. For the next three weeks, the boy received one point for every four problems he did correctly. One point earned one minute free time. The boy progressed from 9-10 problems correct per minute in the first week to the goal of 20 correct per minute by the third week. The specific data of direct and daily measures were used, in this study, not only for information on the boy's performance but also as a standard for dispensing reinforcers.

Lovitt (1972) reported a similar study on oral reading. Points were given to a seven-year-old boy based on his rate performance. For the baseline phase, the boy read daily for five minutes from two readers. In a second phase, the boy was allowed to pre-read the material from one reader that would be read orally. In a third phase, the pre-reading condition remained in effect and, in addition, one point was presented for each word read in a perfectly read sentence. The points were not redeemable. From the second to third phase the student's oral reading rates increased while his error rates decreased. On six of the ten days of this phase, his error rates were at zero. Since the points were not redeemable, neither models nor leisure time were earned. The results revealed that, for this student, simply being able to accumulate points was reinforcing.

Lovitt (1972) suggested that reinforcers for some individuals are easily accessible and inexpensive. For those studies that reported significant effect, it was possible that their effects were as much due

to the tokens themselves as to the fact the tokens were redeemable for something.

The use of direct and daily measures have been viewed in terms of assessing teaching techniques, materials, and pupil performance (Lovitt et al, 1968; Anderson et al, 1972). Projects were discussed which focused on various reading behaviors and on the manipulation of variables that influenced reading proficiency (Lovitt et al, 1970; Bradfield, 1970). Other similar studies (Cohen & Martin, 1971; Lovitt, 1972), revealed the use of the academic measures as standards for reinforcers. Though the measurements were plotted and shown on charts, the effect that the measurement activity and the use of charts may have had on the academic task was not determined. Reports which have specifically used charts as a teaching tool and as a means for student self-management are discussed in the following.

Charts and Self-management Techniques

Precision teaching. Important strategies of operant conditioning have been applied to the area of precision teaching (Galloway, 1971). One strategy employed is that of recording frequency of behavior and another is standard charting, or the cumulative response record. Starlin (1971a) has stated that central to precision teaching is the daily charting of pupil performance rates. Based on performance data and children's comments, Starlin suggested that the chart used may serve as a strong motivational device itself.

Gaasholt (1970) described the standard chart for precision teachers (Daily Behavior Chart) as a six-cycle logrithmic chart with units

ranging from .001 to 1000. Haughton (1971b) reported that the use of the Daily Behavior Chart has shown that each child's learning pattern is unique and that its use permits the teacher to know and to meet the individual needs of a broad range of performance levels within a regular class. This viewpoint is illustrated in the following classroom description (Starlin, A., 1971a).

> When Patti received group instruction in saying consonant and short vowel sounds, her performance was moving in an undesired direction; she was saying fewer sounds correctly and making more errors. Then Karen worked with Patti individually, and a dramatic change occurred. Patti showed much progress in saying her letter sounds correctly and reduced her errors to one per minute.
>
> The Daily Behavior Chart not only indicated that the individual instruction was an effective way to improve Patti's performance, but it also provided a ready made report of Karen's success and effectiveness as a student teacher [p. 135].

Self-charting. Charts, graphs, or methods of self-recording have been applied to the management of social behaviors. Lamb, Harris, and Copeland (1971) used self-charting as a method for returning an eight-year-old girl to her bed. During a baseline phase, the girl went to her parent's bed every night (100% of the time). Self-charting began on the eighth night when the parents showed their daughter the chart and told her to mark each morning whether or not she had remained in her own bed all night. In this phase, the girl went to her parent's bed only once or 17% of the time. Beginning on the 19th day, a nickel was presented for each night the girl remained in her own bed. After six days, the nickel contingency was removed and the parents kept the chart. Under these conditions the girl continued to remain in bed each night. Another study (Reimers & Hall, 1971) showed similar results using combinations of self-recording and reinforcers.

In dealing with academic behavior, Kroth (1968) wrote of children's performance growth when taught to keep their own charts or records. He referred to classes of third and fourth grade children in a public school in Kansas City metropolitan area, that kept daily charts on the number of arithmetic problems they did correctly under timed conditions. He indicated that, in the instances cited, almost every child made continuous growth in problems correct per minute and that all children improved over the first day's performance.

Lovitt (1970, 1972, 1973) has written of trends in training pupils to manage their own behaviors. In one of ten academic projects, Lovitt (1972) described instructional techniques in teaching written words and thought units in a first grade classroom. Reading stories and seeing charts were presented separately and together as reinforcers. Throughout the project, data was obtained on the number of words and number of thought units written per session. The results showed that once being able to read the story was introduced, the writing, in general, progressed throughout the study regardless of which variable was or was not scheduled. Of special importance was the attitude of the individuals involved. The following sentence was written by a seven-year-old boy at the time in which he could read his story and view his chart. "If you yous (use) a ckart (chart) you can see how mach (much) you'v(e) gron (grown)."

Lovitt (1973) discussed seven projects concerning one or more components of self-management. In the first project a student was instructed to self-schedule, -correct and-chart. He was allowed to specify his own contingencies. Throughout the study, data were obtained

on performance in several academic subjects. The project further attempted to determine the effects of performing self-management requirements on the development of academic skills. There were seven self-management phases. Following the six-week period of baseline assessment, the student was allowed to schedule morning and afternoon assignments which were then increased to his entire day. In a fourth and fifth step, the teacher showed the student his academic response rates at the end of each day and the student charted his data in math and reading. Self-plotting was increased to all six subjects and, the final self-management step was to allow the student to set his own contingencies in three of the six academic areas. The results indicated that the student's performance rate ranged from 1.8 to 2.7 responses per minute, in the baseline phase, to 3.0 and 3.4 in the following four phases. In general, his performance rates accelerated throughout the study. Exceptions to the overall rate increase were noted in the sixth (given data) and seventh (plotting in two subjects) phases. In this regard, it was stated that if a steadily increasing academic response rate was desired these phases should be re-evaluated.

In the self-management projects, no attempt was made to analyze experimentally the effect of specific management components. They did, however, demonstrate that, generally, the involvement of self-steps were motivating. The use of the rate data and plotting on charts did not consistently act as reinforcers for academic acceleration.

Gaasholt (1970) described a project in setting up reasonable proficiency levels for cursive writing in which she assessed the effects of student self-charting on individual writing rates. Fifty letters

written per minute was the set proficiency level. Twenty-five children in grades 3 through 7 were given mimeographed sheets containing cursive writing. At a signal everyone wrote as neatly and quickly as possible for one minute. On the twelfth day of the project, every student was given his correct and error charts and told how to chart his own rate. Before self-charting was introduced, the middle group was 28 correct letters per minute and was accelerating. After student charting began, the middle rate was slightly higher. The data suggested that charting may have hindered the rate of cursive writing, since, as a group, performance during the second phase were decelerating. A further analysis of the relationship between proficiency level and charting was possible when the individual students were examined. One student's middle rate for the first 11 days was 53, which was slightly above the assumed proficiency level. After charting, the middle rate continued to rise to 60 words per minute. This student's self-charting could therefore be interpreted as an aid to his writing rate. On the other hand, a second student's chart showed a middle rate of 17 for the first 10 days, which was considerably below proficiency level, but accelerating. When self-charting was initiated, this student's rates decelerated sharply, indicating that self-charting may have hindered a continued acceleration of his writing rate. The conclusion drawn was that when a student has reached a proficiency level, new tasks and program events are less likely to cause a rate decrease, and that new program events, such as self-charting, may actually increase the rate. Further, when the behavior is in the acquisition stage, new program events may slow down acceleration.

In general, charting has been discussed as a possible self-management technique and as a potential reinforcer in academic areas. Type of condition in which a student begins self-charting has been shown to be an influencing factor and should be taken into account.

Proficiency Aims in Education

Haughton (1971b) cited a remedial reading project in which first grade students practiced phonetically predictable family words and monitored their success on a daily behavior chart. The idea was to keep the students on a practice list until they reached a certain frequency of correct responses before they advanced to the next list. The results showed the feasibility of assigning a particular point on the daily behavior chart as a decision point or objective.

Starlin (1971a) provided data on aim selection which indicated that when correct oral reading frequencies were less than 50 per minute, emphasis on word substitutions, mis-said letters, and omissions produced little gain in charted performance. The errors failed to decelerate and correct performance failed to accelerate. The author found that when concentrating on accelerating correct words to at least 50 per minute before attempting to work on decelerating errors the students showed marked improvement. Also of importance here, are the results that once the student reached the aim (of 50 per minute), they easily doubled to 100 words per minute along with a marked deceleration of errors. Starlin also stated that though a proficiency level for words read orally is 100 per minute or over, a recommended figure for sight word proficiency levels is 50 or more words said correctly per minute.

The data provided by Starlin lends to the concept that it is of importance to specify a relatively high performance aim before expecting students to be competent and independent. Haughton (1971a) reported that first grade students who progressed more rapidly than others said sounds from a list of letters at 40 per minute correct or above, while those below that frequency experienced considerable difficulties.

Teachers in Palo Alto worked with a group of students from third and fourth grades who were reading above 100 words per minute (Haughton, 1971a). The students who read at this level did not drop below 100 words per minute even though they advanced through the California reading curriculum. This report helped to establish a minimum aim of 100 words per minute as important in oral reading.

