Evaluating Progress Toward

Reading Proficiency

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In medical training the medical student is taught those diagnostic, prescriptive, and operative procedures that the present body of accumulated research indicates are the most effective and efficient. There would be many more malpractice suits than there are today if these students as practicing physicians made decisions such as: "I don't like this operative procedure because it takes too much time "; "This diagnostic work-up is too complicated, therefore I will choose a different one "; "I never did like this technique because of the professor who taught it in medical school "; "I won't use this medication because I don't like the smell or I don't think the patient will like the taste of it." Physicians do not make such choices. They use standardized measurement instruments and standardized tests for diagnosing a patient and then prescribe the most appropriate remedial procedures based on the objective diagnostic information.

In contrast, too many educators persist in basing teaching techniques on beliefs and not data, saying, "I don't care what the evidence says, I believe this is a better procedure; therefore I am going to continue to use it," rejecting a method that has been proven to be a tremendous aid in facilitating academic progress because it takes too much time, or preferring to "love" children in deference to teaching them. The terms ***love*** and ***teach*** should coincide. As long as an educator looks upon his job as one of choice without responsibility and fails to use the precise evidence and tools at his disposal, the academic death rate (failures) will increase or remain at its already atrocious level and he will continue to retard the educational system and the youngsters in it rather than facilitate its progress.

Assuming the reader finds some basis for accepting a data-based system for approaching educational evaluation, the next question is why should we use the precision teaching system to obtain this information.

WHY PRECISION TEACHING EVALUATION?

Likely the single most important thing that Precision Teaching has and

is contributing to education is a standardized recording system. Where the central focus of most educational systems is the modification of behavior, the central emphasis of Precision Teaching is the direct recording of behavior.

Performance Rate

Precision Teaching uses pupil performance rate as a standardized measurement unit. Pupil performance rates are used because, based on observation and thousands of rated projects (Behavior Research Company-Behavior Bank, 1969), this is the most legitimate measure of a youngster's academic performance. Performance rate refers to the frequency of responding (count) divided by the time (in minutes) during which the responses occurred (duration) ($\frac{\text{count}}{\text{duration}}$ = rate).

When the term ***rate*** is used, it should not be confused with speed as in racing or speed for the sake of speed. Rather the orientation is based on the equation of speed + accuracy = proficiency. That is, one needs to know both the accuracy of a response as well as the amount of time required to make a response(s) in order to determine whether a youngster has mastered the material on which he is working. Merely having knowledge of either working duration or count of tasks completed does not give adequate nor precise enough information. For example, two first grade youngsters may be given the same 1500 word book to read for a half-hour assignment. At the end of the half-hour, both may have finished the book. However, one youngster may have finished in 15 minutes (indicating a rate of 100 words per minute) and the other may have taken the full half-hour (indicating a reading rate of 50 words per minute). The precision information is lost by merely noting that both finished at the end of a half-hour or that both read the 1500 words.

Standardized Data

The system also uses a standardized behavior chart to represent all the

performance rate information collected in the academic or management areas.[4] The performance rates are recorded on the chart using standardized charting conventions, vastly facilitating communication and the ability to cover large amounts of information in a short time.

What standardization has done for medicine is analogous to what a standardized system such as Precision Teaching can do for education. For example, we can go to an M. D. in New York or Wisconsin or Oregon and feel quite secure that each physician will check our blood pressure, pulse, eyes, ears, and throat with standardized measurement devices. Also, his laboratory results will be related to standardized information about acceptable regular limits. Although, even if a physician, using his standardized diagnostic tools and procedures, finds that two patients have an identical physical ailment, he may still prescribe a different medication or treatment because of individual body chemistry or clinical history. Similarly, in education we must individually tailor instruction for each student and use a standardized direct recording system (i.e., Precision Teaching) to determine if goals are being successfully achieved.

We would be somewhat concerned if a physician used his fingers to look in our mouth rather than use a sterilized tongue depressor. Unfortunately, education is still at the stage of having our fingers in students' mouths!

The crucial importance of standardization is also evident in all weight and length measures. It would be a disaster if someone in Los Angeles asked a manufacturer in Chicago to send one hundred 16" by 20" frames but the manufacturer had a different unit length for his inch and counted in base two! Because of the lack of standardization in

[4]Precision Teaching divides behavior into two main categories, academic behaviors (reading words, answering social studies questions) and management behaviors (inappropriate talking out, saying nice things, getting out of seat without permission).

educational measurement, a great deal of information is being lost resulting in erroneous statements about data, and exorbitant amounts of time being spent on interpretation of what data there is.

Descriptive Language

A second major contribution Precision Teaching has made to education is the introduction of a descriptive language that enables communication with all those persons directly or indirectly associated with education (parents, teachers, the public, teacher aides, specialists, administrators, psychologists, legislators, and most importantly the students themselves). The descriptive nature of the Precision Teaching terminology is illustrated by the identification of the two scales on the standardized chart. The left side is called "up-the-left" rather than vertical or ordinate and the bottom scale is called "across-the-bottom" instead of horizontal or abscissa. If the best possible job of educating youngsters is to be accomplished, information must be shared locally and nationally. This requires that everyone can understand each others' language.

Given the precise records and descriptive terminology of Precision Teaching, deciding what educational procedures should be used to achieve the desired changes in a youngster's academic or management performances remains in the hands of the teacher. The teacher has the most frequent and intensive educational contact with the pupil, thus he is best able to predict what instructional or motivational procedures might be most successful with each child. With the aid of the Precision Teaching records, field analysis techniques, and computer analysis, regular classroom teachers can determine if their predictions are correct; if not, they may try again to continue monitoring the students' performance records.

EXPLAINING PRECISION TEACHING RECORDING AND CHARTING

So you, the reader, will have some background for interpreting the charts

and a basis for the recording practices followed in keeping Precision Teaching records, this section briefly discusses the basics involved in Precision Teaching recording and charting.

Recording

Once the response categories to be used have been identified, we can then obtain time and frequency information and compute the students' performance rate. For example, in the reading area we would be concerned with response categories such as letter sounds, blending, and sight words.

Time sample. The period during which performance rates are recorded is called the time sample—the duration during which behavior is being sampled. The time sample should be distinguished from the program time which refers to all the time during which we are working on the behavior but not necessarily recording it. For example, you may plan a 20-minute lesson on reading but only collect performance data for two minutes of this period. The 20 minutes is the program time and two minutes of these 20 is the time sample.

The exact start and finish time for both the time sample and the program time should always be recorded. It may be that just the time of day when a lesson is presented and the data collected will influence the youngster's performance. However, without the start and finish times the influence of the time of day cannot be determined.

It is usually desirable to maintain a constant time sample particularly with projects in the reading area.

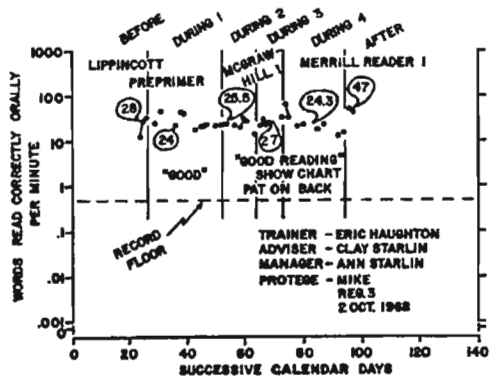
Daily record. There are three basic phases involved when Precision Teaching techniques are used to evaluate a youngster's performance. These three phases are the "before" phase, the "during" phase, and the "after" phase. The "before" phase refers to the period from the beginning of data collection in a project to the introduction of the

first major educational change, so the "before" phase is the time *before* making an educational change. The "during" phase refers to the period *during* which some intervention has been introduced to change the behavior. Because first tries at changing a performance are not always wholly successful sometimes other procedures must be tried. Different tries (or "durings") are merely indicated by successive numbering such that there may be during 1, during 2, during 3, etc. The intervention procedures used are indicated in each "during" on the charts. The "after" phase is the period following (*after*) removal of all "during" intervention.

The time samples should be kept daily in order to show the daily fluctuation of the pupils' performance. It is extremely misleading to have a spot check sort of procedure like the popular pretest and posttest design from which conclusions may be drawn that distort the picture of the youngster's performance between the two checks. A project done during one term at the remedial clinic at the University of Oregon demonstrates the potential risks of such a spot check procedure (see Figure 1). If Mike's performance had merely been checked at the beginning of the term (the "before" phase) and at the end of the term

FIGURE 1

THE RISKS OF SPOT-CHECK DATA SAMPLING



(the "after" phase), this spot check data would not have given any indication of his performance during the middle of the term.

Also, by having daily information, the teacher can make educational decisions on a daily or weekly basis. It is not necessary to wait for months to find out whether the intervention procedures he is using with a child are successful. The information is available a few days after intervention when there are daily records.

Permanent record. When obtaining the response frequency record in the academic areas it is necessary to have a record of the number of correct and error responses made during the time sample. It is therefore very important that some sort of permanent response record be obtained. The procedures for obtaining these records in the reading skill areas are represented in the section "Recording the Reading Skills."

Direct record. It is also extremely important to obtain a direct versus indirect measure of achievement. The count should be in close temporal proximity to the occurrence of the response, not remote (e.g., we should not have to think back over the day trying to remember how many words Hank read correctly during the time sample that was obtained in the morning and then derive the count from this reflection.) The direct record must involve our observation of the particular response of concern rather than recording a movement related to it and inferring a relationship. For example, the inference should not be made that because Richard hesitates a great deal in his reading he has a high error (mispronunciation) rate. Nor should the hesitation count be used as an error count. The hesitation problem may be a very legitimate project in itself but gross reading errors should not be inferred because Richard hesitates. If information is wanted about errors they must be directly counted.

With academic projects it is helpful to keep a copy of the materials being used (e.g., a xeroxed page from the reading book, a list of sight words which the student is working on) with the rate computation

sheet and the chart. Then anyone who looks at the projects not only has the charted information but also an example of the material.

Charting

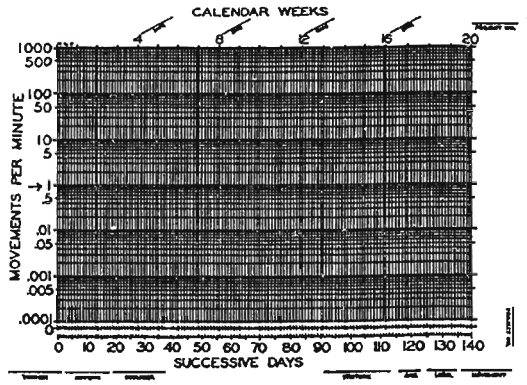
Central to Precision Teaching is the daily charting of the pupil performance rates. This procedure enables the teacher to have daily feedback from which to evaluate the success of her teaching techniques and provides her with information for making future tactical decisions.

The Precision Teaching chart enables charting of any and every human behavior (academic or management) that may occur in an average waking day and, for this reason, it is called a behavior chart.

The behavior chart is presented in Figure 2. The chart used in the classroom is identical to the one in Figure 2 except that the grid lines are blue and it is on standard 8½ x 11 erase resistant, translucent paper.

FIGURE 2

THE PRECISION TEACHING BEHAVIOR CHART



The four project team members of trainer, adviser, manager, and protege identified across the bottom of the chart are general terms that enable identification of a variety of people in these positions. Any position may be occupied by anyone, although characteristically in a classroom project the protege is a student; the manager is a teacher, teacher's aide or parent; the adviser may be a principal, counselor, resource teacher or similar person; and the trainer is often a university teacher trainer, school psychologist, social worker or someone in a similar position.

The team names were developed in an attempt to describe as precisely as possible the function that the various persons involved in a project may have. Very often the efforts of a number of persons are responsible for a youngster's improvement in any given area. Thus, by identifying all persons who functioned in some capacity on a project, all members of the team are credited.

The "age" space following "protege" refers to the age of the protege. In the "label" space, the protege's class placement (regular fourth, primary remedial reading) or occupation if not a student (teacher, counselor, plumber, parent) is entered. Finally, the "movement" category is where the movement that is being recorded on a particular chart is entered.

At the top right center of the chart is the address of the Behavior Research Company where the chart paper and the rate computation sheet can be purchased.

Across the bottom of the chart successive calendar days are indicated. Each heavy vertical line in the grid represents a Sunday line with Monday through Saturday lines occurring between the Sunday lines. In the upper left hand corner of the chart grid, the letters *M, W, F* represent a key for the days of the week. The numbers 4, 8, 12, 16 and 20 at the top of the grid indicate the number of elapsed weeks. Above the first four of these cumulative week indicators is a place to put the

day, month and year of the Sunday on which the number is resting. So on each chart it is possible to record 140 successive calendar days which is 20 calendar weeks. Two charts will cover a full school year for one movement of one student.

Up-the-left side of the chart, labeled "movements per minute," is the grid for the performance rate. Remember,

$$\frac{\text{number of movements (responses)}^5}{\text{minutes recorded}} = \text{the rate.}$$

After computing the rates, directly transfer them to the chart placing them at the appropriate rate on the appropriate day. The range of the up-the-left side is from .001 per minute which means 1 count/1000 recorded minutes, to 1000 per minute which means 1000 counts/1 recorded minute. There are six basic sections to the chart. The rate to which the arrow is pointing refers to one movement per minute. The lines between 1 and 10 are counted by ones (2, 3, 4, 5, . . . 10). Lines between 10 and 100 represent steps by ten (20, 30, . . . 100), and from 100 to 1000 the lines are jumps by hundreds (200, 300, . . . 1000). Below 1 there are increments of tenths from .1 to 1, then hundredths from .01 to .1, and finally thousandths from .001 to .01. A useful way to remember how to convert the up-the-left rate statements to a movement/minute statement is represented below:

[5]The term *movement* or *movement cycle* is related to the term *response* but there is an important distinction that should be made between the terms at this point. Most persons are more familiar with the term response and its meaning, thus this term has been used in the first sections of the article to convey concern with an observable behavior of an individual. A behavior is called a movement cycle when merely discussing or describing it. The same behavior is referred to as a response only when it can be demonstrated that the behavior is performed at a designated rate and when it has been identified which events stimulate or consummate the behavior. Thus, the term movement cycle is a description of a behavior in the environment, whereas the term response indicates that a functional behavior is present in some persons' repertoire.