Haughton (1971a) also reported classroom data which revealed that at 50 words per minute correct or below, 90 percent of the students had relatively high error rates, between 50 and 100 words per minute, only 30 to 40 percent of the students made mistakes in their oral reading whereas of those students who were above 100 words per minute, only 10 percent made mistakes at all. In view of the reports (Gaasholt, 1970; Starlin, 1971a; Haughton, 1971a), proficiency as a rate aim has been shown to be an influencing factor in the teaching of academic subjects.

The Use of Tutors as Behavioral Engineers

A source of manpower for the teaching staff is students who have been especially trained or who have already mastered the material to be taught (Starlin, 1971b; Davis, 1972). Wills, Crowder, and Morris (1972)

successfully used eighth grade students as behavioral engineers in teaching remedial reading to children in grades 2 through 8 who read two or more grade levels below their grade placement.

Starlin (1971b) wrote of using peers as tutors in one first grade class. Students who had learned a set of geometric figures (using charted performance as a guide) could then become a teacher for his peers in that classroom. The learning of geometric figures was a success not only in the area of tutoring but in charting as well. Starlin felt that one advantage of charting was that it made it easier for the teacher to utilize peer tutoring. Each student kept his own record of the progress he made with his tutor. This procedure also permitted the students to exercise more responsibility and control over their own learning.

Other researchers (Harris, Sherman, Henderson, & Harris, 1972) used peer tutoring on spelling performance of elementary students which showed that gains from pretest to posttest were consistently higher for tutored word lists than for comparison word lists. Retests of both the tutored word lists and the comparison word lists showed the tutoring effects to be maintained over a four to five week period.

Davis (1972) investigated the effect of having one remedial student tutor another remedial student. The results showed that there were two criteria of effectiveness of the tutoring program. First, he showed that the program contingencies consistently resulted in improved performance by the students being taught; and, secondly, the tutors completed more of their assigned exercises when their participation in the tutoring program was contingent on their completion of exercises

than when those contingencies were not in effect. Also of importance, the results showed the quality of the tutors' performance on the exercises appeared to be functionally related to their participation as tutors. These results indicate that the program was highly effective as an instructional procedure. Also supporting these results, Paoni (1971) showed reciprocal effects of sixth graders tutoring third graders in reading.

Starlin (1971b), Davis (1972), Harris et al (1972), and Willis et al (1972) have sucessfully demonstrated that children can learn with the help of other children. Jenkins and Mayhall (1973) have contrasted the effects of cross-age tutoring with small group instruction.

Using direct and daily measures, Jenkins and Mayhall (1973) recorded word recognition rates of five second grade students. Each student was instructed for 10 minutes either in a small group with a certified, experienced classroom teacher or with a cross-age tutor. Instructional techniques, using flashcards, were similar in both conditions. Pre- and posttests were administered on the same flash cards on which the students received practice. The results showed that four of the five students learned more words from tutor instruction than they did from small group instruction. Under tutor instruction conditions, the mean difference per child between the number of words read correctly in one minute on the pretest and last posttest, over 4 sessions was 30.0 words as compared to 20.4 words under group instruction.

Factors such as the use of tutors have been discussed as valuable in academic areas for both the student and the tutor. Direct and daily measures (Jenkins & Mayhall, 1973) and charting (Starlin, 1971b) were

used as procedures to assess the effectiveness of the tutors. Such procedures can also be applied to the acquisition of word recognition as well as to reading in general.

Word Recognition

Chambers (1971) described word recognition as the ability of the reader to recognize the words as a form he readily knows—a sight word. He stated that "...lacking an adequate sight vocabulary, the child is without word recognition skills and necessarily then, without word meanings [p. 158]." He further indicated that when meaning is not present neither are comprehension and/or recall.

Harris (1961) and Hackney (1971) supported the concept that the absence of an adequate sight vocabulary is reflected in incorrect, inadequate phrasing, or word-by-word reading. If it is evident that because of a letter-by-letter or syllable-by-syllable attack a reader's rate is being kept low, Harris suggested that practice should be given to increase speed of word recognition. He also added that two procedures for increasing speed of word recognition were to use flash cards or tachistoscopic exposure.

In reference to reading ability, Starlin (1971a) emphasized the equation that speed + accuracy = proficiency. He suggested certain aids in measuring reading rate, such as using a one minute time sample whenever possible. He also specified that, as all responses must be counted in only the specified time sample to maintain reliable records, enough material should be ready to use during that time or, as with flash cards, the student should start over again if he finishes his set

before that time is completed. Because of the time factor involved for the classroom teacher or manager, Starlin saw the importance that students be taught to record and chart their own performance rates.

Modifying reading behavior. Investigators (Staats, Staats, Schutz, & Wolf, 1962; Staats, Minke, Finley, Wolf, & Brooks, 1964; Whitlock & Bushell, 1967) have reported on the effective use of extrinsic reinforcers on reading behavior. Staats, Staats, Schutz, and Wolf (1962) were the first to demonstrate the feasibility of defining and measuring reading behaviors in a study of the practicality of using extrinsic reinforcers in the teaching of beginning reading. Using words presented on 5 X 8 cards to six four-year-old children, the authors measured oral reading. For three subjects, social consequences followed each correct response until the subject requested that the program be terminated. From that point to the conclusion of the study, the subjects received trinkets and edibles as consequences for the first two sessions; then the consequences were discontinued until the subjects requested termination, at which time they were reinstated. A comparison was made between the cumulative number of correct texts on the tests and the zero rate that would have occurred if the subjects had refused to come back. It was concluded that it was possible and practical to study defined reading behavior. It was also determined that extrinsic consequences may act as reinforcers for reading behavior.

In a later study, Staats, Minke, Finley, Wolf, and Brooks (1964) attempted to find a more effective and less satiating reinforcer. This was done by placing the subjects on a variable-interval schedule for receiving toys, trinkets, and edibles. A general conclusion drawn was

that operant conditioning methodology and apparatus combined with a system of self-variable reinforcers backing up a token could be used with children engaged in reading acquisition.

Also studying textual behavior, Whitlock and Bushell (1967) tested the possibility that extrinsic consequences may act as reinforcers for reading behavior. Words on 3 X 5 cards were presented to a first grade girl. The subject was tutored on unfamiliar words prior to each experimental session. Each correct response resulted in the awarding of one point. After several sessions, presentation of the points was discontinued and the rate of correct responses decreased. Upon reinstatement of the first condition, the ratio of responses remained at the same low level. In this study, the points did not appear to be reinforcers.

The results of Whitlock and Bushell (1967) were in contrast to results of Lovitt (1972), in which the accumulation of nonredeemable points was reinforcing. To determine whether or not tokens are reinforcing for a particular subject is not the purpose of this study. What is of importance to the reader is that reports have shown that reading behavior can be measured and modified.

Summary

This review has presented the use of direct and daily measures as an educational assessment procedure. Recorded data on pupil performance was shown to be valuable in making educational decisions concerning teaching techniques and materials. The effect of knowledge of charted performance data was not directly or experimentally manipulated. The reports were not clear, therefore, as to whether or not this knowledge accelerated academic performance.

Proficiency as a rate aim and the use of tutors were discussed as important factors in the teaching of academic subjects. Word recognition was discussed and defined as an important reading skill. The literature revealed no conclusive evidence as to which procedures would best accelerate reading performance. It was demonstrated, however, that reading behavior could be measured and modified.

If it can be shown that collecting and recording daily performance rates accelerates the performance being measured, the teacher will have an easily accessible and economical reinforcer. What is the effect, if any, of daily rate measures and charting on word recognition? Using direct and daily measures and charts, each student's performance can provide the answer.

CHAPTER III

Description and Procedure

The purpose of this study was to investigate a feedback system on word recognition gain. The feedback was in the form of charted daily rate measures on a subject's performance. The manager, the tutor, and the subject had access to the charts. Two conditions were arranged to investigate the feedback system.

Condition A. The subject was instructed by his tutor for a timed 15 minutes, using flash cards as a means for word recognition study. At the end of the 15 minutes a one minute rate sample was taken to measure the number of words a subject read correctly and incorrectly from the flash cards. The rate sample was taken by the project aide. The subject then plotted the number of words read correctly and incorrectly on his daily chart. In this way the feedback was available to the subject, his tutor, and the manager.

Condition B. The subject was tutored in the same manner as in Condition A. At the completion of the 15 minute instruction, a one minute rate sample was taken to measure the number of words read correctly and incorrectly. However, this information was charted by the project aide without results being given to the subject, tutor, or manager.

Personnel

Manager. A resource room was established in an elementary school in the Las Cruces Public School system, Las Cruces, New Mexico. The manager was an experienced, certified classroom teacher. The project

aide was also an experienced, certified classroom teacher who volunteered to take the daily measures.

Subjects. Children with classroom learning difficulties were referred to the resource room by the first, second, and third grade teachers. Ten children were placed in the resource room following the diagnosis and screening procedures outlined in the State Standards for Special Education (1972) for the Learning Disabled Child. Seven of the ten original children were selected for this particular study and shall hereafter be referred to as subjects.