Place all rates above 1 over 1

1000 = 1000/1 = 1000 movements per minute
50 = 50/1 = 50 movements per minute
2 = 2/1 = 2 movements per minute

Convert all rates below 1 to fractions

.5 = 5/10 = 5 movements in 10 minutes
.03 = 3/100 = 3 movements in 100 minutes
.005 = 5/1000 = 5 movements in 1000 minutes

The rates below 1 can be converted to a "per minute" statement if it is wished. For example, 5 movements in 10 minutes would be equal to 1 movement every 2 minutes or .5 per minute which is less than once every minute. Five movements in 1000 minutes equals 1 movement every 200 minutes or .005 per minute.

The reason the horizontal rate lines squeeze up near the top of each of the six sections (i.e., (1) .001 to .01, (2) .01 to .1, (3) .1 to 1, (4) 1 to 10, (5) 10 to 100, (6) 100 to 1000) is because the up-the-left scale is a proportional scale on which equal academic gains are represented by equal visual distance. For example, the distance from 5 to 10 is the same distance as from 500 to 1000 because proportionally both gains represent a doubling of rate. Thus, a lower rate youngster gets as much credit for the same proportional gain as a higher rate youngster, which is not true on an arithmetic scale.

Based on classroom data and youngsters' comments, the progress (proportional) nature of the behavior chart may serve as a very strong motivational device itself. Children are very concerned about making their correct performance go up and incorrect performance go down. To keep their slope of acceleration or deceleration the same, they have to continue gaining by the same ratio.

The standardized up-the-left scale represents the range (in terms of rate) of all human behavior that could occur in an average waking

day.[6] There are no human behaviors that occur at a rate of more than 1000 responses/minute, which is the upper end of the scale. The lowest possible rate a person could have in one day would be once in his waking day which is approximately 1 response in 1000 minutes or a rate of .001. And .001 is the lower end of the behavior chart scale. The behaviors characteristically of concern in the classroom distribute themselves over the range of the behavior chart in terms of their common rates. (Starlin and Starlin, 1969)

Lindsley (1969) has found that with the standardized behavior chart, as opposed to a nonstandardized graph, it is possible to obtain 10 times the amount of information in the same period. For example, using the behavior chart,with the standardized charting conventions a teacher may look through 30 projects in the same time it would take a teacher using nonstandardized techniques to look through three.

It also allows comparisons ***within*** youngsters on different performances as well as between youngsters on the same and different areas.

Charting conventions. There are a number of conventions to follow in recording data on the chart. So that the reader will have at least a summary of these conventions, Figure 3 has been included. For more elaboration of these conventions, see Starlin and Starlin, 1969.

A charting check list[7] developed by Dr. Eric Haughton (1968b) is presented for those persons interested in starting Precision Teaching projects.

[6]Based on data collected by Dr. Eric Haughton (1968a), an average waking day was determined to be around 16 and one-half hours or approximately 1000 minutes.

[7]This check list may be xeroxed and used as an actual check list for any projects you may wish to start.

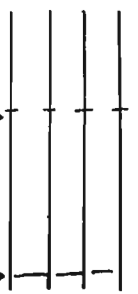
Charting Project Check List

	Projects 1 2 3 4 5
All performance measures are in terms of rate (i.e., movements/minute).	
Daily records have been entered daily on the rate computation sheet.	
Rates have been plotted on the behavior chart.	
Charts are being kept daily.	
If there is a frequency of correct and error movements, both correct and error should be charted and on separate charts.	
Have record floor indicated.	
Have record ceiling indicated.	
Have distinguished between *ignored* and *no chance* days.	
Have a chart for each rated movement.	
Have included samples of protege performance (e.g., worksheets, photographs, tape recordings, etc.) with charts.	
Have executed and indicated phases—before, during, after.	
Have identified intervention procedures in each phase on the chart.	
Have indicated middle rates for each phase.	
Have identified all project team members on chart.	
Have calendar synchronized charts and entered Sunday dates.	
Have followed all charting conventions (see Figure 3).	

FIGURE 3

A SUMMARY OF CHARTING CONVENTIONS

Term	Definition	Charting Conventions
RATED DAY	A day in which the movement	Chart point on daily chart. Connect points with lines. Skip all no chance and phase change space. Chart in pencil only, no colors. Use dot for acceleration target (e.g., .—.) and x's for deceleration target (e.g., x—x) ***Each movement cycle on a separate chart.***
NO CHANCE DAY	A day in which the movement has no opportunity to occur.	Skip day on daily chart
IGNORED DAY	A day in which the movement could have occurred but was not recorded.	Draw line across day only chart.
PHASE CHANGE SPACE	The space following the last rated day of one phase and the first day of the next phase.	Draw a vertical line on the chart in the phase change space. Don't connect data points.
RECORD CEILING	The highest measurable performance rate determined by the program or program events.	Draw dashed horizontal line on the chart at the maximum rate. Dashes should occur across Sunday lines, e.g., →
RECORD FLOOR	The lowest measurable performance rate, other than zero determined by length of time sample (i.e., 1/time sample = record floor).	Draw a horizontal dashed line on the chart at the record floor. Dashes should occur across week day lines, e.g., →



ZERO RATE	No movement cycle recorded within *the time sample.*	Chart point directly below record floor.
MIDDLE ACCELERATION RATE	Mid-point of rated days in each phase.	▽ tail of tear drop points at mid-point (middle), number inside tear drop.
MIDDLE DECELERATION RATE	Mid-point of rated days in each phase.	▽ tail of triangle apex points at mid-point (middle), number inside triangle.
CALENDAR SYNCHRONIZE	Standard time for starting all charts (i.e., the first day of school).	It requires two charts to cover a full school year. The first Monday of the first chart is the Monday of the first week of school. The first Mondayof the second chart is the Monday of the 21st week.

READING DEFINED

Over the years there has been a good deal of confusion and disagreement on such points as how reading and comprehension are related, what skills are prerequisite to beginning reading, what precisely are the skills a youngster must master to be able to read and comprehend what he has read, or the order in which the tasks (if identified) should be presented to him.

Two possible reasons for the confusion over such issues are failure to pinpoint precisely the movements comprising the reading and comprehension areas with consequent imprecision in identifying what environmental events are related to what movements and failure to obtain direct daily pupil performance records even on those movements which have been identified.

Basic Segments of Language

Trying to pinpoint what is meant by reading brings unavoidable concern with the science of language called linguistics, for reading involves an interpretation of written language. (Barnhart, 1960)

The many complexities underlying reading seem best understood by reviewing the three basic segments of language—phonology, grammar and semantics. (Gleason, 1961)

> ***Phonology*** involves the linguistic study of the speech sounds and sound system of a specific dialect or language during a particular period. (Lowry, 1968)
>
> ***Grammar*** involves the science or study of the system and structure of language. There are two basic components of grammar: ***syntax*** and ***morphology.*** Morphology deals with the grammar within words (the combination of roots and affixes) and may be contrasted with syntax which deals with the building of individual words into larger language structures (phrases, sentences). (Lowry, 1968)
>
> ***Linguistic semantics*** deals with the growth and modifications of word meanings. (Lowry, 1968)

Depending on the particular written language system encountered and the type of reading response made, all of these basic linguistic units are of concern to a greater or lesser degree.

As Hanna et al. (1966) point out, there may be different kinds of written language. There are alphabetic forms of language which, as the name suggests, are comprised of alphabetic letters. Other written languages may use pictures (hieroglyphics), numerals (mathematics), or some other linguistic unit other than alphabetic letters.

A numerical orthography would have an underlying phonology (sound system), but it would be primarily related to the morphology and syntax of the language. At the other end of the continuum, a purely alphabetic language would have its orthography determined primarily at the

phonological level, with morphological and syntactical factors determining a small percentage of the alphabetic options. (Hanna, et al., 1966, p. 106)

Thus, in teaching persons to read an alphabetic written language, we are primarily concerned with teaching them the sounds the various alphabetic symbols represent. Whereas in teaching a person to read a written language more dependent on morphological or syntactical properties, the emphasis is on teaching the meaning represented by each symbol and what interpretation to make when these symbols are arranged in various ways.

One can start to see that the sounds which make up words in an alphabetic language are analogous to the components of, for instance, a mathematical formula in a numerically based language. In order to emit the correct response when confronted with the formula 5 + 7 = ☐, it must be known what the symbols *5, +, 7* and = mean. Similarly, in order to emit the appropriate response when confronted with the word *cat,* it must be known what sounds are represented by the letters *c, a,* and *t.*

The preceding discussion in this section was presented with the hope of conveying to the reader the linguistic knowledge that must precede and underlie the understanding and subsequent teaching of reading. Drawing from this discussion, the definition of reading will be broadly viewed as the vocal or subvocal pronunciation of any written language. Thus the interpretation of a mathematical formula is reading as legitimately as is the pronunciation of a written word.

However, of particular concern in this chapter is reading the alphabetic language of American English. It will be this aspect of reading that will be inferred when the term "reading" is used.

The Alphabetic Nature of American English

The next question that arises is, if we are to treat American English as an alphabetic language rather than some other linguistic form, how closely does it in fact approximate the definition that a purely alphabetic language is one in which each graphic symbol (letter) represents only one phoneme (sound) of speech?

In the first phase of the scholarly study conducted by Hanna et al. (1966), it was found that of the 52 sound units (phonemes) they analyzed slightly greater than 73 percent demonstrated a consistent phoneme-grapheme (sound-symbol) correspondence in 17,000 commonly used English words. However, the 73 percent figure only repre sents a consideration of phoneme-grapheme correspondences in terms of phonological analysis. When both position in syllables and syllabic stress are considered, the 52 phonemes approximate the alphabetic principle slightly over 84 percent.

The criteria that Hanna and his associates used was, "if a given phoneme had one graphemic option which occurred 80% or more of the time in the entire (17,000 word) corpus, that particular phoneme-grapheme relationship was considered to exhibit a satisfactory approximation of the alphabetic principle."

Although there are a few reservations to bear in mind when considering phonemic position in syllables and the syllabic stress variations in an alphabetic analysis (Hanna, et al., 1966, p. 99), the conclusion of the authors was that "phase I. . .seems to have demonstrated satisfactorily the basic hypothesis that American English is primarily an alphabetic language."

The more sophisticated traditional[8] research studies support the teach

[8]Traditional refers to the fact that most of these studies used a pre- post-achievement test design rather than obtain actual reading performance data.

ing of reading following phonic (alphabetic) regularity principles (Chall, 1967). It also appears from preliminary Precision Teaching data that the results of these traditional studies will be confirmed in terms of actual student reading performance.

Because of this large amount of information, for purposes of this chapter the teaching of reading written American English is viewed as necessarily approached from a phonic, or alphabetic, orientation.

Oral Reading

The potential stimulus events for ***beginning*** reading are words and the desired response is the saying of these words. So that we are assured that a youngster learning to read is consistently pronouncing the words correctly and fluently (i.e., with appropriate punctuational inflection, no repetitions, no hesitations), initially he should read orally. It is only through listening to a youngster reading that those areas that are in need of reading remediation can be identified. Once it is certain that a youngster has mastered the reading of words, he can then move toward reading silently.

Reading Distinguished from Comprehension

To further refine the definition of reading used in this chapter, a brief statement of the features that distinguish it from comprehension are discussed below.

Reading involves the saying of words whereas comprehension involves the understanding of what is read. This understanding may be demonstrated through any number of different movements (writing an answer, saying an answer, performing some activity) depending on the question asked. The illustration below differentiates reading and comprehension on two dimensions.

	Characteristic events present:	Characteristic desired movement:
oral reading:	words on a page	saying the words
comprehension:	a written question	writing the answer to the question

Summary

In short, the refined definition of reading as will be used in the remainder of the article involves 1) the assumption that American English is primarily an alphabetic language, which means that the teaching of reading is approached through the matching of speech sounds with the letter forms that represent them, 2) an oral reading approach is emphasized because the concern is in determining the correct and fluent word pronunciation of beginning or remedial readers, and 3) reading and comprehension are distinguished because of the different events and movements present when these skills are performed.

After pinpointing how reading is to be defined, the next task, as stated in the second paragraph of this section, is to collect some precise performance data on the skills that make up reading. Consequently, the remainder of the article is concerned with applying the Precision Teaching recording system to the evaluation of oral reading skills, with the reading instruction emphasis involving a phonic regularity (alphabetic) orientation.

PRECISION TEACHING AND READING

When using the Precision Teaching recording system to evaluate reading, we no longer use traditional testing procedures but completely rely on performance rate data for diagnostic and remedial success information. Traditionally and presently the main means of evaluating a pupil's academic progress or potential has been in terms of intelligence tests and spot check diagnostic and achievement tests. However, these as-

sessment procedures seldom evaluate the actual performance. For example, the actual performance assessment of a youngster in oral reading involves determining how many words he can read accurately in a given period over so many days in a particular material. Unfortunately, such daily classroom performance of pupils has been overshadowed by their achievement test scores. These intermittent tests usually do not give precise performance data. Performance from the test scores obtained must be inferred. Nancy Johnson (1966) found that "pupils do not perform the same on an arithmetic achievement test as they do on their daily arithmetic assignments. . .and that teachers were more influenced in their ratings of superior students by their IQ and achievement test score than by their daily performance."

It must be known how many words a youngster can read and how many and what kinds of errors he makes in a designated period in the book or books that are available for him to read in. This oral reading is an accurate index of his reading performance, not that he has a 2.5 grade level score on a reading achievement test.

READING PROJECT PINPOINTS

Pinpointing refers to identifying a movement cycle (response) precisely enough to obtain a record of the movement. Thus, what is identified must be observable and countable.

There are three basic response skills involved in learning how to read phonically regular words. These skills include 1) knowing the letter sounds (knowledge of the relationship between letter forms and their sounds), 2) ability to blend these sounds together to make a word *c a t*, and 3) ability to blend the letter sounds fast enough for the student to be saying the word as a sight unit—that is, reading the words.

One other project that would be most helpful in aiding oral reading fluency is one on phonically irregular sight words (was, are, shoe). A

sight word is any word that the reader knows as a unit. There can be phonically regular or phonically irregular sight words. The reason for an emphasis on an irregular sight word project is because of the assumption that, if a student has been taught the regular sound-symbol relationships, he can sound out phonically regular words independently.

To assist in evaluating a student's progress towards the goal of oral reading mastery, there are four basic recommended projects. It is important to make a statement concerning both correct and error performance when identifying the pinpoints for the four project areas. Generally, the project pinpoints are as follows:

1. a) letter sounds said correctly
   b) letter sounds said incorrectly (errors)
2. a) letters blended correctly in sequence
   b) letters blended incorrectly in sequence (errors)
3. a) (irregular) sight words said correctly
   b) (irregular) sight words said incorrectly (errors)
4. a) words read correctly orally
   b) words read incorrectly orally (errors)

Reading Movements Handled by Instruction

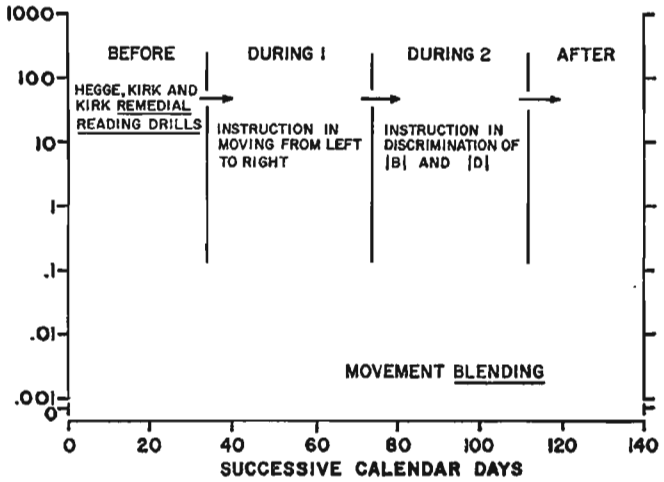
There are also abilities such as moving from left to right in reading, discriminating between letters and words and appropriate inflectional emphasis in response to punctuation that should be considered in establishing oral reading mastery. However, attention in these areas is frequently handled by instruction without a project on the recordable movement. For example, a youngster may be instructed on how to move from left to right within words, phrases or sentences; but it is rather difficult to evaluate "a left to right movement" unless eye movement photography is used to obtain a record of fixations and regressions. Such a procedure is not very feasible and definitely not practical in terms of classroom projects. The discrimination area provides another good example of the distinction between a reading response category and instructional procedures aimed at teaching these various

responses. There is not a discrimination response as such, but in reading a discrimination between letter forms and sounds and words. Thus, a discrimination error (saying /b/ for /d/) would show up as an error in a letter sound, blending, or oral reading project. Correct performance in these project areas would indicate correct discriminative ability at least for one given time sample. No specific project would be necessary on discrimination because both correct and incorrect discrimination performance would be picked up in the projects that require this ability.

The instructional intervention necessary to teach such skills as left to right and discrimination would be part of, or a complete "during" phase in one of the four project areas (see Figure 4).

FIGURE 4

AN EXAMPLE OF INSTRUCTIONAL INTERVENTION IN A BLENDING PROJECT



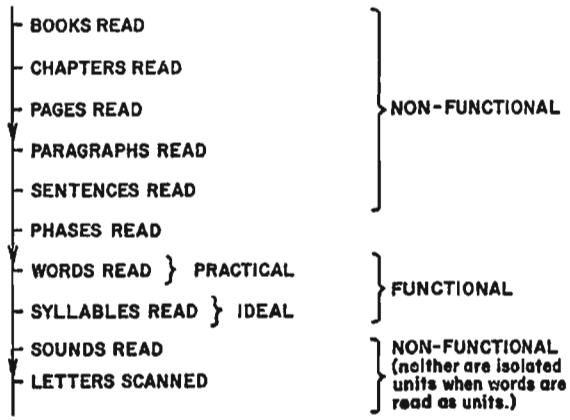
Refined Pinpointing

Although given the basic project pinpoints there are possible variations that should be kept in mind, an understanding of two fundamental dimensions of pinpointing enables more specific identity of a variation in a basic project that may be individually relevant to particular needs.

Calibration. One of the pinpointing dimensions is that of calibration. Calibrating involves assuring that the standard units of measurement are the same. We must be sure that the response unit conveys as precisely as possible the amount of information covered and the approximate length of time necessary to emit each response. The oral reading area is probably the most prone to potential calibrating difficulties. Figure 5 presents a range of refined pinpoints in the oral reading area from books at the top of the scale to letters scanned at the bottom.[9] As indicated in Figure 5, there are nonfunctional units for eval-

FIGURE 5

CALIBRATING IN ORAL READING



[9]Dr. Eric Haughton was most helpful in elaborating and refining this figure.

uating oral reading such as books, chapters, pages, sentences, phrases, letter sounds and letter forms; and there are two identified functional units (words and syllables). If oral reading were assessed in terms of books read, only an extremely gross indication of how many responses a youngster emitted would be obtained;and there would be almost no indication of the number of oral reading errors. The same situation exists with chapters, pages, paragraphs and sentences, though the degree of grossness decreases. Even when counting oral words read, which is one of the suggested project pinpoints, the measurement has not been refined as precisely as it should. For, if we concede that time spent performing is indeed an important element of mastery (almost all traditional testing procedures do concede this by the incorporation of time limits), then we must guarantee that the measurement unit identified does not require differing amounts of time to emit (i.e., one second or more variation). For example, if a youngster is reading a book with mostly three, four and five syllable words in it, instead of one with only one syllable words, there will be a significant difference in the amount of time spent pronouncing the different words. A five syllable word like ***interpretation*** takes at least four times as long to say as a single syllable word like ***in*** which is in fact one of the five syllables of ***interpretation.*** The number of prerequisite skills necessary to pronounce ***interpretation*** are greater than those needed to pronounce ***in.*** Thus ***interpretation*** is not only a more time-consuming word to read but also requires more knowledge to pronounce. It appears that the most functional and ideal unit of measurement in reading is a syllable count.[10] Even with the variation in the number of letters in such single syllable words as ***a*** and ***shake,*** the difference in the pronunciation time is almost nonexistent if they are read as sight units. However, the only practical and most functional unit at the

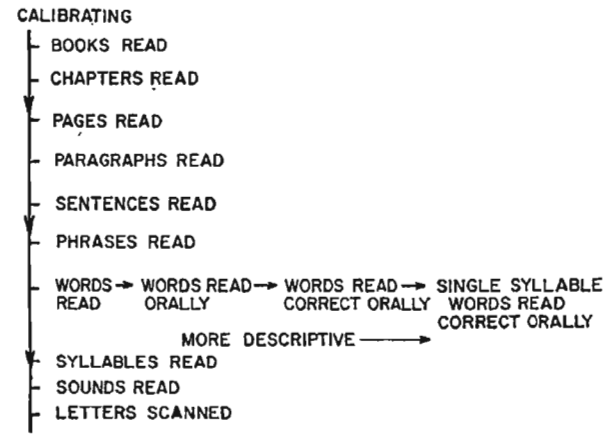
[10]Both "sounds read" and "letters scanned" are nonfunctional criteria for reading evaluation because, as indicated on Figure 5, they are not isolated response units separated by a closure in articulation as is the case with syllables. For instance, the emitted response that is made when the one syllable word ***cat*** is said as a whole is exactly ***cat.*** If the word is blended (c-a-t), then it is possible to record a sound count, but these sounds are not isolated response units when the word is read as a whole.

present time is the word count. It is not feasible for a teacher to count the number of words read in a two minute time sample for 25 youngsters every day. Thus, it is necessary to have the student himself or some helper (teacher aide, mother, advanced student) do the counting. Because of the variation in breaking polysyllabic words and the amount of time involved in determining the number of syllables in each word, it is not feasible to ask a student or a helper to accurately and efficiently accomplish this task. However, words are easily visible and countable in books because of the spacing between them and thus are reasonable units for students and helpers to record.

Description. Once the unit of measurement that is to be used in a project has been determined, we must then be sure that the movement has been described as precisely as is desirable for our needs. The degree to which the movement is described involves the second major dimension of pinpointing. For each unit on the calibration scale there is a continuum of how precisely to describe the movement. An example of such a continuum has been added to the "words read" area of Figure 5 to give Figure 6.

FIGURE 6

THE TWO DIMENSIONS OF PINPOINTING



If a teacher plans to work with a student on a pinpointed movement that is more precise and descriptive than are the basic project pinpoints already listed, then the pinpoint should include this information. For instance, as in Figure 6, if a pupil will only be working on single syllable words, it would be more precise to make this youngster's project pinpoint "single syllable words read correctly orally" and "single syllable words read incorrectly orally" that just ***words*** read correctly and incorrectly orally. Of course, the latter basic pinpoint will cover reading of both single and multiple syllable words.

There are other examples of more descriptive pinpoints in the other basic project areas as well. For instance, in the letter sound area, a decision might be made to specifically do a project on short vowels, long vowels, or consonants. In the blending area one may wish to differentiate between isolated blending (enunciating each letter sound in sequence) and continuous blending (continuing one sound into the next in sequence) as different, more specific project pinpoints. In the sight word area there may be situations when projects involving regular sight words or a combination of regular and irregular sight words would be more appropriate—for example, a youngster becomes overanalytic in his blending. As in the oral reading area, one could also be more specific and indicate two-syllable sight words, medial short vowel sight words and so on.

Pinpointing of reading errors. All the error categories of the basic projects are in need of more precise and descriptive pinpointing. Rather than merely identifying "words read incorrectly orally," it should be specified that the error was an omitted word, a word substitution (*a* for ***the***), a word reversed (***saw*** for ***was***), and so forth. However, again the problem of ideal versus practical arises. Practically, it is not feasible to have a classroom teacher keep one chart for each type of reading error a student makes. As more help is available for the classroom teacher in the form of parent helpers,

interested volunteers and teacher aides, this further degree of preciseness will become more feasible.

Even with the present more global pinpoints such as "words read incorrectly," if we listen and watch carefully when evaluating a pupil's daily performance, it is possible to identify specifically the type of errors being made. With this information it is possible to precisely tailor the remedial intervention for each specific error, although still having a grouped error record.

There are some "error type" projects that should not be grouped with a mispronunciation error project. Such things as long hesitations, repetitions, and "I don't know" responses should be separate projects and distinguished from mispronunciations. There have been projects done in these areas that will be discussed briefly in the next section.

One final comment related to errors concerns "carelessness." Often a teacher will infer that a youngster is being careless when he responds correctly one day and incorrectly the next day to the same item, or when he does not "attend" and makes mistakes such as saying *a* for ***the.***

Part of the difficulty with attaching the label "carelessness" to such behaviors is that this term gives very few leads for what might be an appropriate remedial procedure. On the other hand, to stay with a descriptive statement such as, "June read the word 'horse' Friday but on Monday she did not," requires a very precise statement of June's performance.

It is likely that the pattern that many remedial youngsters display of "knowing" a skill one day and not the next is explainable by noting the distinction between a behavior being a movement cycle or a response. That is, because of a lack of practice, of systematic instruction or of appropriate motivation, a youngster may not have mastered

a skill to the extent that it is a functional response in his behavioral repertoire.

Whatever the pupil behaviors are that stimulate the use of the term "carelessness," the term takes us at least one step away from a precise description of the youngster's actual disturbing behavior and further suggests that it is the fault of the student, when the existence of such behavior usually indicates a faulty educational environment.

In summary, one should strive to calibrate and describe the reading response areas as precisely as is practical yet still functional. As is evident from the discussion in this section, there is considerable variation in what specific reading movements could be most relevant for a person to record in a given situation; although, after reading the "Recording the Reading Skills" section, the reader should understand how the four basic project pinpoints will enable obtaining most of the information necessary to efficiently and effectively establish oral reading proficiency in students.

PROFICIENCY

As is the purpose of most academic evaluation, the reason for evaluating student reading performance in terms of rated information is to determine the present level of performance mastery. Given such rated performance data, the question then arises: what performance criteria or standard should be used to determine how well or poorly a youngster is performing? That is, what does a proficient sounder, blender or reader look like in terms of performance rates? It is precisely the answering of these questions that is and has been a major concern of the author. Thus, before discussing any specific data or rated proficiency levels for the various project areas, it would be helpful to specifically delineate what the term "proficiency" is attempting to convey.

Components of Reading Proficiency

There are four factors which combine to determine proficiency levels in the reading skill areas.

Since correct and error performance rates are used as standard measures of evaluation, it follows that both response ***speed*** and ***accuracy*** (the two components of rate) are two factors involved in determining proficiency levels.

A third factor involved in the proficiency statement is ***fluency.*** Maintaining accuracy and moving fairly rapidly through the material, whether it is sounds, sight words or running words in a book, enables very little repeating, inappropriate hesitations or inattentiveness; for such nonfluent behavior would result in failure to reach proficiency. Although it is somewhat more difficult to obtain records of the fluency dimensions, fluency is always directly or indirectly part of the proficiency picture.

Not only should the performer achieve the designated standard in terms of speed, accuracy and fluency, but he must demonstrate the proficiency rates ***consistently over time.*** It should not be assumed that because a proficiency level is achieved on one day that the student is in fact proficient. ***At least*** a middle[11] performance rate for one or two weeks at or above the correct standard and at or below the error standard should be obtained. It is crucial that the definition of proficiency include both a statement concerning correct ***and*** error performance simultaneously. Otherwise, we might know that 40 letter sounds said correctly in a minute is proficiency and find that a student in fact achieved this, only to find out later he also had 15 errors per minute.

[11]The term "middle" is equivalent to the nonparametric median statistic. However, "middle" is more descriptive of the point (in a ranked distribution of data) which is being referred to than is the term "median."

Proficiency: A Minimum Statement

The proficiency statement refers to the minimum fluency, consistency, speed and accuracy performance levels necessary to demonstrate mastery of the material. For example, what are the fewest number of words read correctly orally and the largest number of errors that a youngster could emit with the least amount of fluency over the shortest length of time and still be considered a masterful reader? A youngster below the minimum correct standard is either not fluent or making too many errors. Above the minimum error standard the reader is inaccurate because of the many errors he makes. Confusing letter sounds, repeating words, and continuing to blend words that should be known by sight are but a few examples of some of the factors that may be interfering with a student reaching proficiency in one or more of the project areas.