TABLE 1

Background Data for Selected Subjects

Subject	Sex M-F	Age yr-mo	Grade	Sullivan placement	Reasons for referral
1	M	9-1	3rd	Book 1	Missed 1st grade, lacks basic reading skills
2	M	9-9	3rd	Book 2	Repeated 1st grade, lacks phonetic skills
3	M	6-6	1st	Prereader	Non-reader
4	M	6-8	1st	Prereader	Repeating 1st grade, unsuccessful reading progress
5	M	7-4	1st	Prereader	Unsuccessful past experiences in reading
6	F	8-7	2nd	Book 2	Lacks phonetic skills
7 *	F	6-2	1st	Prereader	Non-reader

* The reader should note that subject 7 was excluded from the sample because of absenteeism.

Tutors. Fourteen tutors were selected from the fifth and sixth grades by the classroom teacher on the basis of academics and good social/peer relationships. The seven fifth grade tutors were instructed for 15 minutes per day and were randomly assigned to a subject. The seven sixth grade tutors were to instruct during the next 15 minute session and were randomly assigned to a subject.

Materials and Instrumentation

The Sullivan Programmed Reading (1963) series was selected for this study. The material includes terminal objectives and successive approximations specified for each of the twenty-one books in the series. It is accompanied by a systems and vocabulary chart, commercially produced for that series, in which a group of words are listed for each of the twenty-one books.

The initial level or book in which a subject was to begin instruction was determined by a Sullivan Placement Test; a curriculum based placement guide.

The words, corresponding to the subjects' book placements, were printed on 3 X 6 cards. One half of the cards were randomly selected and were called set A, to be used under Condition A. The other half were called set B, to be used under Condition B.

The charts used to plot the number of words read correctly and incorrectly were made available by the Southwest Regional Resource Center. The horizontal line indicated daily sessions. The vertical lines, numbered 0 through 50 indicated the number of words read correctly or incorrectly per minute.

Procedure

Tutor training. The tutors were trained in the week prior to the initiation of the project in teaching methods for word recognition skills using flash cards (Appendix A). Instruction on the use of charts and charting was given.

Scheduling. There were two teaching sessions per day for 10 consecutive school days: Session I at 8:55-9:15 and Session II at 10:15-10:35. For Session I, S_1, S_2, S_3, and S_4 worked under Condition A while S_5, S_6, and S_7 worked under Condition B. For Session II, each S changed to the opposite condition (Appendix A).

Daily procedure. The tutor picked up the assigned subject in that subject's regular classroom. In the resource room, tutors were given a folder which contained the subject's chart for that condition and the corresponding set of cards. Tutoring was timed with a stopwatch or a kitchen timer for the 15 minutes of instruction. The manager and the project aide observed the tutors and students during instruction. The one minute rate sample was taken at the end of the 15 minutes. In Condition A, the project aide told the subject the numbers for the words read correctly and incorrectly and the subject, with the help of his tutor if necessary, plotted the points on his chart. In Condition B, the one minute rate sample was taken in the same manner but the number of words read correctly and incorrectly were counted and charted by the aide without giving the specific feedback to the subject, his tutor, or the manager.

Rate goal. It was determined by the manager that a goal of 25 words read correctly per minute would be the project's rate target. This allowed the subjects more frequent success during the project and provided a goal close to the subjects' performance levels. The recommended proficiency rate, of 50 or more words for word recognition (Starlin, 1971a), could be used at a later time when the subjects were more familiar with their rate of progress, their tutors, and the type of material used. The number of words read incorrectly was not emphasized in view of the previously cited study (Haughton, 1971a) which showed that with the increase in correct rates to a proficiency level, a student's error rate would decrease.

After reaching the rate goal in Condition A, the subject was required to reach that goal on a pretest (before instruction) on the next Condition A session. If the goal was reached, the next set of cards was given. If the goal was not reached, instruction using the same set of cards was continued. Once a subject was given a new set of cards in Condition A, the corresponding set for Condition B was given in the next session.

Design. Treatments X subjects design was used in this investigation. It is a design in which the treatments are administered to the same subjects, instead of to different groups of subjects (Lindquist, 1953). The treatments X subjects design was used to eliminate inter-subject differences as a source of error. Each subject was his own control and participated in both the feedback and no feedback condition. A measure was recorded for each subject for each condition.

Data collection. The project aide collected all data during the study in order to provide a consistent rate sampling for both conditions. Before the project began, the manager and aide worked together to establish the following guidelines for the rate samples.

1. Words from the deck of cards would be shown to the subject by the aide.

2. Once a word was read correctly a new word would immediately be shown to the subject.

3. Mispronunciations would be counted as words read incorrectly. These included whole reversals, part reversals, wrong beginning, wrong middle, and wrong ending (Harris, 1961).

4. If no pronunciation was tried after being shown the card for five seconds, the word would be considered incorrect.

5. If a pronunciation of the word was begun during the first five seconds, the subject would be given another five seconds in which to complete that word. If not completed during that time, the word would be considered incorrect.

6. If all words had been shown to the subject before the one minute was up, the aide would then stop the stopwatch, tabulate the number of words correct and incorrect, replace all words back in the deck, and begin again until the one minute was completed.

A pretest rate sample was taken before any instruction for each new set of flash cards for conditions A and B. A posttest rate sample was taken after each 15 minute instruction period. Correct and incorrect points were plotted by the subject or the aide on the daily chart.

Reliability measures were obtained by having an observer independently time the one minute sample and independently count the subjects' correct and incorrect responses. Reliability on the subjects' responses was computed by dividing the number of agreements between the two observers by the number of responses that the observer scored. These measures were recorded on two days. The mean rate of agreement between observers on correct and incorrect responses was 98%. Timing checks indicated that there were no discrepancies greater than 3 seconds.

Data analysis. Daily charts were visually examined for each condition, A and B. These charts showed (a) the number of words read correctly and incorrectly for each day, (b) the days in which new flash cards were introduced, and (c) the interventions used by the manager.

Charts for the number of words read correctly, A and B, and incorrectly, A and B, were made available for comparison. Two mean scores for the number of words read correctly and incorrectly were obtained, for each subject and for all subjects combined. The mean scores were examined in terms of the direction of difference for conditions A and B.

Word recognition skill was measured on the basis of the number of words "gained" from one day to the next or, as in the case of new flash cards, from pretest to posttest. The score (Sc) was calculated by subtracting the daily number incorrect (I) from the number correct (C): $Sc = C - I$. Gain (G) was calculated by subtracting one day's score (Sc_1) from the next day's score (Sc_2): $G = Sc_2 - Sc_1$. When new flash cards were introduced, the pretest (p) score, before instruction, was subtracted from the posttest (pt) score, after instruction: $G = Sc_{pt} - Sc_p$.

The daily number of words gained for each subject was plotted on charts for visual comparisons. The mean number of words gained for each subject was also presented for analysis. The Sign Test (Siegel, 1956) was used to analyze the direction of gain in conditions A and B. Differences between the two scores were determined as statistically significant at the .05 level.

CHAPTER IV

Analysis of Data

The purpose of this study was to determine the effect of a feedback system on word recognition gain. The feedback system involved the manager, the subject, and his tutor through the use of daily rate measures and charts. The subjects (Ss) were six students from the primary grades who were referred to a resource room for reading problems. (The reader should note that the number of subjects was seven, however one subject was dropped due to absences.) It was hypothesized that feedback, in the form of daily rate measures and charts, would have no effect on word recognition gain. The purpose of this chapter is to analyze the data in terms of (a) rate aim achievement, (b) mean number of words read correctly and incorrectly, and (c) mean number of words gained. Gain Score Charts in Figures 1, 2, and 3 and three tables will be presented for discussion.

Rate Aim Achievement

An examination of the daily charts (Appendix B) shows that in the feedback condition, Condition A, four of the six subjects (S_1, S_4, S_5, and S_6) reached the rate aim of 25 or more words read correctly per minute at least once in the ten day project. S_6 reached the rate aim three times in Condition A. On the last day of the study, S_2 and S_3 had not reached their rate aim. However, S_2 had reached 22 words read correctly in Condition A and 19 words read correctly in Condition B. S_3 had reached 23 words read correctly in Condition A and had decelerated to 10 words read correctly in Condition B. At no time, during the

project, did any of the subjects reach the rate aim of 25 words read correctly per minute in the no feedback condition, Condition B.

Feedback on daily performance using rate data and charting seems to have accelerated the performance of four subjects in reaching the rate aim. Using the same feedback system, two other subjects had reached a greater number of words read correctly when compared to the no feedback condition.

Because the study was of short duration, it could not be determined how the subjects would respond over a longer period of time. However, it is important for the reader to note that with the knowledge of rate measures a student may be provided with the information necessary to reach the rate aim in less time.

Mean Number Correct and Incorrect

Table 2 presents the mean number of words read correctly per minute for each subject and for all subjects combined as a basis for comparing conditions A and B. The results reveal that, for five of the six subjects (S_1, S_3, S_4, S_5, and S_6), the mean number of words read correctly was greater than the corresponding mean number for Condition B. For S_2, the mean number of words read correctly was greater in Condition B. His score was 16.0 in Condition B as compared to 13.9 in Condition A. The mean number of words read correctly for all subjects combined was greater in Condition A, 16.2, as compared to 13.5 in Condition B.

Table 3 presents the mean number of words read incorrectly per minute for each subject and for all subjects combined.