The minimum nature of the proficiency statement says that a youngster must at least achieve this performance level if he is to efficiently and in many cases effectively work on the next task.

Ceiling Levels

There are likely physiological ceiling rates for the oral production of sounds and words. However, the proficiency performance rates, which will be suggested for the various basic project pinpoints in the next major section, do not approach the highest possible rates in these areas.

An approximation of the ceiling performance rates in the various reading areas has been obtained by screening adults who have mastered the reading skills very well. These ceiling estimates will be presented along with the proficiency standards. The discrepancy evident between the rate proficiency statement and the ceiling rate estimates, emphasizes rate not as speed for the sake of speed but rather the guarantee of enough speed to ensure mastery and fluency.

It would, of course, be possible to attempt to accelerate a youngster beyond the proficiency level in correct performance in a given area in an attempt to more closely approximate the ceiling performance rate. However, a question of educational efficiency then enters in: how much time should be invested in putting a little more frosting on the cake when it has been established by the proficiency standard that a child has mastered the material? Just because proficiency is achieved does not mean that a pupil cannot be encouraged to strive for a higher rate by continuing the project independently on his own time.

Independence of Age or Material

An interesting and unanticipated development of the proficiency picture, particularly relevant to oral reading, is that the proficiency standards appear to be the same regardless of the age or label (retarded, remedial, regular, gifted) of the pupil or the material being used. This might be explained first by recognizing that if indeed certain responses are prerequisite to other responses in various skill areas, such as reading, then regardless of the age or label of the student they must acquire minimum proficiency in the prerequisite skill before they can proceed to the next one. The suggestion that proficiency should not change even though the material does recall the definition of proficiency as a minimum criterion level. Any performance below this minimum would indicate some breakdown in the reader's mastery or fluency. Above the proficiency level there is still plenty of room—up to the ceiling level (for instance in the oral reading area)—for rates to fluctuate when reading a technical textbook as opposed to a light novel.

What the pupil performance rate data allow is the establishment of some normative information in terms of actual reading proficiency. Consequently, when it is determined that a protege who is supposed to be reading orally at 100 words correct/minute with 2 or less errors/minute is in fact reading at 20 words correct/minute and 10 errors/

minute, there is immediate and precise information regarding the discrepancy between where he is and where he should be. By maintaining daily records, it is then possible to determine on a daily basis the success of efforts to reduce or eliminate this discrepancy.

WHAT THE DATA SAY

The large majority of the reading performance data [12] available to the author falls into the four basic project areas of letter sounds, blending, sight words and oral reading. It is these four categories that will constitute four of the subsections of this section. Under each broad category where the information is available, some discussion of the pinpoint variations (e.g., a consonant or vowel project versus a letter sound project) mentioned in a previous section will be included. The fifth subsection includes a summary of a few projects related to reading fluency.

Letter Sounds

Information from seven adult projects, including a self-project of the author, indicate that with a flash presentation adults are capable of a middle performance of just greater than 100 sounds correct/minute with a middle of one or zero errors. By laying all the flash cards out on the table and going through them in this manner, it is possible to add approximately another 50 sounds correct with no loss in error performance. This information should give the reader some idea of the optimum performance level in the letter sound area.

[12]The data presented and referred to in this section have been collected by practicum students in the University of Oregon remedial reading clinic and by school teachers in the public schools in and around Eugene, Oregon, under the supervision of the author. The conclusions presented concerning these data have been arrived at through a hand tabulation of the data. A thorough statistical analysis has not yet been completed. Therefore, the conclusions drawn are of a tentative nature. When a more extensive analysis has been completed, it will be possible to make range and median statements about *large* groups of projects in the various areas.

Most of the student letter sound projects that have been supervised by the author have involved presentation of both upper and lower case letters by means of flash cards. The youngster is asked to give the sound of each letter presented.

At the time of this writing 66 youngsters' letter sound projects had been screened, 42 from the remedial reading clinic and 24 from a first grade classroom. A middle correct and error performance rate for the last five days of both completed and ongoing projects was taken for each of the 66 projects. The range of these "last five day middles" was from 17 to 89 sounds/minute correct and 0 to 9 errors/minute. The interquartile range was from 35 to 52 sounds correct and 0 to 2 errors. The middle of the ranked "last five day middles" was 43.5 sounds/minute correct and 1 error/minute.

Based on this information, a tentative letter sound proficiency standard of 40 sounds correct per minute and 2 or less errors per minute is recommended.

Figure 7 is representative of the 24 letter sound projects that are being recorded in the first grade room.[13] During the before phase, Janet was in the middle of the class in terms of both correct rate (0 correct/minute) and error rate (19 errors/minute). Janet's correct chart indicates that it took her 19 days or four weeks to reach the proficiency standard of 40 sounds correct/minute for the first time. The middle number of days to reach proficiency for the whole class was 29. The median (middle) number of errors that a student was making when he achieved proficiency in the sounds was two per minute. The acceleration in correct performance and deceleration in error performance evident on Janet's sound charts was achieved by presenting (in the "during" phases) the sounds with a brief demonstration of how to say them, and then allowing the youngsters to practice.

[13]For assistance in interpreting this and the following charts, the reader might benefit from restudying the chart in Figure 2 and the charting conventions in Figure 3.

FIGURE 7

JANET MOVES FROM THE MIDDLE OF HER FIRST GRADE CLASS IN THE "BEFORE" PHASE TO LETTER SOUND PROFICIENCY IN 19 DAYS

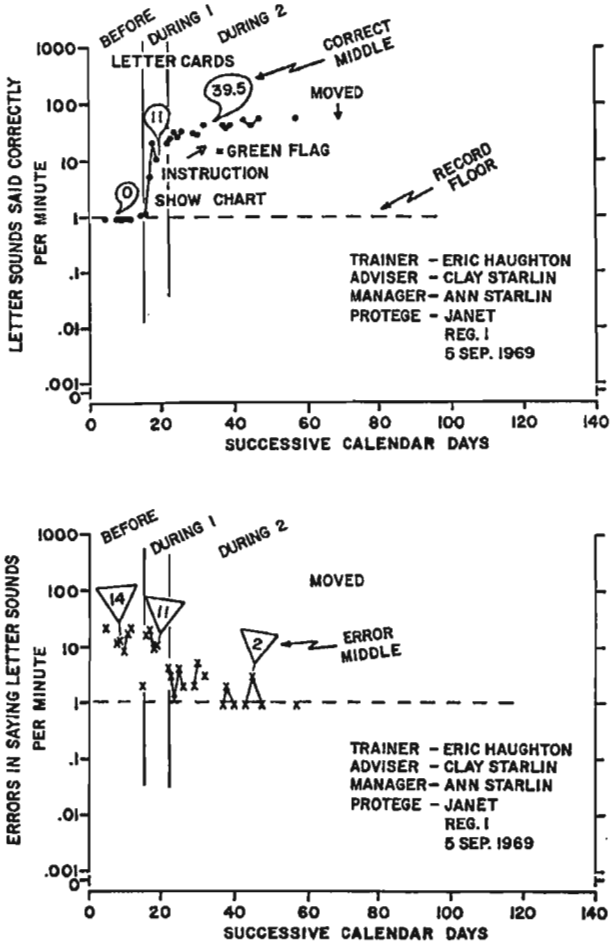
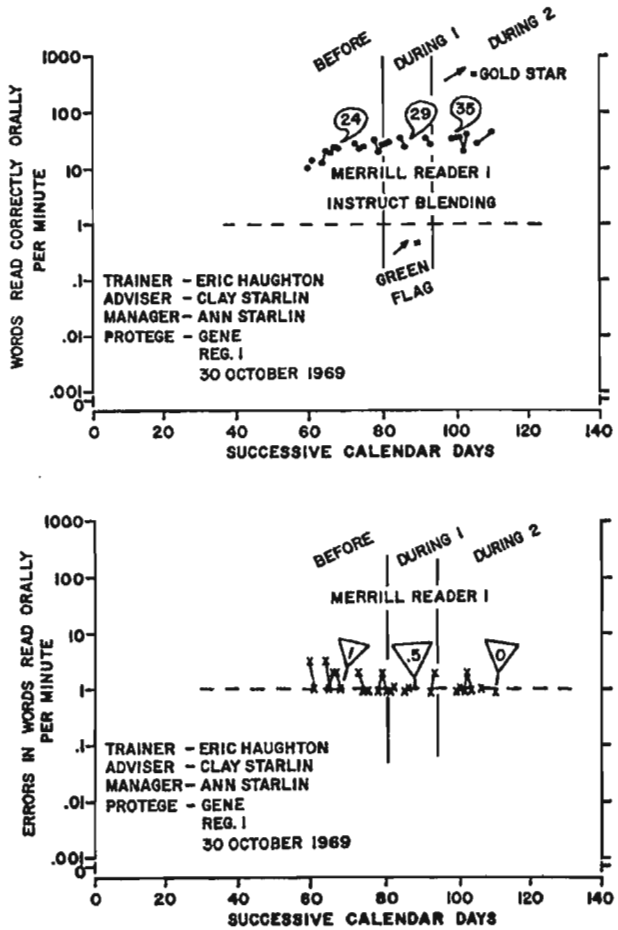


FIGURE 8

GENE REPRESENTS THE CLASS "BEFORE" PHASE PERFORMANCE IN ORAL READING, AFTER YOUNGSTERS HAVE BEEN MOVED TO ORAL READING, UPON ACHIEVING A PROFICIENCY LEVEL OF 40 SOUNDS/MINUTE CORRECT



The projects from the first grade class are most likely influenced by the fact that the proficiency standard of 40 sounds/minute correct and 2 or less errors had been established on a trial basis at the beginning of the year, based on public school and remedial clinic data from the previous year. Consequently, both the teacher and the youngsters were aiming for these proficiency levels. However, all youngsters in the class did achieve these proficiency levels, even a little girl who had been "IQ tested" retarded before entering the first grade. The "last five day middles" interquartile range for the 24 youngsters was from 41 to 50 sounds/minute correct indicating that 40 sounds correct/minute was by no means unreasonably high.

To have the greatest confidence in recommended letter sound proficiency levels, large groups of youngsters are needed who have achieved various levels of correct letter sound performance (10, 20, 30, 40, 50 sounds/minute correct) with a low error rate, and then move these various groups on to blending and oral reading and see which youngsters achieve proficiency in the next skill the quickest.

For example, those youngsters who achieved the letter sound proficiency levels of 40 sounds/minute correct and 2 or less errors were then given some instruction in blending and were started in an oral reading project. Gene's performance presented in Figure 8 represents the class middle in terms of words read correctly/minute in the before phase of the oral reading projects, although Gene's middle oral reading error rate of 1 per minute was one less than the class error middle of 2 per minute.

The performance picture of these first grade youngsters as they move toward oral reading proficiency should be monitored and compared with other groups of youngsters who moved on to oral reading projects at different letter sound proficiency levels.

As more and varied types of proficiency related data are collected, it is also quite possible that we may run into situations such as: finding

that youngsters who were moved to blending projects after achieving 40 sounds/minute correct achieved blending proficiency a week sooner than a group of youngsters who moved to blending from 30 sounds/minute correct, yet the 30 sounds/minute group spent two weeks less on letter sounds, thus totally they reached proficiency in blending a week earlier than the 40 sound/minute group.

There are many questions such as the ones raised above that are in need of very refined and controlled investigation. It is the author's hope to undertake some of these investigations in the very near future.

The proficiency levels for projects that only concentrate on one portion of the letter sound area (e.g., digraphs, vowels, or consonants) appear to be approximately the same as those recommended for the inclusive letter sound projects. For example, Figures 9 and 10 present projects done in the remedial reading clinic, where only short vowels were recorded (Figure 9) and only consonant sounds were recorded (Figure 10).

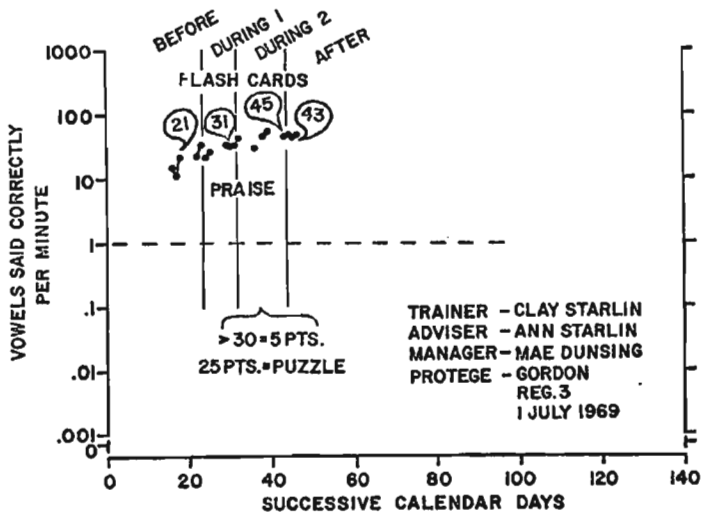
Blending

Initially, a good deal of indecision existed on the author's part concerning what the most practical and functional project pinpoint should be for the blending area. Thus there is a considerable amount of variation in the types of blending related movements that have been recorded. For example, Figure 11 presents a project using words from the Hegge, Kirk and Kirk Remedial Reading Drills (1965) with the recorded movement being "words" blended correctly and incorrectly.