TABLE 2

Mean Number of Words Read Correctly
For Feedback, Condition A, and
No Feedback, Condition B

Subject	Condition A	Condition B	Direction of Difference
1	15.3	12.7	$X_A > X_B$
2	13.9	16.0	$X_A < X_B$
3	16.9	10.3	$X_A > X_B$
4	14.8	10.8	$X_A > X_B$
5	16.6	13.8	$X_A > X_B$
6	19.8	17.1	$X_A > X_B$
Mean	16.2	13.5	

TABLE 3

Mean Number of Words Read Incorrectly
For Feedback, Condition A, and
No Feedback, Condition B

Subject	Condition A	Condition B	Direction of Difference
1	5.0	5.7	$X_A < X_B$
2	7.9	5.3	$X_A > X_B$
3	3.6	6.4	$X_A < X_B$
4	3.4	5.1	$X_A < X_B$
5	3.2	4.2	$X_A < X_B$
6	4.8	6.8	$X_A < X_B$
Mean	4.6	5.6	

Table 3 reveals that the five subjects, who had a greater mean for words read correctly in Condition A, read fewer words incorrectly in Condition A. S_2, who had a greater mean for words read correctly in Condition B, also read fewer words incorrectly in that condition. His mean number of words read incorrectly for Condition B was 5.3 as compared to 7.9 in Condition A. The mean number of words read incorrectly for all subjects combined was 4.6 in Condition A and 5.6 in Condition B.

The condition in which the six subjects reached a greater number of words read correctly was the same condition in which there were fewer errors, or words read incorrectly. This data supports the studies cited earlier by Haughton (1971a) in that as a subject read a greater number of words correctly, his number of errors, or words read incorrectly were lower.

Five subjects reached the greater number of words read correctly in Condition A. The mean number for all subjects combined reveal that, in general, the subjects reached a greater number of words read correctly, with fewer words read incorrectly, in the feedback condition.

Word Recognition Gain

Word recognition was measured on the basis of the number of words gained from one session to another or from pretest to posttest. A score was obtained for each rate sample by subtracting the number of words read incorrectly from the number of words read correctly. Gain was computed as the difference between one score and the following score.

Figures I (S_1 and S_2), II (S_3 and S_4), and III (S_5 and S_6) present charts for the daily number of words gained in Condition A and Condition B.

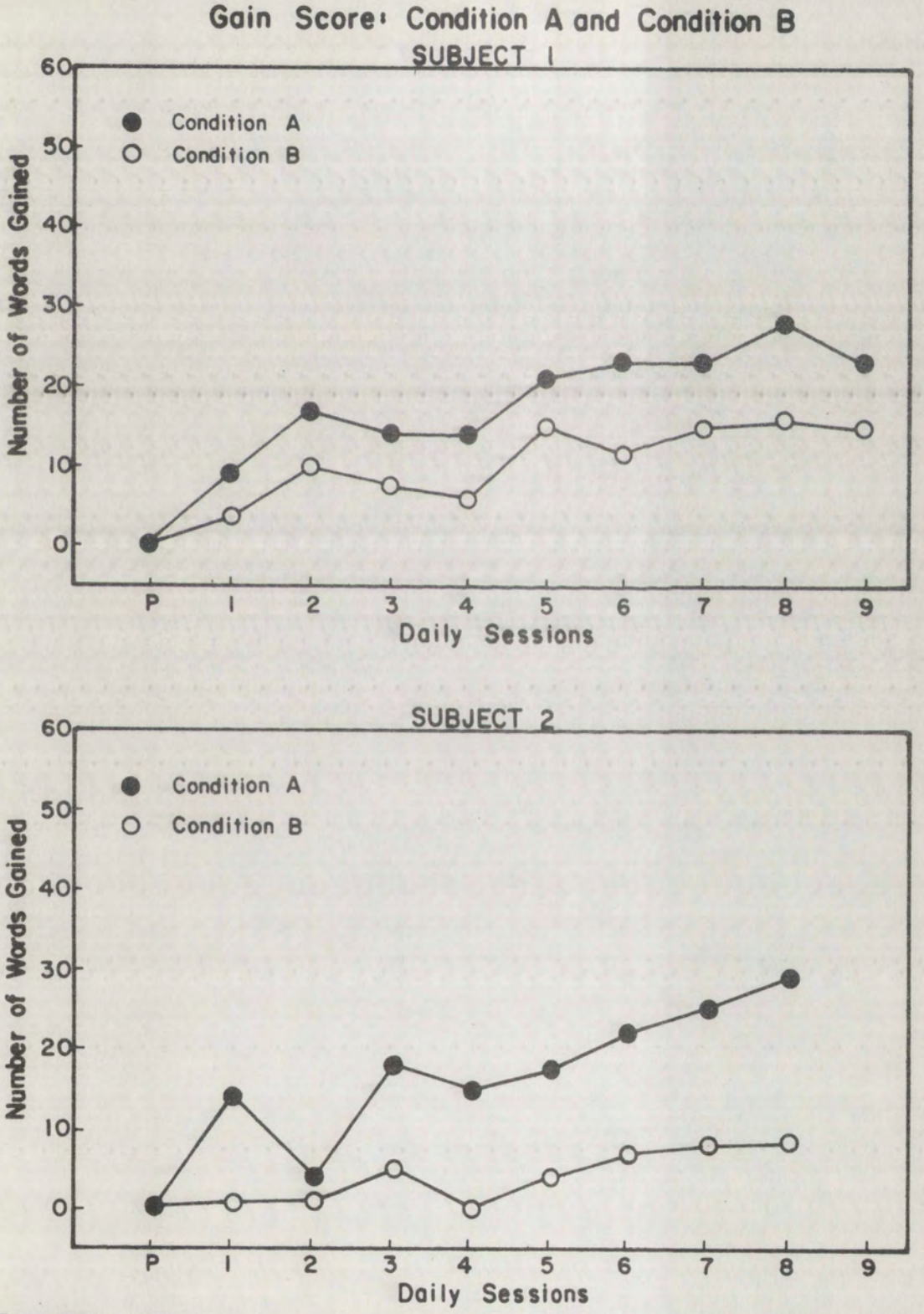

FIGURE 1. Comparison of words gained for Condition A, with feedback and Condition B, no feedback.

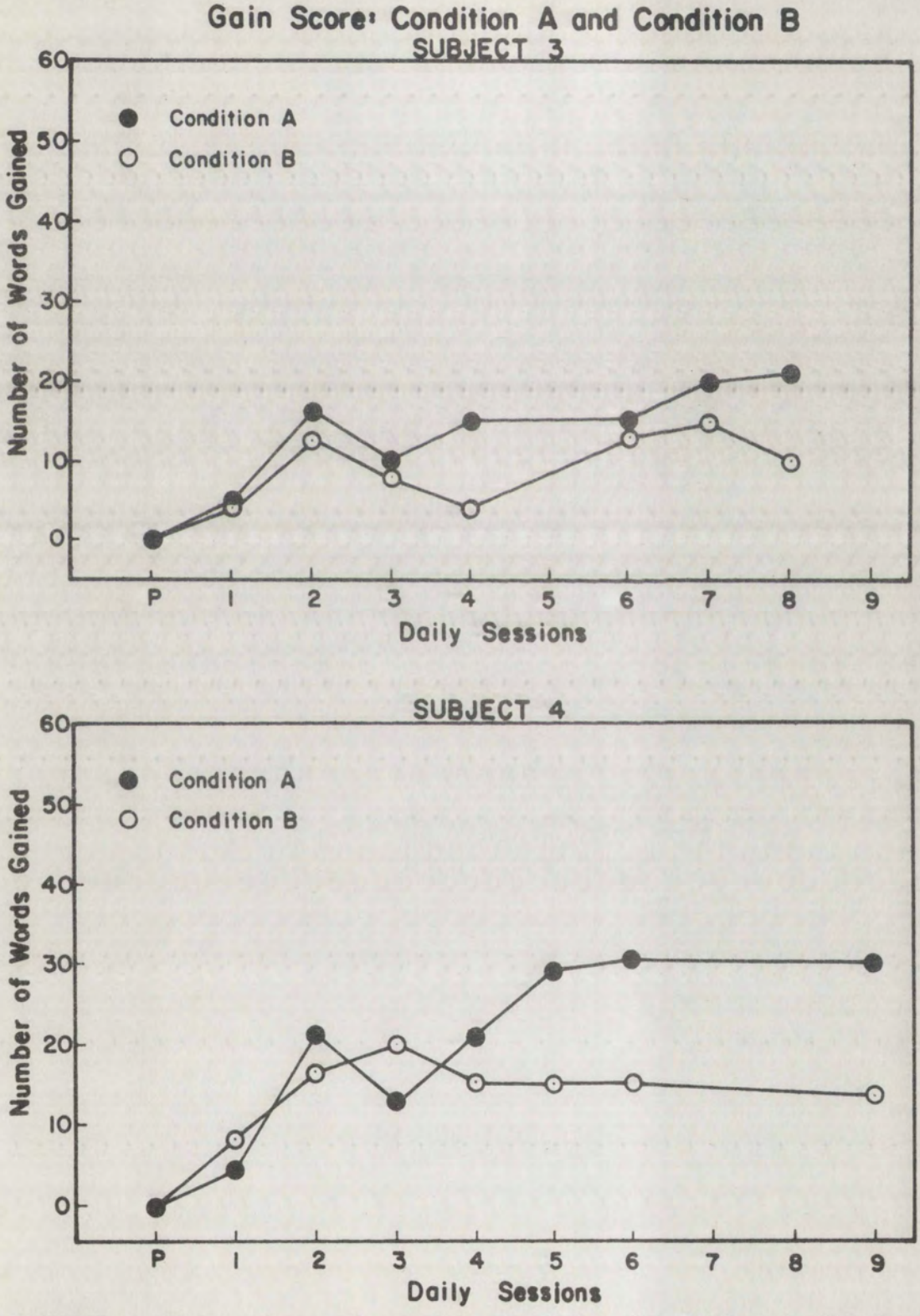

FIGURE 2. Comparison of words gained for Condition A, with feedback and Condition B, no feedback.