Other blending dimensions besides whether the basic pinpoint should involve words blended or sounds blended also developed. For instance, there is a difference between requiring a youngster to blend the sounds as isolated units and continuing one sound into the beginning of the

FIGURE 9

EXAMPLES OF MORE REFINED PINPOINTS
IN THE LETTER SOUND AREA



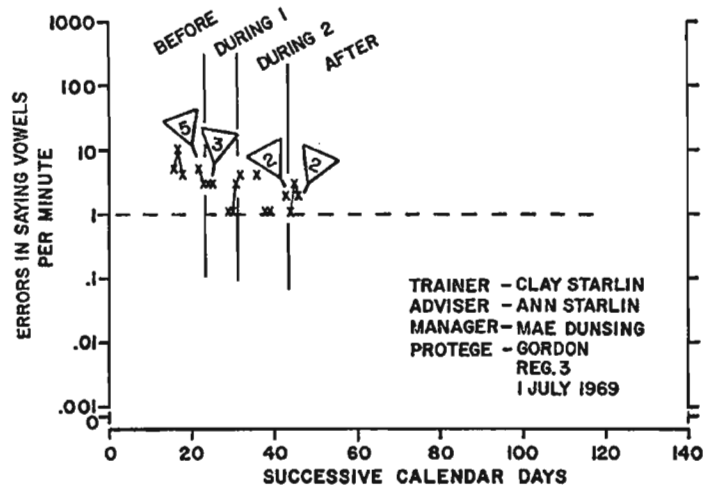
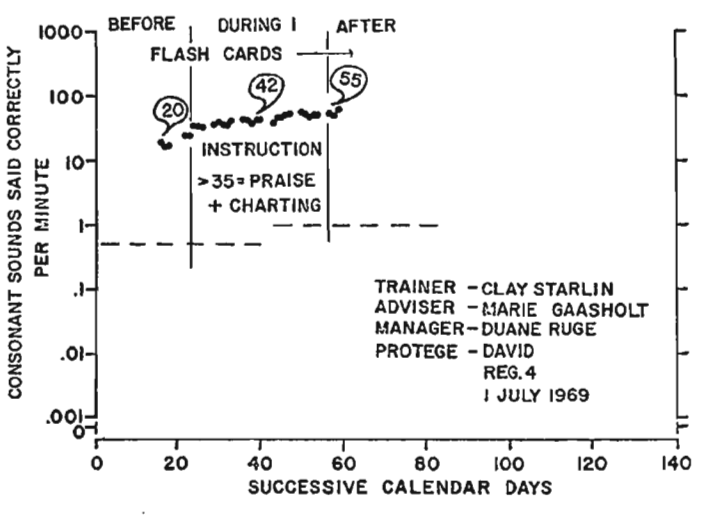


FIGURE 10

EXAMPLES OF MORE REFINED PINPOINTS
IN THE LETTER SOUND AREA



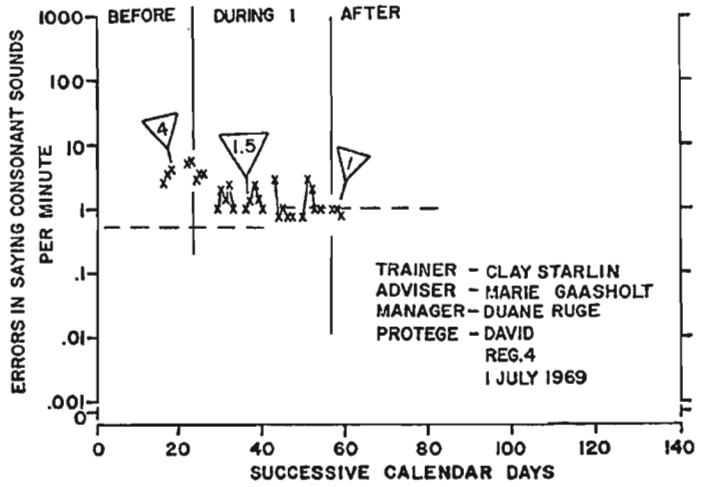
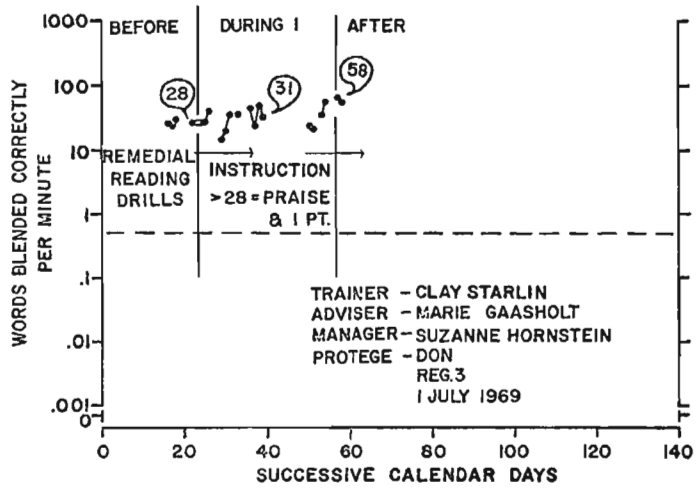


FIGURE 11

PINPOINTING "WORDS" READ IN THE BLENDING AREA



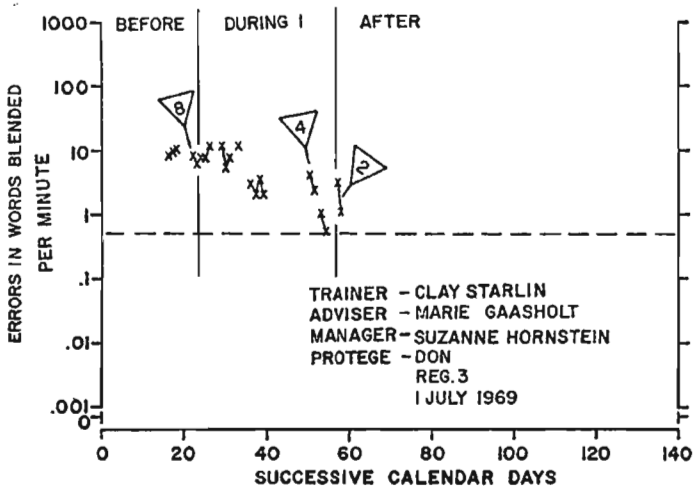
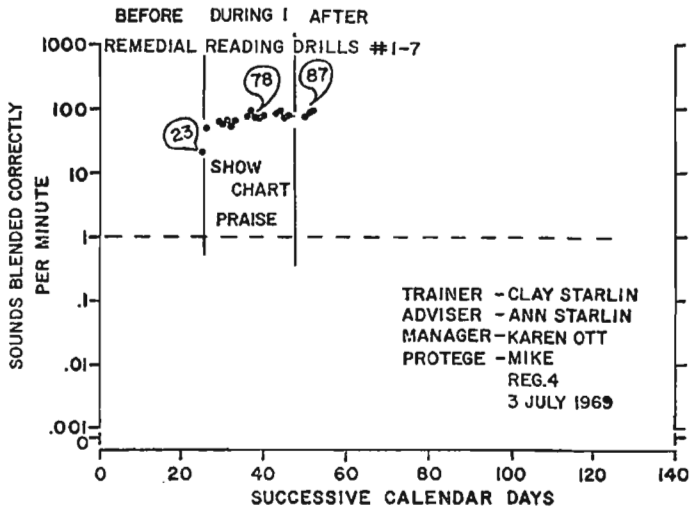
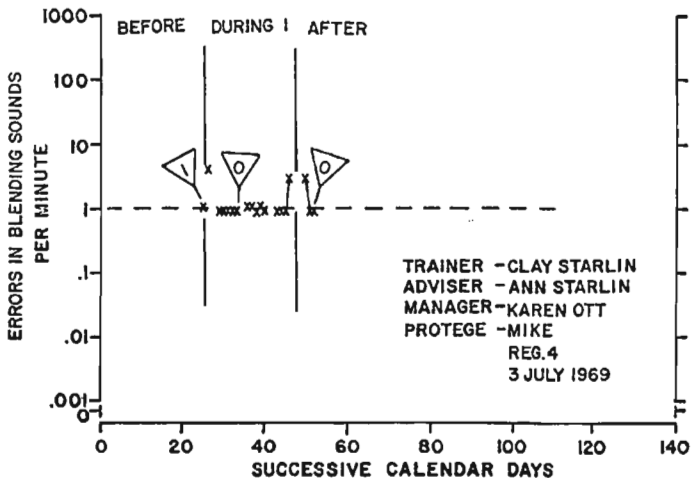


FIGURE 12

IDENTIFYING LETTER SOUNDS BLENDED IN SEQUENCE AS A BLENDING PROJECT PINPOINT





next sound. Since the youngster has learned the sounds in isolation some persons might assume that isolated blending is a logical intermediary between practicing sounds in isolation and continuous blending.[14] Engelmann (1969) adds another dimension when discussing fast and slow blending as variations of continuous blending. However, it appears that these blending dimensions can be handled through instructing (Engelmann, 1969) without the necessity of separate charted projects.

The reason for the basic project pinpoint in the blending area (letter sounds blended correctly and incorrectly in sequence) is to ascertain that in fact a pupil does blend the sounds in the correct sequence, and to ensure that the specific sound errors—if any—the youngster is making while blending, are identified. Such specificity enables better tailoring of the remedial instruction to the particular needs of individual students. Thus, if a youngster blends *p-ĭ-t* for *p-ă-t* the count would be two correct and one wrong. If sounding short i for short a in blending is a common error pattern, this knowledge provides some precise diagnostic information.

Because of the experimentation involved in trying to identify a precise blending project pinpoint, only five projects with the designated project pinpoint were available. The range of the "last five day middles" for these projects is from 37.5 to 136 letters blended correctly in sequence/minute and from 0 to 4 errors/minute. The middle correct performance was 85, for errors it was 3.

Three adult projects very tentatively suggest that optimum performance in the basic project area is between 180-200 sounds blended correctly in sequence per minute and two or less errors per minute.

To obtain a rough estimate of what student performance in the blending area should be, the ceiling adult correct performance was divided by two giving 90-100 sounds blended. It is the combination of this estimate and the middle of the student data discussed above that underlies the recommended proficiency levels of 90 letter sounds blended correctly in sequence per minute and 2 or less errors per minute.

The project done with Mike (presented in Figure 12) is representative of the five student projects to which the author had access. Mike's middle correct performance in the "after" was 87 sounds blended in sequence and the middle error rate in the "after" was 0.

As in moving from letter sounds to blending, the assumption is that a youngster should achieve and maintain a level of proficiency in blending before being moved on to oral reading. However, again analogous to the letter sound area, information is needed concerning what performance level of reading words orally youngsters achieve and how quickly they achieve them when they move to the oral reading area from different blending achievement levels (e.g., 20 sounds blended in sequence correctly, 30, 40, 50, 60, 70, 80, 90, 100).

Oral Reading

Two hundred and eighty public school oral reading projects were available to be analyzed. Again the procedure of taking the middle of the last five days of both completed and ongoing projects was incorporated. The correct performance range of these middles was from 35 to 224 with an interquartile range from 98 to 149. The error range varied from 0 to 13 with an interquartile range of 1 to 4. The middles of the correct and error distributions were correct 124 words read/minute and 2 errors/minute.

Combining the above information with that from five adult oral reading projects which suggest oral reading ceiling levels to be between 300 to 350 words correct per minute (depending on technicality of material) and a bottom level of one error per minute, the recom-

[14]The answer to this assumption will have to await more performance data than are available at the present time.

mended oral reading proficiency levels are 100 to 120 words per minute correct and 2 or less errors.

Fairly consistent reading patterns have appeared in the collected oral reading data. One common pattern is the youngster whose correct performance falls between 15 and 30 words correct per minute and whose error rate is in the vicinity of 4-8 per minute or higher. (For example, note the correct and error performance of Mike in Figure 13.) This performance is very much of a remedial nature. Such students characteristically have not mastered some of the prerequisite reading skills or need some systematic instruction on reading from left to right, discriminating letters, and so forth.

A second common pattern is the pupil who hovers around 50 words correct per minute and whose error rate is frequently around 2 to 4 per minute. Such a performance picture is illustrated in Figure 14. Youngsters with this type of pattern seem to be on the launching pad needing the ignition to break through what seems to be a type of barrier between being an ineffective remedial reader and progressing on the way to be remediated. The error rate is typically not too serious with this performance pattern, the main difficulty being that the youngster for some reason (e.g., slow blending, hesitating on words, or repeating words) still finds attack of words in context tedious.

In terms of the correct performance picture, breaking through 50 words correct/minute appears to be a very difficult task. However, once this has been accomplished with some consistency, it is often only a matter of motivation and practice until the protege reaches an oral reading proficiency of 100 words correct/minute. There are, of course, individual differences in the rapidity (i.e., the steepness of the acceleration slope) with which different pupils move from 50 to 100, but the slope most often seems to be on an upward incline. Figure 15 demonstrates one pattern of such progress, although David

had not quite reached 100 words per minute correct by the time the school term, and thus the project, ended.

Figure 16 represents the performance of David, a fourth grader who was proficient in both oral reading correct and error performance from the beginning of the project in November until the last four data points were collected in June. It is this type of performance that public school youngsters should be exhibiting in their grade level reading material.

The maintaining of oral reading proficiency for a period of one to three weeks in a given material is often a very appropriate criterion for moving a student up to more difficult reading material. As can be seen by David's chart, three such material change decisions were made by the teacher with no appreciable drop in correct performance or rise in errors.

Once intermediate grade level (fourth, fifth, and sixth) youngsters have demonstrated consistent, proficient oral reading for a reasonable length of time (a month) in grade level material or above, this might legitimately serve as a criterion for moving the emphasis from oral to silent reading, although it is probably desirable to make periodic oral reading checks even through the twelfth grade. With such checks it would then be possible to assure that a youngster's word attack skills were not breaking down as the vocabulary and content of their reading material became more sophisticated.

Sight Words

As briefly mentioned in the project pinpoint section, it is probably most efficient to have an irregular sight word project if the protege has been provided with the skills to sound out regular words. Although to facilitate greater speed, practice on regular words as part of a sight word project may be most helpful.

FIGURE 13

A COMMON PATTERN
OF A VERY REMEDIAL READER

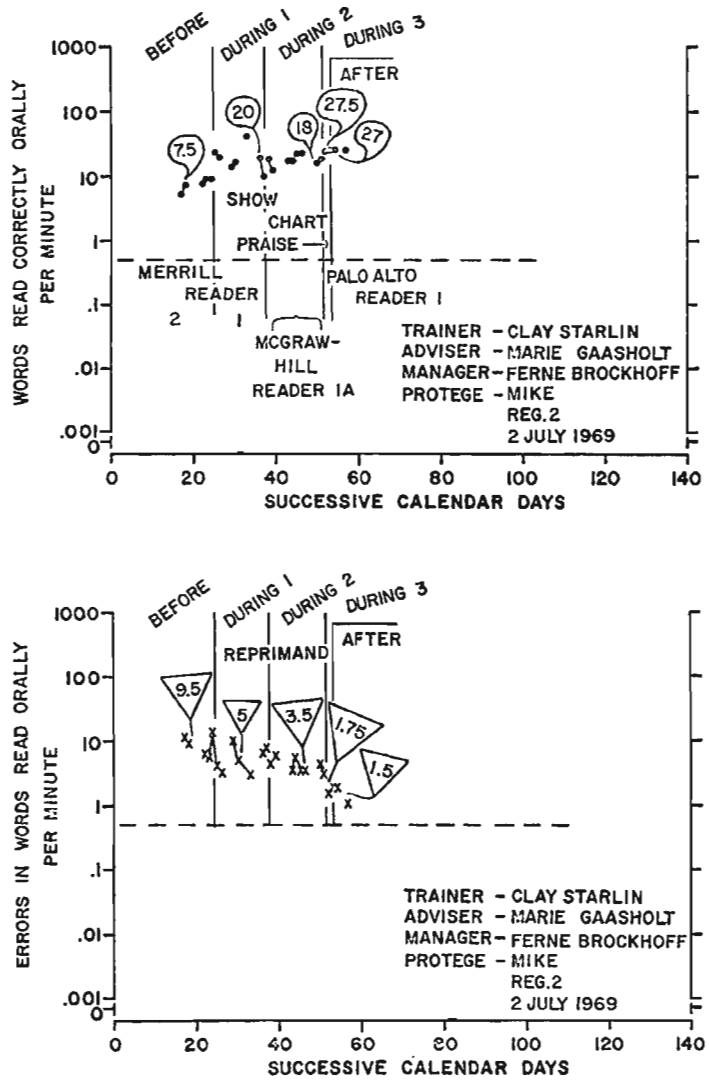


FIGURE 14

THE READING PERFORMANCE PICTURE
OF THE YOUNGSTER WHO LACKS
PRIMARILY SPEED AND FLUENCY

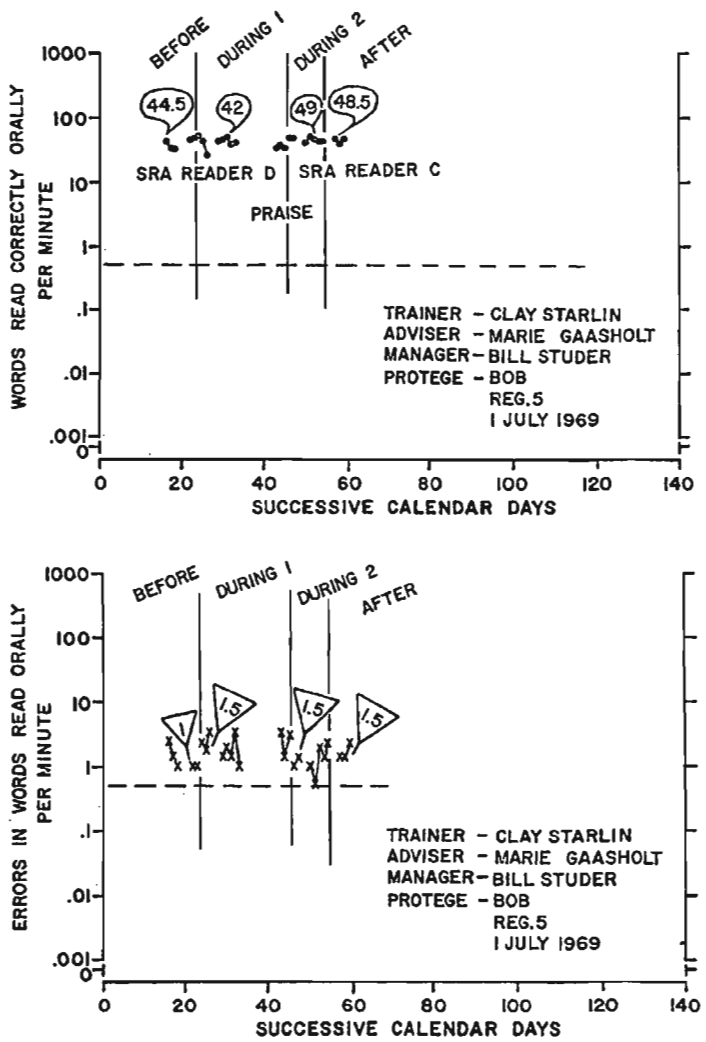
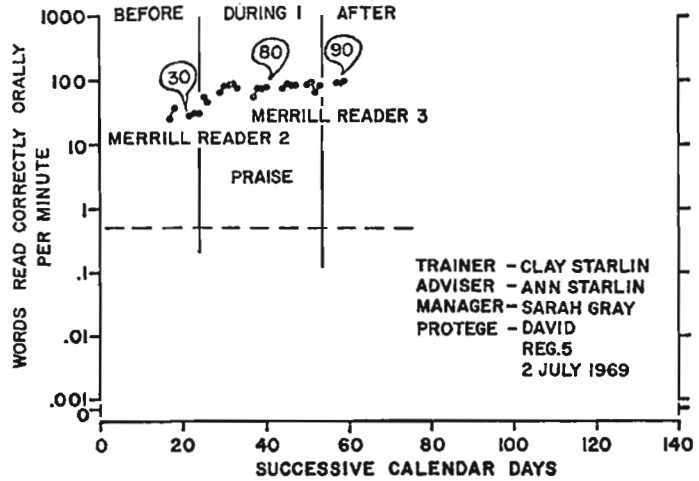


FIGURE 15

DAVID NEARS PROFICIENCY
IN MERRILL READER 3



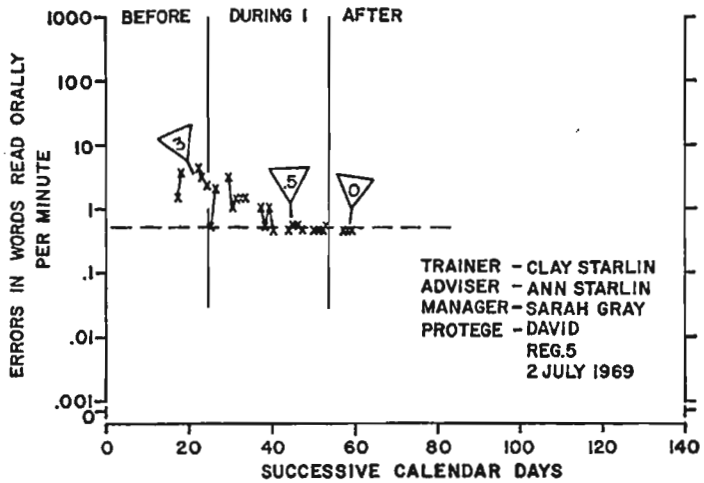
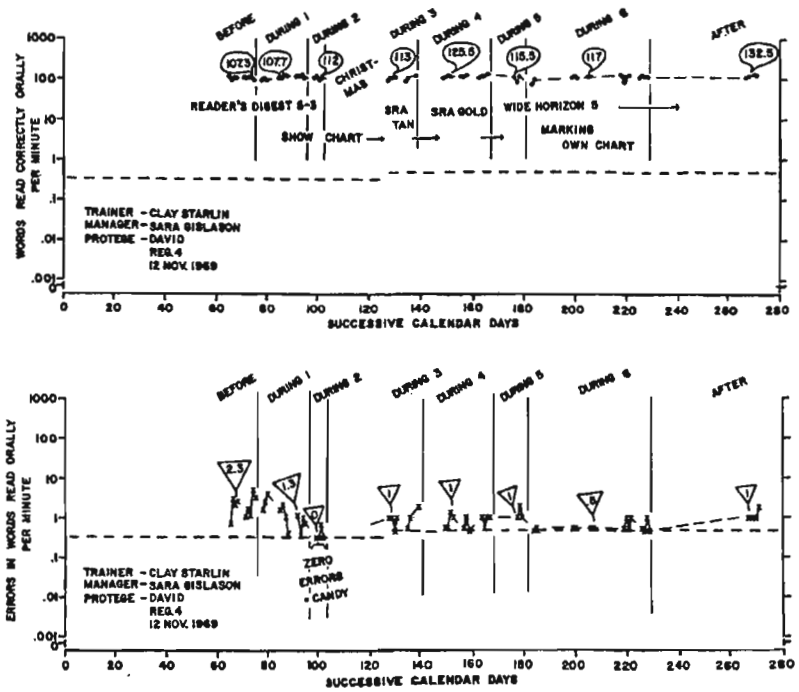


FIGURE 16

A PICTURE OF A PROFICIENT ORAL READER



The ceiling and bottom adult performances with a flash card presentation using something like the 220 Dolch basic sight cards (Dolch, 1949) appears to be very close to the adult ceiling in letter sounds, a little better than 100 words per minute correct and one or no errors. Also, as in the sound area, it is possible to increase the correct performance by approximately 50 per minute by placing the cards on a table or listing them on a sheet of paper. This relation between the sight words and sounds might be explained by the fact that most of the words in the basic Dolch list are single syllable words. As pointed out earlier, the amount of time to say an isolated letter sound or a single syllable word is nearly the same. No data has been collected by the author yet, but it is very likely that the ceiling level will lower slightly as the sight words used move from one syllable words to two syllable to three syllable and so on.

Fifty-three student sight word projects ranged from 7.5 to 89 words said correctly per minute with a 0 to 13 error per minute range. The interquartile range for correct was 25 to 61, while the error interquartile was 0 to 3. A middle of the "last five day middles" was computed to be 40 words said correctly per minute and 2 word errors/minute.

Unfortunately, all 53 of these projects are from the remedial reading clinic. This means that the distribution of "last five day middles" and descriptive summary is likely biased toward lower performance.

Taking into account the fact that all the student projects available were the performance of remedial youngsters, and using the rule of thumb of dividing the adult ceiling performances by two to approximate student proficiency performance, a recommended figure for sight word proficiency levels is 50 or more words said correct per minute with 2 or less errors per minute.

Figure 17 is a representative sight word chart showing Bob moving from a middle of 35.5 Dolch words correct in the before phase to a middle of 50.5 in the after phase. Bob's error chart indicates that he

maintained his errors at or below the recommended proficiency level throughout the project. Figure 18 shows Jeff's performance in a somewhat more refined pinpoint within the general sight word area. As in Bob's case, Jeff did not achieve correct proficiency until near the end of the project; however, in many cases reaching and maintaining a proficiency level are the criteria for ending a project in an area and moving on to another task or skill.

Proficiency Summary for Basic Project Pinpoints

Directly below is a summary of the recommended correct and error proficiency levels for the four basic project pinpoints.

Pinpoint	Correct	Error
letter sounds said	40/minute	2 or less/minute
letter sounds blended in sequence	90/minute	2 or less/minute
words read orally	100-120/minute	2 or less/minute
(irregular) sight words said	50 or more/minute	2 or less/minute

In Figure 19 the estimated ceiling, bottom, and proficiency levels for the four areas are presented on the behavior chart grid to give a summary picture of what the data say. This information can provide guidelines in setting reading goals with students.

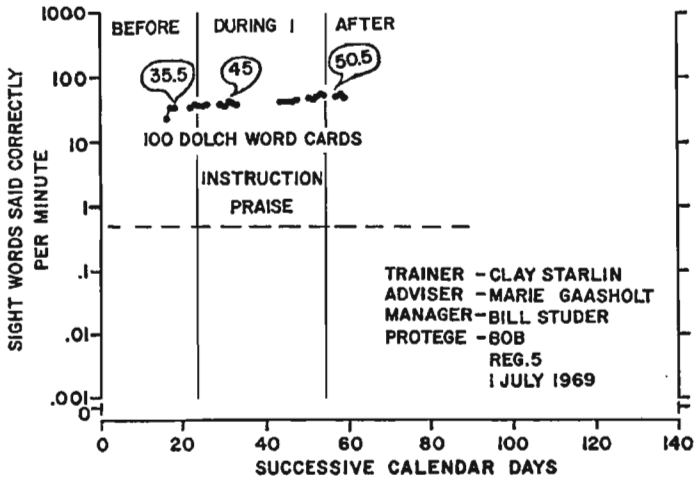
Fluency

The third dimension of reading proficiency, fluency, merits a brief discussion in terms of some of the possible project pinpoints that will enable having some index of this dimension.