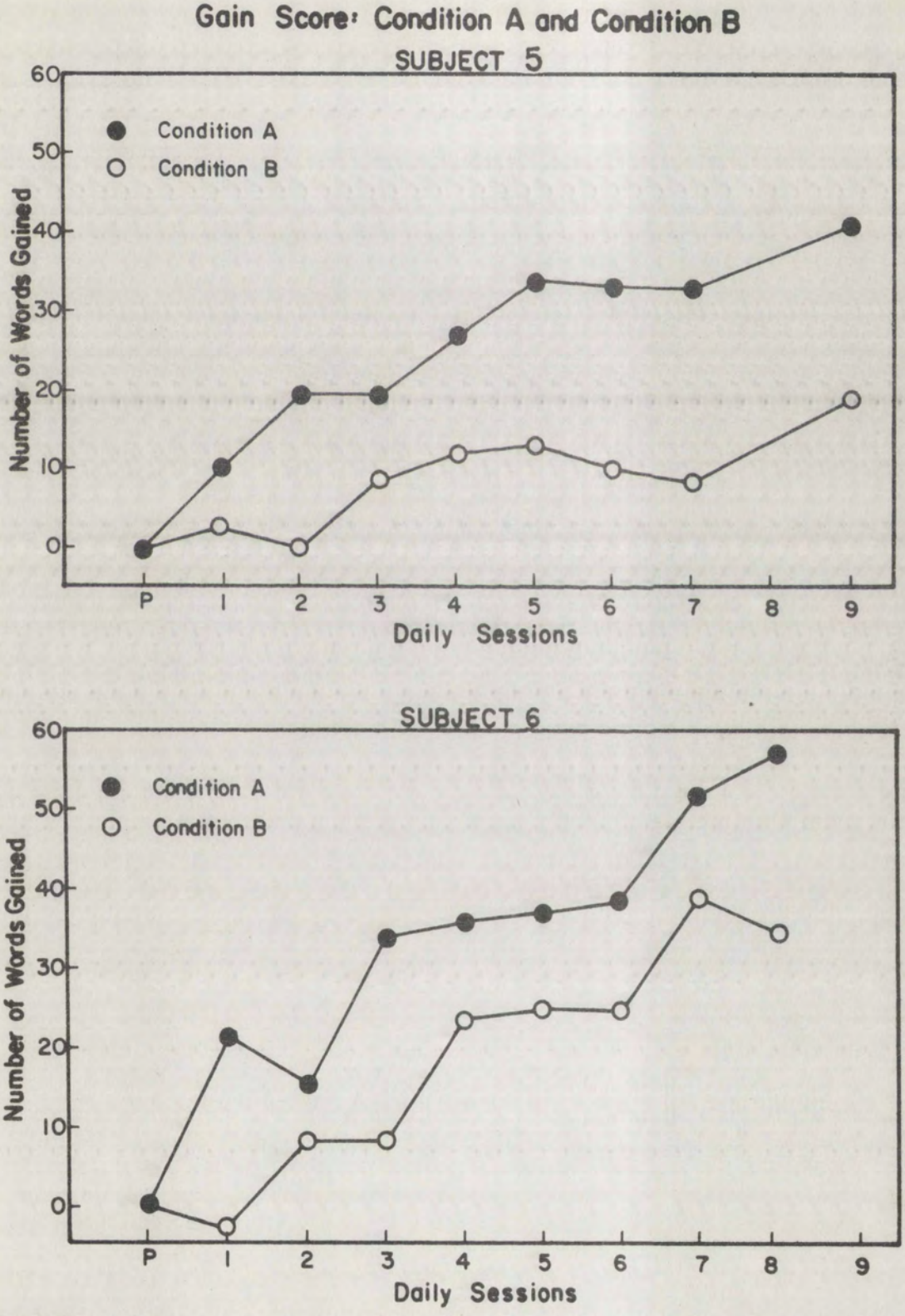

FIGURE 3. Comparison of words gained for Condition A, with feedback and Condition B, no feedback.

Table 4 compares the mean score, for each subject for both conditions. All subjects showed a greater mean gain in Condition A than in Condition B.

TABLE 4

Mean Gain on Word Recognition Rate For Feedback, Condition A, and No Condition B. Sign Test

Subject	Condition A	Condition B	Sign	Probability Level
1	23	17	+	
2	29	8	+	
3	21	10	+	p = .016
4	30	13	+	
5	41	19	+	
6	57	34	+	

A sign test was employed to analyze the directions of the differences. These differences were obtained by subtracting the mean gain in Condition B from the mean gain in Condition A. Gain, loss, or no difference were indicated by the following signs: +, -, 0.

Under the null hypothesis (H_0) it would be expected that one-half of the differences would be negative and one-half positive (Siegel, 1956). The null hypothesis is therefore rejected.

The results of Table 4 show that the number of words gained in Condition A was greater than the number of words gained in Condition B for each of the six subjects. The Sign Test (Siegel, 1956) revealed that there was a significant difference between the Condition A means

and the Condition B means with a probability level of .016. The analysis indicate that in the resource room tutorial project the use of a feedback system, in the form of daily rate measures and charts, increases word recognition gain.

Summary

In examining the data, it is apparent that the subjects combined responded with a greater number of words read correctly with fewer words read incorrectly under the feedback condition. Four of the six subjects demonstrated the ability to reach the rate aim while under the feedback condition but not under the no feedback condition. Also, the data reveal that the use of the feedback system increases word recognition gain. Since the difference is significant beyond the .05 level, the null hypothesis is rejected.

CHAPTER V

Discussions and Conclusions

The purpose of this study was to determine the effect of a feedback system on word recognition gain. The subjects were six primary students referred to the resource room for reading problems. A cross-age tutorial project was established in which the subjects were tutored, using flash cards, for two 15 minute sessions each day.

The feedback system, in the form of daily rate measures and charts, included the manager, the tutor, and the subject. In the first session, Condition A, the subjects received feedback on a one minute rate sample of reading performance and were allowed to chart the number of words read correctly and incorrectly. The charted information was made available to the tutor and the manager. On reaching 25 words read correctly per minute for a second time, the subject was given a new set of cards. In the second session, Condition B, the subject was tutored in a similar manner. A one minute rate sample of performance was taken, but the results of the performance were charted without specific feedback given to the subjects, his tutor, or the manager. Once a new set of cards was presented in Condition A, a corresponding set of cards was presented in Condition B.

A score was obtained for each session by subtracting the number of words read incorrectly from the number of words read correctly. If new cards were presented, two scores were obtained, one for the pretest (before instruction) and another for the posttest (after instruction). Gain was defined as the difference between one day's score and the next day's score ($G = Sc_2 - Sc_1$) or the difference between the pretest and

posttest score ($G = Sc_{pt} - Sc_p$). The Sign Test (Siegel, 1956) was selected to analyze the data.

Results

The results of the data demonstrated that the use of the feedback system increases word recognition gain. The differences between the mean number of words gained in Condition A and Condition B revealed a probability of .016.

Hypothesis. Feedback, in the form of daily rate measures and charts, will have no effect on the word recognition gain of primary students in a tutorial project. This hypothesis has been rejected as the difference between the feedback and no feedback condition is significant beyond the stated .05 level.

Discussion

Reports related to charting procedures have revealed that charts or records were used to accelerate math performance of third and fourth graders (Kroth, 1968). Gaasholt (1970) and Lovitt (1972, 1973) used self-charting as an approach to accelerate pupil performance in several academic subjects. Pupil performance in the cases cited differed as some performance rates were accelerating while others were decelerating. The effects of self-charting, however, were not analyzed experimentally. In this study, the effect of charting daily rate measures for six subjects was directly manipulated. The use of the charting procedures accelerated word recognition gain for all six subjects. The results have shown that the use of charting procedures can be an effective teaching tool.

Staats, Staats, Schutz, and Wolf (1962), Staats, Staats, Wolf, and Brooks (1964), and Whitlock and Bushell (1967) revealed that reading behavior could be measured and modified. In this study, one minute rate samples of words read correctly and incorrectly were used as a measure of word recognition skill and charts were used as a record of the pupil's performance. The results indicated that the process of measuring and recording on charts accelerated the performance being measured. The use of direct and daily measures recorded on charts can be used by the teacher or manager as an efficient and economical modification technique.

The data presented in the tables and charts for this study reveal important similarities and differences among the six subjects. S_6 showed a greater mean for words read correctly as compared to the other five subjects for both Condition A, with feedback, and Condition B, no feedback (Table 2). It appears to the investigator that the initial placement for S_6 in Book 2 may have been too low, resulting in a higher rate of performance for that subject. S_6 reached the rate aim, of 25 words read correctly per minute, most frequently during the study (Figure 3). The rate aim, however, was only reached in Condition A. For S_6, reaching the rate aim seems to have been a motivating factor which became present in Condition A but not in Condition B. The rate aim could also be set at or near the 50 words read correctly per minute as recommended by Starlin (1971a). The reader should note that the daily rate aims could vary according to the level and learning rate of each individual. The charts can provide the information necessary on which to base such a decision.

Table 2 reveals that S_2 had achieved a higher mean for words read correctly in Condition B. The daily charts (Appendix B) indicate that S_2 began at 13 words read correctly in Condition B as compared to 6 words read correctly in Condition A. The Gain Score Chart for S_2 in Figure 1 reveals that the gain in Condition B remained fairly consistent, with a mean gain of 8 (Table 4). The gain, in Figure 1, was accelerated more rapidly in Condition A, with a mean gain of 29 (Table 4). It appears that though S_2 showed a greater mean for words read correctly in Condition B the learning situation as revealed in gain score was considerably greater in Condition A.

S_2 was a boy 9 years, 9 months of age. The tutors assigned originally for both conditions was a female. A visual examination of the daily chart for Condition A indicated that during the first five days S_2 was not accelerating as much as could be expected (Appendix B). With this feedback, along with daily observations, the manager intervened by arranging for a male tutor to be assigned to instruct S_2 for both conditions. This was made possible by using a male tutor previously assigned to S_7. Following the male tutor assignment there was an acceleration in the word recognition gain for S_2. The response of S_2 to his female and male tutors may have influenced his reading performance in such a way as to bias his response for one condition or the other. The reader should note that extra tutors could be trained thereby making it possible to arrange a more suitable tutor-subject relationship if necessary. Most important is that, in this study, the use of the charts in a feedback procedure provided the information for the manager to make an appropriate instructional decision.

Five of the six subjects were male. The larger number of male subjects may limit the application of the results of this study. Because the population of children available to the resource room was limited, there was no opportunity of control for that variable. In future research, however, it would be of value to use a more equal population of male and female subjects.

Conclusions

It has been demonstrated that a feedback system using daily rate measures and charts can accelerate word recognition gain of primary students in a tutorial project.

This study indicates that, for a resource room teacher, the use of daily rate measures and charts may provide necessary feedback concerning the student performance for decision-making. Daily rate measures plotted on charts may also provide a record for teacher and program accountability. However, further implications of the results may be limited by the briefness of this study.

The effect of feedback in this resource room project was examined in order to compare it with a resource room project in which feedback (charted daily measures) was not present. Therefore, the investigated feedback system included those members directly involved in the resource room; the manager, the tutors, and the students. Further research could determine what effect feedback has for each of these members and the possible effect on the performance being measured.

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APPENDIX A

Tutor Training

To train tutors, first, an introduction to tutoring was held. This session lasted one and a half hours. During this session, the manager modeled tutoring, contingent praise, taking one minute rate samples, and charting progress. The tutors also participated in structured activities which permitted them to practice the previously modeled behaviors.

After the introductory session, each tutor received additional training in a guided participation model. He would first watch the manager tutor a student. Secondly, he would tutor while sitting next to the manager who prompted, reinforced, and provided only intermittent guidance.

Daily Schedule

Session I

8:55

S_1, $Tutor_1$: Condition A

S_2, $Tutor_2$: Condition A

S_3, $Tutor_3$: Condition A

S_4, $Tutor_4$: Condition A

S_5, $Tutor_5$: Condition B

S_6, $Tutor_6$: Condition B

S_7, $Tutor_7$: Condition B

Session II

10:15

S_1, $Tutor_8$: Condition B

S_2, $Tutor_9$: Condition B

S_3, $Tutor_{10}$: Condition B

S_4, $Tutor_{11}$: Condition B

S_5, $Tutor_{12}$: Condition A

S_6, $Tutor_{13}$: Condition A

S_7, $Tutor_{14}$: Condition A

APPENDIX B

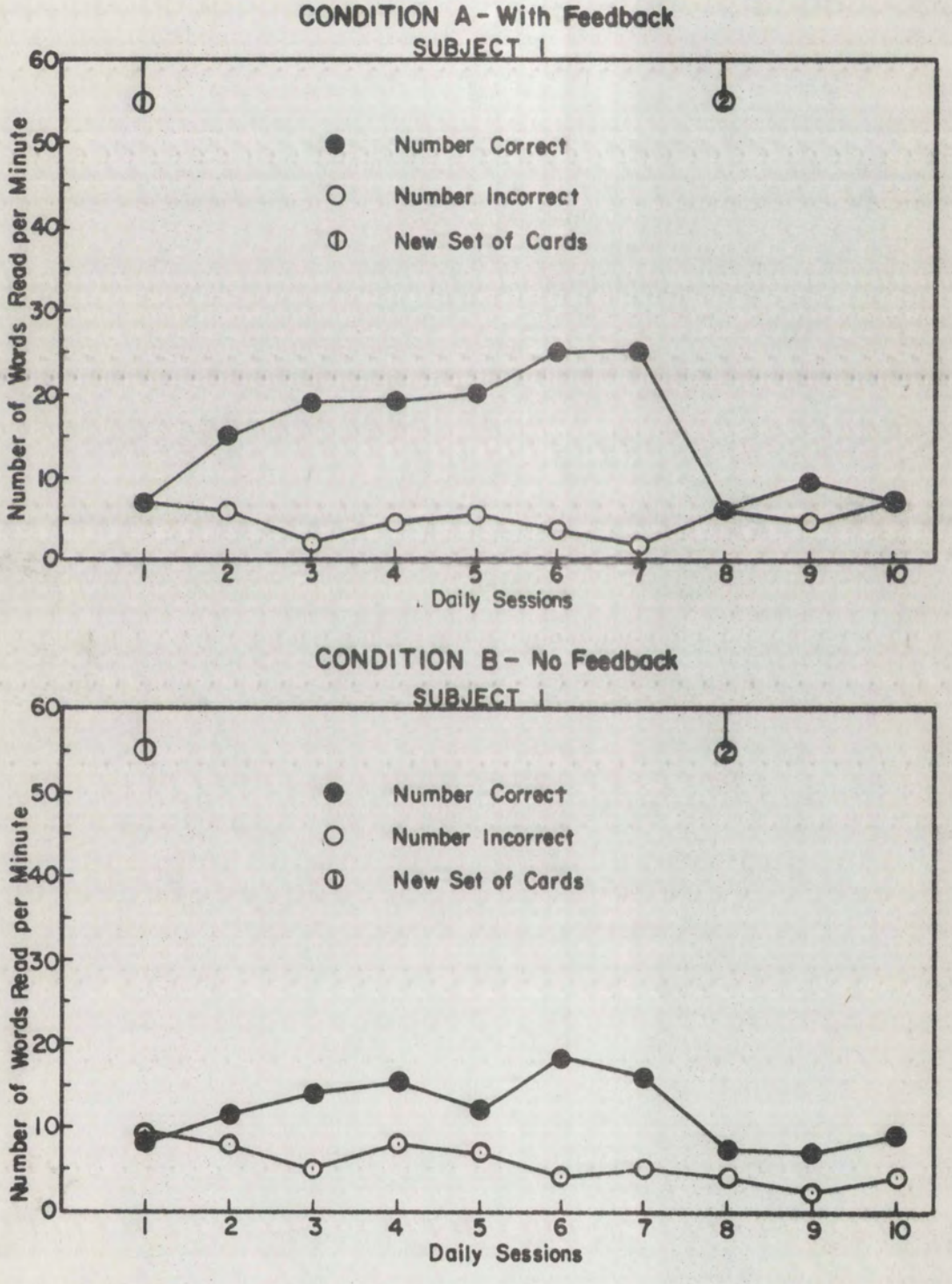

FIGURE 4. Daily charts: Conditions A and B.