Repetitions. Most of the fluency related projects are of the deceleratic type, noticing that a protege is doing something that interferes with his fluency which needs to be eliminated. As an example, the word repeti-

FIGURE 17

BOB ACHIEVES PROFICIENCY
IN SAYING ISOLATED SIGHT WORDS



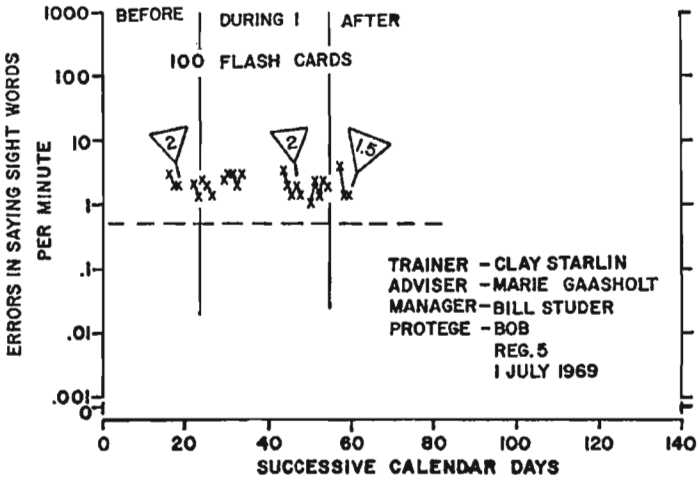
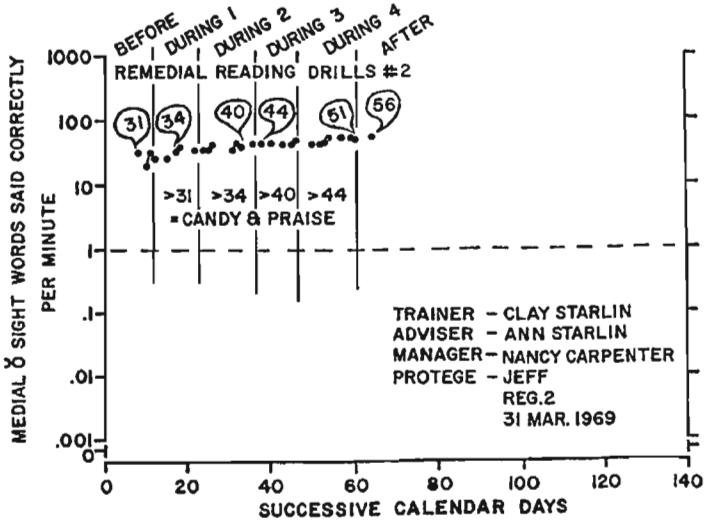


FIGURE 18

REFINING A PINPOINT IN A SIGHT WORD PROJECT



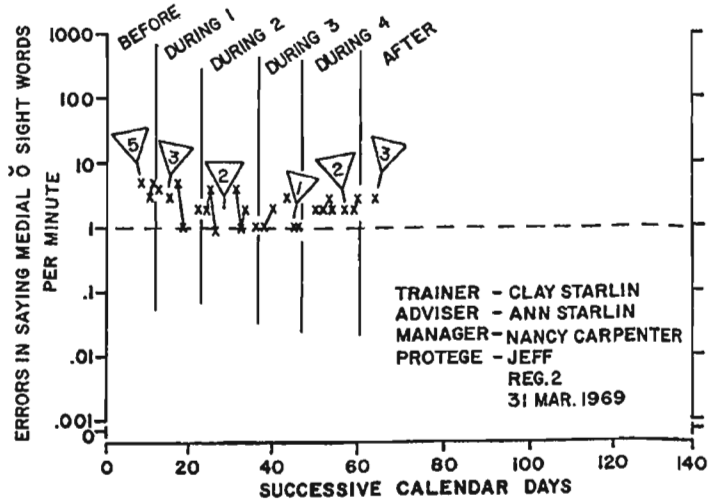
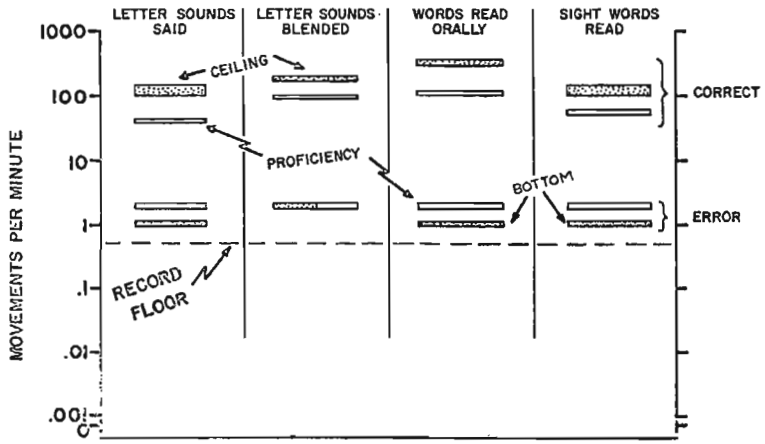


FIGURE 19

A SUMMARY PICTURE
OF THE BASIC READING PROJECT
AND PROFICIENCY LEVELS



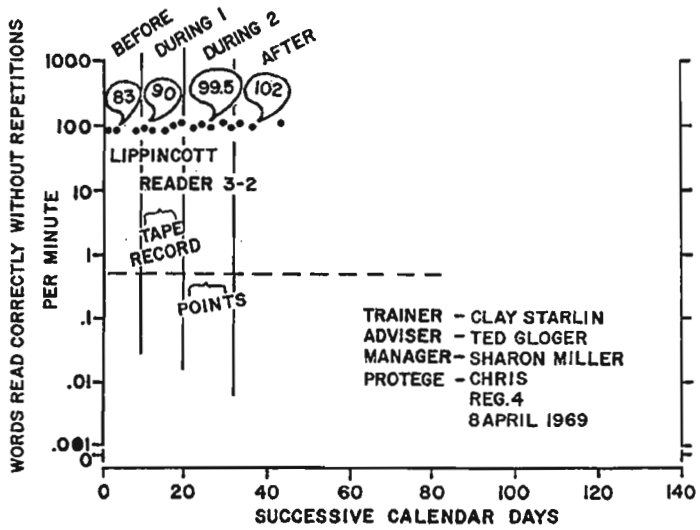
CEILING, BOTTOM AND PROFICIENCY LEVELS

tion project presented in Figure 20 demonstrates an interesting relationship between oral reading without repetitions and the repetition rate itself. Chris was repeating words at a rate of three per minute in his oral reading in the "before" phase. As his repetitions decreased (to zero) his oral reading rate (without repetitions) increased to a proficiency level.

Hesitations. Another fluency related project on hesitations is presented in Figure 21. The hesitation dimension is tricky for two reasons. One is because a hesitation is not a response but rather the ab-

FIGURE 20

A RELATIONSHIP BETWEEN ORAL READING FLUENCY
AND REPEATING WORDS



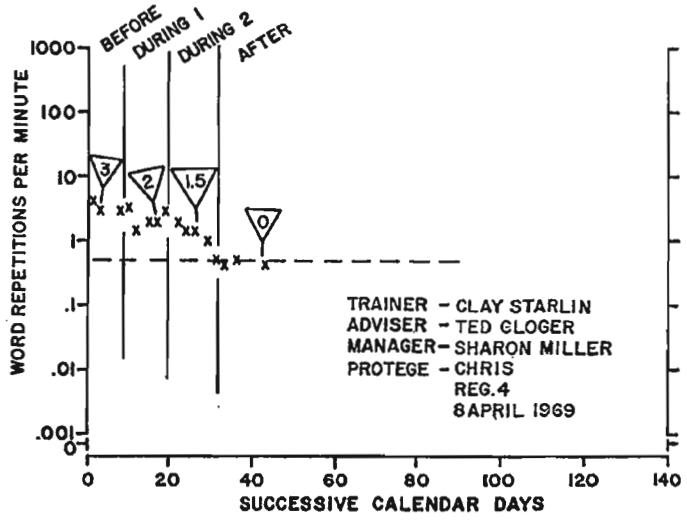


FIGURE 21

AN EXAMPLE OF RECORDING ORAL READING HESITATIONS

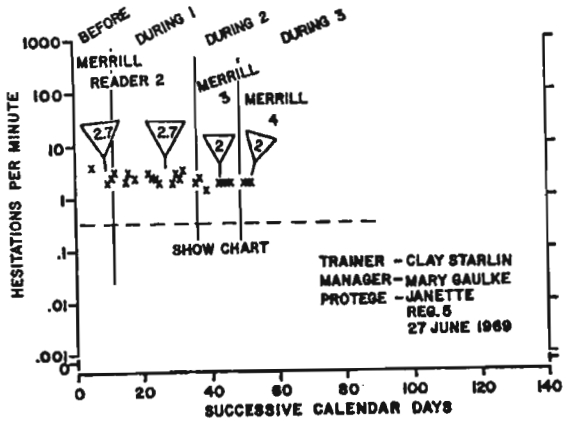
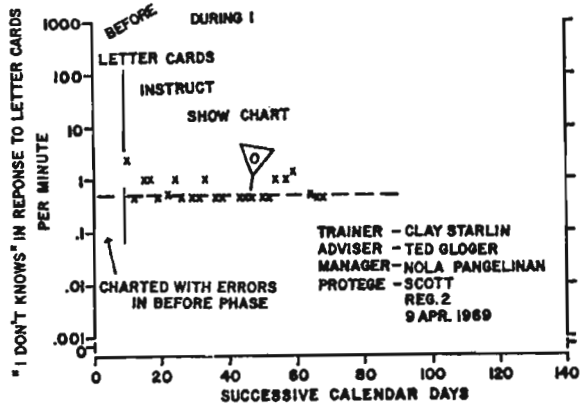


FIGURE 22

IF SCOTT DIDN'T KNOW, HE SAID SO



sence of a response for a certain length of time. Second, it is necessary to make somewhat of an imprecise judgment as to how many seconds of delay constitute a hesitation and then to consistently get a count when a hesitation occurs. With these cautions in mind in interpreting such projects, it can be seen that Janette dropped from three hesitations a minute to two and then remained stuck at two per minute for the rest of the project. There will always be a per minute ceiling on all hesitation projects because, for instance, the greatest number of five second hesitations a youngster can have in a minute is 12.

"I don't know." Finally, Figure 22 presents a record of Scott's "I don't know" responses. When Scott encountered a letter for which he did not know the sound, he said "I don't know." It is important to distinguish an "I don't know" response from an error response for these are very definitely different movements and in a number of cases suggest different remedial tactics. If a youngster is making "I don't know" related comments, this will influence his fluency as well as his speed.

RECORDING THE READING SKILLS

The recording plan and suggestions presented in this section enable us to achieve the greatest general application and practicality and still be as functionally precise as possible.

General Recording Suggestions

There are some general points concerning obtaining records in the reading skill areas that are important to keep in mind. These general points are listed immediately below. Following this general list are some specific suggestions for recording in each basic project area.

Do not let a close approximation of a correct response pass for a correct response. This is not a favor to the youngster for the responses as correct may decelerate the introduction

of needed practice or instruction.

Do not let a youngster practice on exactly the same material he will be performing on in the time sample just before the time sample. This is like taking the test just before taking the test.

If a youngster exhibits a good deal of unusual behavior when being timed, offer a simple explanation of why time is an important segment of mastery. Then possibly try timing everything to help the youngster adjust to being timed. Let him time you on some things so he knows it is a two-way street.

Try not to become terribly upset if something interrupts a time sample. It is, of course, desirable that no interruptions occur. But, if the youngster drops part of the material necessary for him to perform the movement being recorded,or someone enters the room unexpectedly, the time sample can always be started over again.

If the protege is distracted for a few seconds when individual reading data are being collected and if a cumulative stop watch is being used, the watch can be stopped while the student is distracted and then resume the timing when he is attending.

Do not stop the record before the time sample is completed or 10 or 15 seconds after the planned sample is over just because a youngster happened to finish a sentence in his reading or got through the flash cards once. All the responses must be counted in *only* the specified time sample to maintain reliable records for making educational decisions.

There should always be more material present than a pupil will be able to finish during the time sample. This guarantees that a performance ceiling is not imposed on the student's performance by the fact that he finished all the material available before the time

sample was over. In projects that involve such things as flash cards, if the youngster finishes the set once, he can just start over again.

If a time sample finishes in the middle of a story or in the middle of a page of sight words, it is of course permissible and in many cases desirable to let the youngster finish the page or story where the time sample ended is marked.

The achievement and maintenance of the proficiency standards in each area should be used as criteria for moving from one skill to the next on the skill ladder (e.g., from sounds to blending) or moving from Dolch set I to Dolch set II or moving from one book to the next most difficult book.

Remember to have a "before" and "after" for each project and as many "durings" as are necessary to reach proficiency. Five or seven days are usually the minimum number of days necessary in the "before" and "after" to obtain an accurate picture of the performance in these periods. Fifteen days is often the maximum number necessary in a "before" or "after" phase. The number of "durings" and the number of days in each "during" will of course depend on what types of educational decisions are being made based on the collected data.

Since the time sample is an attempt to obtain an indication of a pupil's independent performance, it is usually desirable not to introduce instructional or motivational procedures during the time sample. Educational intervention in the project area should occur during the other program time that is reserved for work in the area.

It is desirable to have a one minute time sample whenever possible for this eliminates the necessity of dividing to get the per minute rate statement. In the letter sound and sight word projects, a one

minute time sample has proved to be quite satisfactory. In many cases a one minute sample may also be sufficient for the blending and oral reading areas, but other times a youngster needs a little longer to respond.

A sweep hand on a wrist watch or wall clock, a direct reading clock, or a stop watch are a few of the devices available to assure an accurate time sample.

Letter Sounds

Characteristically the presentation procedure for the letter sound objects has been through flash cards. The letter forms (upper and lower case) are placed on flash cards and the protege is asked to respond when each card is presented. Those that are responded to correctly are placed in one pile while those responded to incorrectly are placed in a separate pile. After the one minute time sample is over, the number correct and the number of errors are determined and the per minute rates are placed on the chart.

It is also possible to have a sheet with the letter forms on it and to point to each letter and request the sound. If a separate identical sheet is kept by the recorder, the start and finish place can be marked on this sheet and errors can be indicated by placing a small *e* over them.

A suggested procedure for introducing the letter sounds is presented on the next page in terms of the first eight phases.

Blending

The author has found that one of the best materials to use for a blending project is the Hegge, Kirk and Kirk Remedial Reading Drills (1965). These drills actually have the words separated at the top of each drill to encourage blending. The drills range from those containing regular three letter medial short vowel words (cat, sit, cut) to the introduction

Before	During 1	During 2	During 3	During 4	During 5	During 6	During 7
common consonants B,b,C,c, D,d,F,f, G,g,H,h, J,j,K,k, L,l,M,m, N,n,P,p, R,r,S,s, T,t,V,v, W,w,Z,z.	common consonants	introduce short ă, ă	introduce X, x	introduce short ĭ, ĭ	introduce Y, y, Qu, qu	introduce short ŭ, ŭ	introduce short ŏ, ŏ

Movement: letter sounds

of more difficult sound combinations (sion, aught, ook). Of course, any list of regular words can be used as the material for a blending project. The youngster should blend the word rows from left to right to give him practice in the motion necessary for reading, rather than allowing him to go up and down a list. Having a duplicate drill book or word list again enables the recorder to mark where the youngster began and ended and indicate what letters he blended incorrectly. The error count is then subtracted from the total number of letters covered in the time sample to get a correct and error count. If the time sample was two minutes, divide the correct and error counts by two. If it was a one minute sample, it is not necessary to divide.