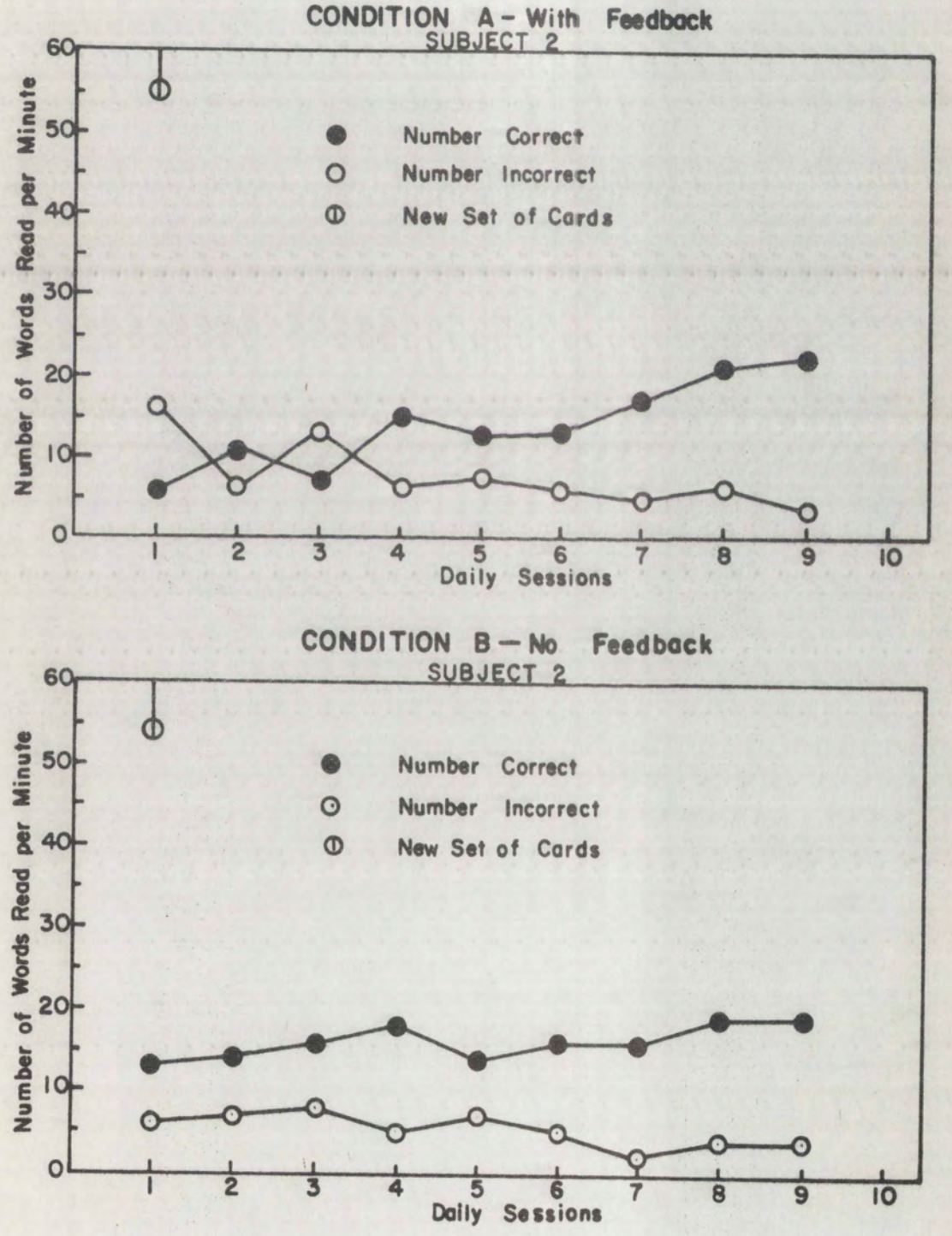

FIGURE 5. Daily charts: Conditions A and B.

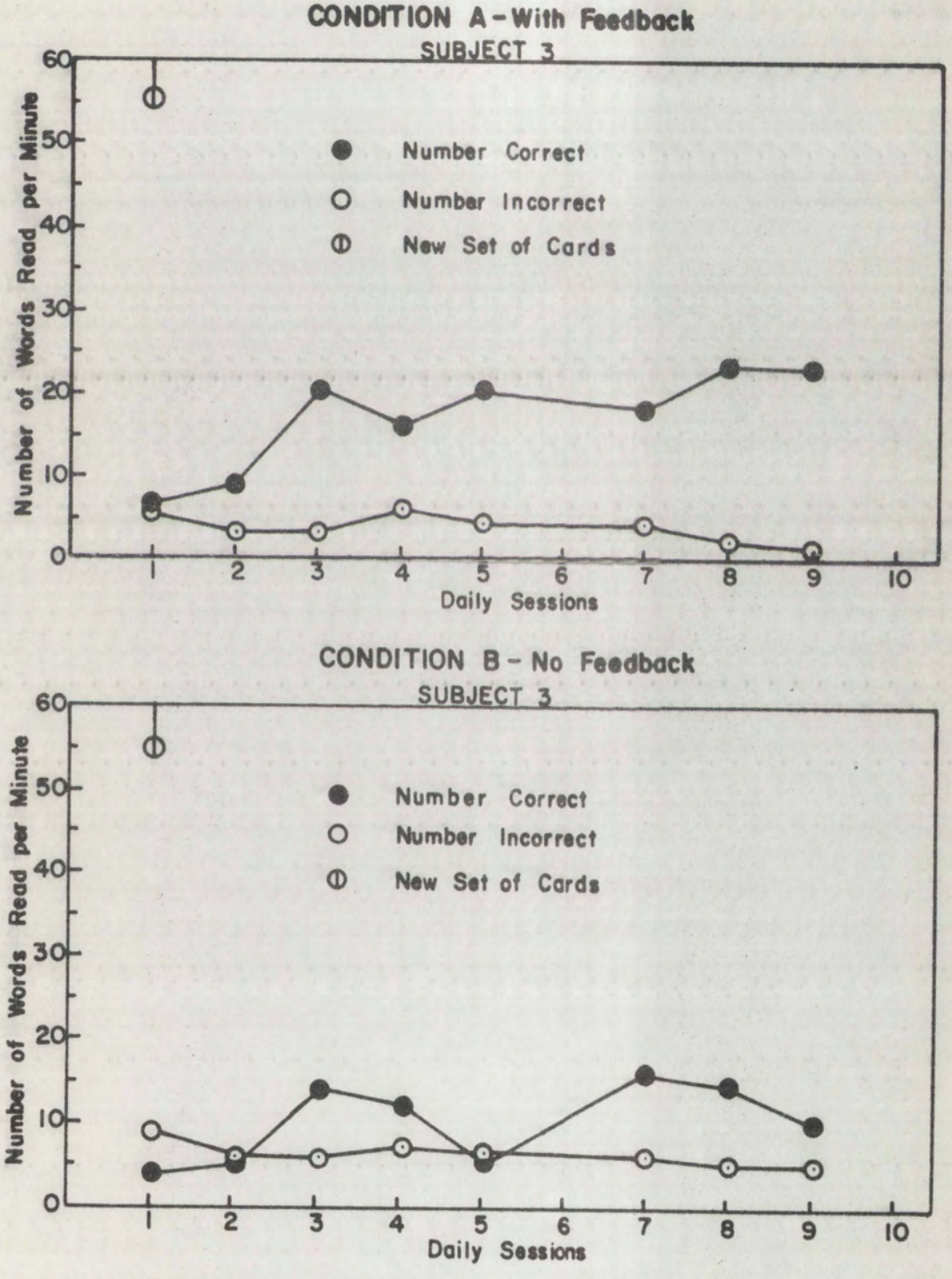

FIGURE 6. Daily charts: Conditions A and B.