A suggested plan for the first seven phases in a blending project is indicated below.

Before	During 1	During 2	During 3	During 4	During 5	During 6
three letter short ă words (cat)	short ă words	short ĭ words (sit)	short ŭ words (cut)	short ŏ words (not)	regular words with digraphs (when)	short ĕ words (fed)

Movement: letters blended

Oral Reading

Again, if the person obtaining the record in the oral reading area has a duplicate book, he can keep track of the start and finish time and the word errors and also maintain a permanent record. It is considerably more efficient in obtaining the word count if a class member, aide or mother helper has previously gone through the books and lightly written in a cumulative word count for each sentence as well as a total count per page.

Because publishers are not standardized in their criteria for grading the various reading series, it is difficult to know what book of what particular series would be most appropriate for a given youngster. Even knowing a grade level from the nonperformance-based achievement tests does not help, for the 2-2 book in one series may be considerably more difficult than the 2-2 book in another series. The best solution to this problem is to make the best estimate of a youngster's reading grade level and then screen him on one or two available books at this level and on two or three books a half or full year below this estimate. This screening should continue throughout the "before" phase. The book in which the youngster attains the highest middle correct rate and lowest middle error rate is the one that should be continued into the first "during." An example of this record keeping procedure is shown in Table 1. The circled correct and error rates on Table 1 indicate the middle performances for the four readers over the five-day "before." Based on these "middles," Sherri performed the best in LET'S READ, Book 1, although her performance was very remedial in all the books.

Once the book to be used in the first "during" has been determined, work to establish and maintain oral reading proficiency in this book. Once this has been accomplished, move to the next most difficult book, establish proficiency in this book, move on to the next, and so on.

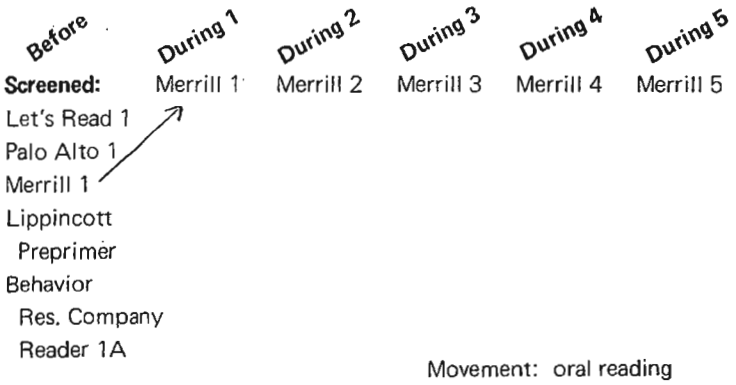
TABLE 1

A RECORD OF SCREENING AVAILABLE BOOKS IN THE "BEFORE" PHASE TO DETERMINE THE MOST APPROPRIATE ONE FOR SHERRI

Correct and Error reading rates for 5 days on 4 readers.
Manager: Faye Hammarback
Protege: Sherri, 6 years old
Time Sample: 2 minutes

Reader	Correct		Error	
	Count	Rate	Count	Rate
Let's Read 1	18	9.	2	1.
	17	8.5	3	1.5
	19	9.5	4	2.
	6	3.	6	3.
	14	7.	5	2.5
SRA				
A Pig Can Jig	19	9.5	7	3.5
	11	5.5	9	4.5
	1	.5	19	9.5
	2	1.	11	5.5
	8	4.	8	4.
Singer 1A				
A Fat Cat	20	10.	3	1.5
	11	5.5	14	7.
	10	5.	19	9.5
	13	6.5	7	3.5
	16	8.	9	4.5
Lippincott				
Preprimer	21	10.5	6	3.
	4	2.	20	10.
	3	1.5	11	5.5
	3	1.5	10	5.
	10	5.	6	3.

Following is an example of what the phases might look like in terms of material used in an oral reading project.



Sight Words

As in the letter sound area, the sight words can either be presented by means of flash cards or on a sheet of paper. The recording procedures for obtaining the correct and error count are the same as discussed in the letter sounds area. It is suggested that the "before" phase and first "during" involve one-, two-, and three-letter irregular words such as ***I, we, are.*** The second "during" might involve three- and four-letter single syllable irregular words (own, tree, pony). The third "during" could include two-syllable irregular words (into, table), and the fourth "during" can extend to three- and four-syllable words.

Recording Summary

Even with some of the practical short cuts suggested, it is obvious that there is potentially a tremendous amount of time that can be invested by a teacher in obtaining the precise information that is necessary to evaluate and individually tailor a program for each youngster in the oral reading areas.

It is because of this time factor, as well as other reasons, that it is extremely important that the children be taught to record and chart their own performance rates. There is neither time nor space in which to go into the details of how this can be accomplished. However, there is a mimeographed handbook available from the author (Starlin and Starlin, 1969) that explains how the charting and recording can be taught to young children. First grade youngsters have learned (Starlin, C., in press) and are learning (Starlin, A., 1969) to use and record on the behavior chart. Therefore, if first graders can record and chart their own performance rates, all public school youngsters from first through twelfth grades should be keeping their own precise records.

YOUNGSTERS COMMENT ABOUT PRECISE READING

As with many educational innovations, there has been some controversy over the appropriateness and goodness of using Precision Teaching procedures to evaluate youngsters' performance and the feasibility of youngsters doing their own recording and charting.

Unfortunately, we as adults (as teachers particularly in this case) have certain histories which have created attitudes, beliefs, and assumptions about the appropriateness or difficulty of some material or procedure for school age children. By the very fact that these expectations of childrens' reactions are so frequently based on beliefs, it is difficult to collect qualitative data such as students' comments on how the students themselves react to the material or procedure. That is, the procedure may prove to be very helpful to the student regardless of how it was "thought" he would react.

The concern about "kids won't be able to read the charts," "youngsters will get upset when they are timed" and "kids will get upset if they don't see progress on the chart every day" has not been substantiated by either the youngsters' comments or by their actual performance.

As a matter of fact, the appropriateness of including reading in the school curriculum, which is usually not even subject to debate, was questioned by first grader Dean in a conversation he had with his teacher.

Teacher: "You know, Dean, you're almost to forty sounds a minute and, as soon as you get there, you can start to read."

Dean: "I don't want to learn to read."

Teacher: "Well, what did you come to school for?"

Dean: "Learn about the chart."

Another comment made by Dean when he moved from 20 to 30 sounds per minute from one day to the next was "Gee, going fast is really fun."

All the youngsters in a fourth grade room were asked to state their reactions to and describe the precise reading program they were involved in during their fourth grade year. The description and reactions of David, one of the class members, is presented below.

November 12, 1968 was the first day the fourth grade class at Ida Patterson in Eugene, Ore. did thier "Timed Reading" where you read to a helper for 3 minutes and the helper counts the errors and words then divides it by 3 to find how many words or errors per minute.

We the fourth grade class had fifth and sixth grade helpers. 7 peoples from our room went at one time because there were 7 helpers.

Some of us were reading in about fourth or fifth grade readers.

But a few of us were reading in Readers Digest at IRI (Informal Reading Inventory) level.

The week before Christmas Vacation the teacher (Mrs. Gislason) offered everyone who made zero errors a small piece of candy. That week of reading I noticed a big change in our reading, everyone started being more cautous in there reading and realy tried hard to get zero errors. Our teacher said she was seeing how many could make less errors but still stay close to thier average of words.

After Chrstmas Vacation the Teacher asinged 8 helpers from our own room. Each helper helped two people then two helpers got together and one helper read to the other helper then the other helper reads to the one who read before, it works pretty well. Also after Chistmas Vacation we decreased our reading time to two minutes instead of three.

Some of my feelings about this are: I feel that this useful and that we all have made much progress.

By a fourth grade helper and reader, David

One of the fourth grade helpers referred to in David's description made a number of interesting comments also.

Melora: "When we changed to a 2-minute time and after Christmas Vacation, some of my students' errors went up and words went down. But they soon recovered."

"I learned to use decimals and now I find it very fun to use them. I also learned how to use a chart; (and the chart was quite complicated) it was fun."

"I think this can tell the teacher who needs help on

oral reading and who doesn't."

Other comments by some other classmates were:

Dennis: "I think it improved my reading a hunderd persent."

Keith: "I have enjoyed filling out the chart and I have went up in my reading and down in my errors."

Deanne: "I think the 5th and 6th graders had something to be proud of. They now know how good the 4th grade class can read."

"I felt that this reading is good for me. Well I think it is good. Well I learned to be careful with my reading. Yes I think it is important to improve our reading."

Belinda: "At first to learn to chart it was hard but I cought on any way. And that's how it all happend."

Since all comments that have been accumulated from various youngsters could not be included, there was a selection bias operating in attempting to convey to the reader the variety of comments made, the humor in many, and the excitement and involvement that the youngsters begin to experience because they are such an integral part of their own education. In none of the 43 accumulated comments did a youngster say "I don't like" something about precise reading.

CONCLUSIONS AND IMPLICATIONS

The long range implications of using a standardized recording system, such as Precision Teaching, to look at reading and other curriculum areas is difficult to comprehend. Presently, all projects done using Precision Teaching procedures can be submitted to a national computer behavior bank in Kansas City, Kansas. There are presently over 3,500 projects stored in the bank (Linsley, 1969). Because of the standardized data and manner of submitting to the bank, the bank is able to, with increasing efficiency, store and retrieve more than 300 bits of information on each submitted project.

Because there have been relatively few studies done using pupil performance rates as the measure of reading performance, there are almost unlimited implications for future research. Following are examples of but a few researchable questions: 1) curriculum evaluation—what reading materials have proved to be most successful in achieving rapid acceleration in youngsters' correct reading performance rates; 2) have students achieved and maintained reading proficiency more rapidly by requiring letter sound, blending, and oral reading project; 3) what motivational procedures have been most effective in decelerating errors in letter sound projects; and 4) what instructional procedures have been most effective in eliminating a *b* and *d* reversal problem. There are many projects directed toward answering these and hundreds of other questions which need to be completed. Once these projects are completed and submitted to the bank, some highly sophisticated normative statements can be made about what instructional and motivational procedures have been most effective and efficient with what types and ages of youngsters in what situations in achieving reading performance proficiency, although we must still always be prepared to individually tailor for a given youngster in a given situation. Just because the bank said that in the 1000 projects in the sight word area, free time was found to motivate the most effectively, this is not a guarantee that this will be effective with every youngster, although this may be the first thing to try. The implications of Precision Teaching data in terms of communication are also very exciting. Having the same type of performance measure presented in visual form on a standardized chart enables teachers to share with each other those procedures that they have found successful and those that have been unsuccessful. All teachers can communicate to the

principal or a department head using a standard framework to evaluate teacher effectiveness. Given the performance rate data and the proficiency level information, teachers are able to make precise statements to parents in terms of report cards and parent conferences about where a student is in reading in relation to where he should be. Possibly most important, the system enables communication to the general public who support the schools. The general public is increasingly demanding some objective evidence of teacher effectiveness. Using the Precision Teaching chart, the teacher can show the public where a youngster was upon entering the teacher's classroom (the "before" phase), what things were done, *x* ("during" 1), *y* ("during" 2), *z* ("during" 3), and that the student achieved proficiency in the third "during" and maintained this after instruction was terminated (the "after" phase).

The recording and charting of pupils' performance rates should continue to serve, as it does presently, to decelerate excuses for youngsters not learning (e.g., blaming the home, labeling the child). With the precise performance information, the teacher knows exactly where a youngster is in relation to where he should be. With the resource of his own powers of observation and the benefit of information in the behavior bank, a decision on what educational procedures to use to reduce any discrepancy can be made. By continuing to collect the performance data, the results of the decision can be seen. If the first procedure was not successful, another can be tried until there is success. Thus, youngsters are no longer slow, fast, dumb, smart, mentally retarded, dyslexic or gifted, but rather have varying performance pictures in various areas, some of which are satisfactory, some of which are not. Those performance pictures that are unsatisfactory require accelerated remedial assistance, not excuses for not teaching the youngsters.

If education is to progress and become more of a science and less of a belief-based system, it is essential that educators incorporate the use of objective performance data to evaluate curriculum and teaching

techniques and make changes in these areas in accord with the data collected. Striving for this goal, one should remember that good data are those which describe the performance of a student, not necessarily the data that demonstrate the type of acceleration or deceleration desired. It is, of course, preferable that the desired effect and the data coincide but it is crucial that one remains astutely aware of the difference, not letting concern for the desired effect influence the quality of the data collected.

What has been presented in this chapter is a system for recording reading skill performance. Very little mention has been made of how one might go about remediating a reading problem. Rather, the reader has been given some information about what tentative proficiency standards may be in the reading skill areas and then given the tools to determine where in relation to these standards a given pupil or group of youngsters may fall. Part of the assumption upon which such an orientation is based is that in many cases half the battle of remediation is involved in knowing precisely and immediately that a particular remedial procedure did not work so something else may be tried. Teachers have known what to teach and how to teach in many cases for a good many years. What they have not come close to knowing is how to evaluate precisely whether what they have taught had an effect, or in fact what their aim was, in terms of actual reading performance. However, this recording system combined with the present abundance of remedial procedures enables success and having data to prove it or, if no success, to know how to try again.

My interest, training and inspiration in the area of reading is attributable to Dr. Barbara Bateman, while my involvement and training in the Precision Teaching system is due to my work with Dr. Eric Haughton. To these knowledgeable and competent educators I express my indebtedness and thanks. To my wife Ann, whose comments and precise records in her first grade class have provided much of the data and a good deal of the stimulation for the article, my devotion and thanks. A particular note of appreciation to all the youngsters whose reading performance made it possible to write such an article. I am also most grateful to the practicum students and public school teachers who were responsible for collecting

the vast majority of the data referred to in the paper. Dr. Haughton was also most generous in giving of his time and energy in the editing of the manuscript. Miss Merrie Dinteman was responsible for the typing of the manuscript. Her secretarial skill and patience is particularly appreciated. For additional information concerning Precision Teaching and Reading, contact: Clay Starlin, College of Education, University of Oregon, Eugene, Oregon, 97403.

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