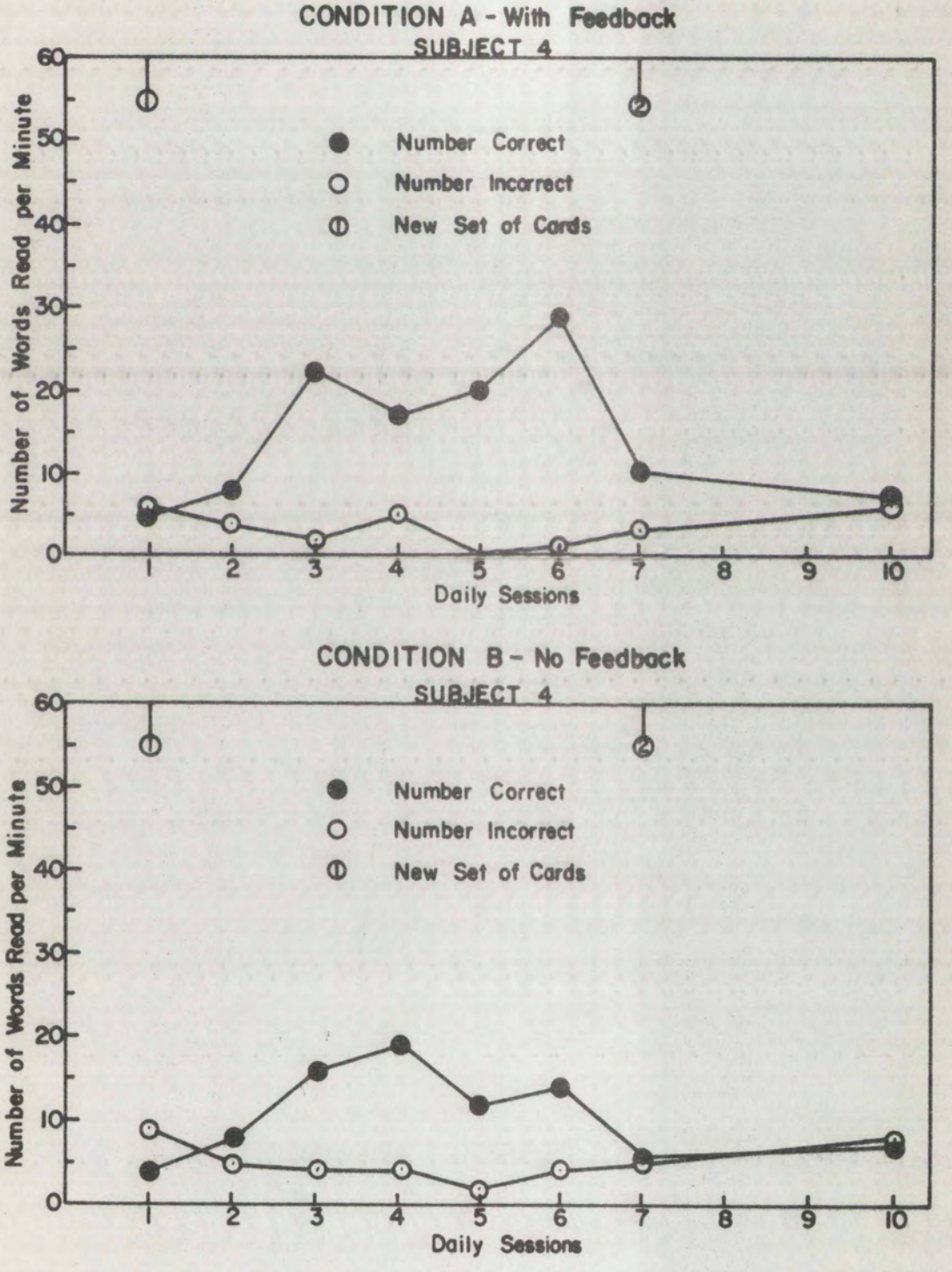

FIGURE 7. Daily charts: Conditions A and B.

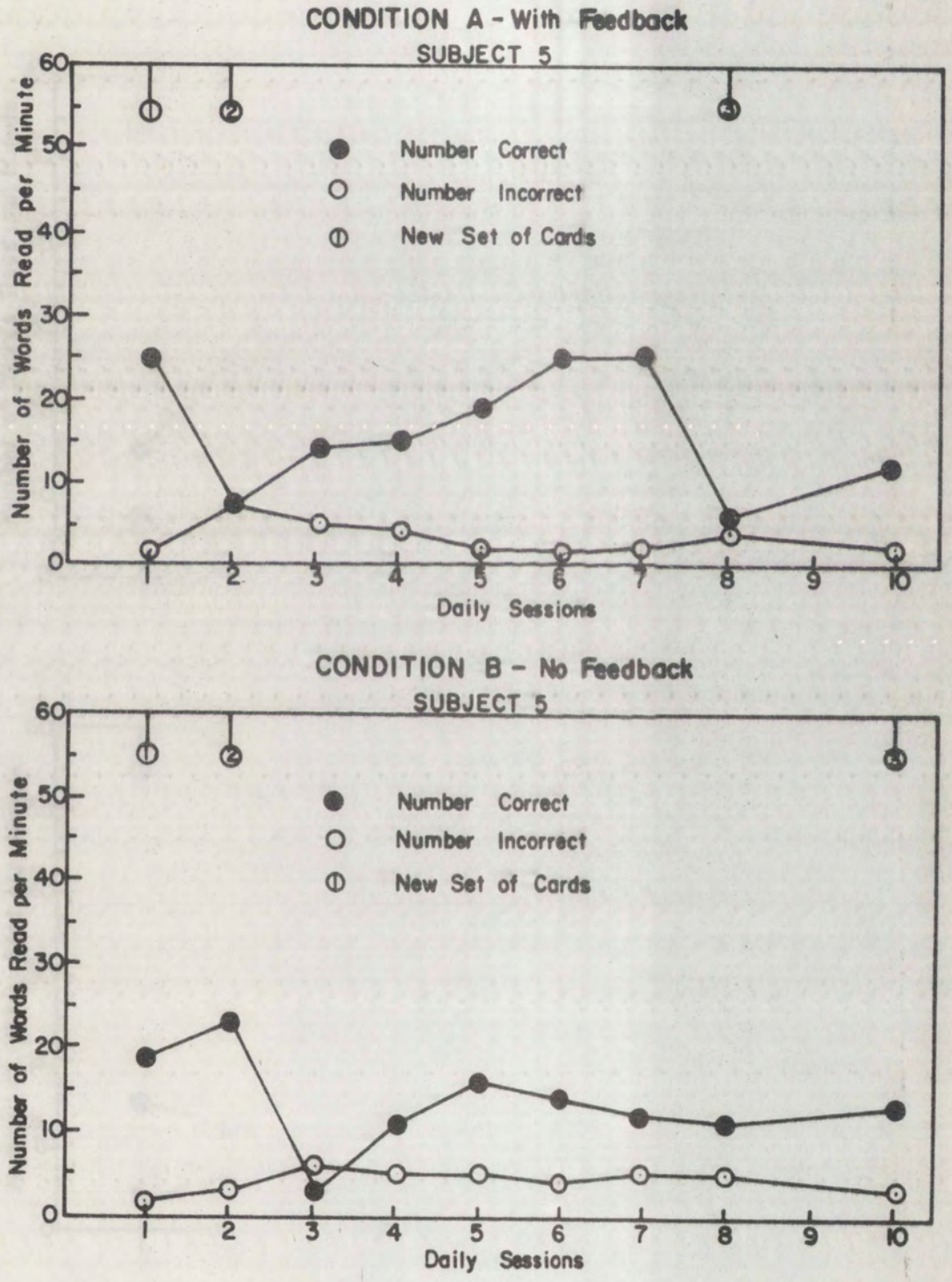

FIGURE 8. Daily charts: Conditions A and B.

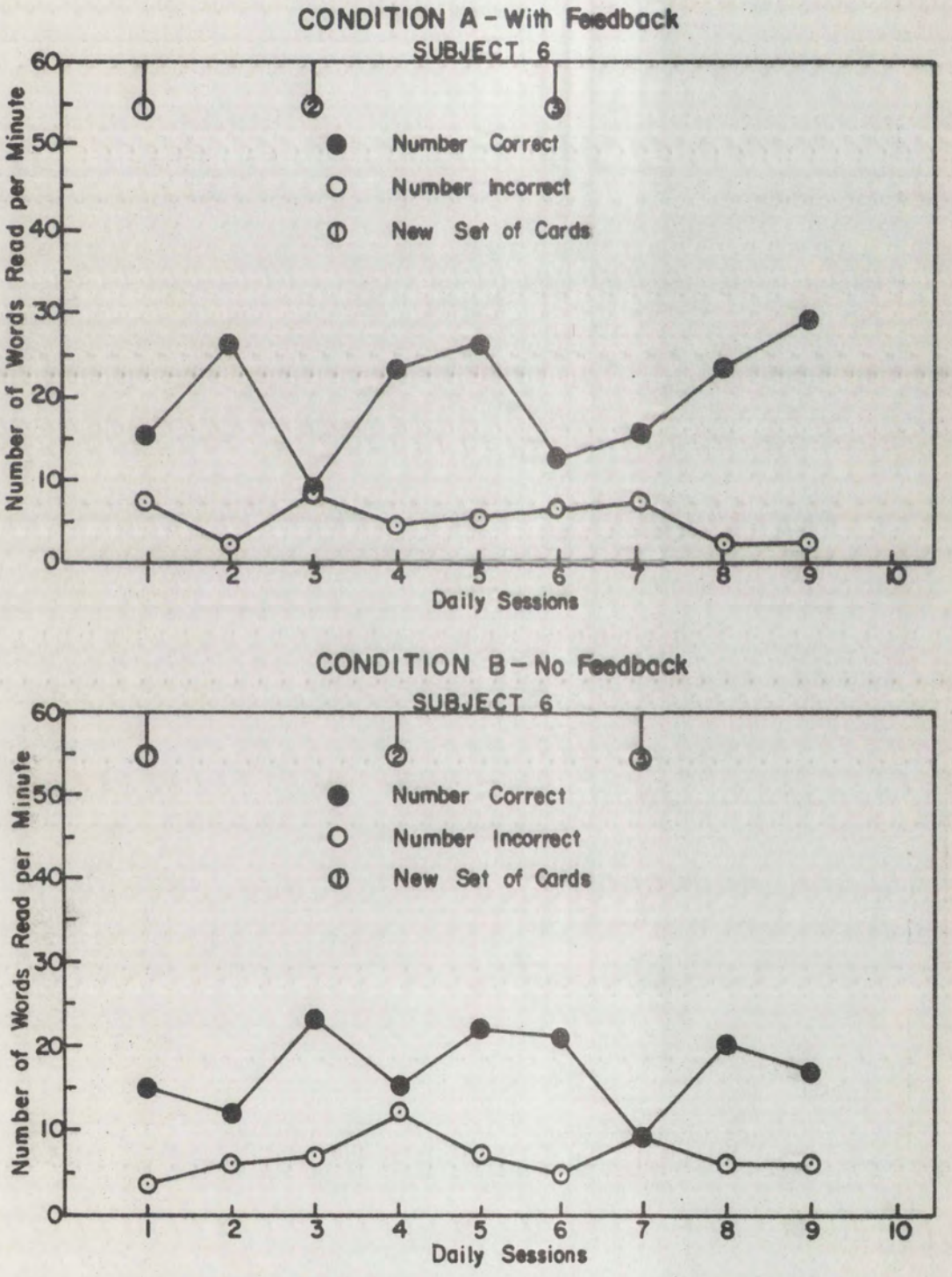

FIGURE 9. Daily charts: Conditions A and B.