The *Journal of Precision Teaching* is dedicated to the direct and continuous measurement of behavior, the recording of frequency and the representation of celeration on the Standard Behavior Chart and Chart-based decision-making. The purpose of the *Journal of Precision Teaching* is to accelerate the sharing of scientific and practical information among its readers. To this end, both formal manuscripts and informal data-sharing are encouraged.

Material submitted for publication should meet the following criteria: (1) be written in plain English, (2) be limited to 8 typed, double-spaced pages of narrative, (3) use the *Journal of Precision Teaching* Standard Glossary and Charting Conventions, (4) contain data displayed on the Standard Behavior Chart and (5) be submitted in triplicate to the editor. Each manuscript will be reviewed by the editor and one consulting editor, both of whom must approve it prior to publication.

The *Journal of Precision Teaching* is published quarterly in April, July, October and January. Each volume begins with the April issue. The annual subscription rate is $16.00 to libraries and $12.00 to individuals, payable in U.S. currency. The single copy price is $4.00. Advertising rates are available upon request.

Submissions, subscriptions and other correspondence should be addressed to the *Journal of Precision Teaching*, Patrick McGreevy, Editor, 4330 N.W. 82nd. Street, Kansas City, Missouri, 64151.

Any article is the personal expression of the author. Likewise, any advertisement is the responsibility of the advertiser. Neither necessarily carries Journal endorsement.

The staples binding the *Journal of Precision Teaching* are easily removed. Readers are encouraged to do this, so that photocopies and transparencies of the Charts can be made. The Journal can then be re-stapled.

Second-class postage pending at Kansas City, Missouri.

As part of its goal to disseminate research, the University Affiliated Facility for Developmental Disabilities (UAF) at the University of Missouri in Kansas City, under the direction of Carl Calkins, assisted with the production of this Journal.
Dear Friends,

I would like to express my sincere thanks for the encouragement and support many of you have provided. As of this issue (Volume I, Number 2), the Journal of Precision Teaching has 142 subscribers in 34 states, 3 provinces of Canada, and England.

I especially appreciate the advice, the learning opportunities, and the assistance that you have offered. Your continued suggestions for improvement are encouraged.

I would appreciate your help accelerating subscriptions for Volume I toward an aim of 250. This can be done by passing a subscription form to several friends, asking your school or university library to order a subscription, or giving the Journal as a gift to a friend. Individual copies of the first two issues are also available. These may be especially useful in college and university classes.

The Association for Behavior Analysis Convention in May offered an opportunity to see old friends, renew acquaintances and meet new "charters." Chart-sharing was frequent and enthusiastic. If you did not attend, you should consider putting it on your 1981 agenda.

I would also suggest that you consider attending the Orange County, Florida Precision Teaching Conference in February, 1981. A conference announcement is included in this issue.

Thank you again and have an enjoyable summer.

Sincerely,

Patrick McCreery
Editor
READING SAMPLES AS PREDICTORS OF READING ACHIEVEMENT

Eugene M. Berquam
Orange County Schools

Jane Z. Siders
Arkansas State University

Abstract: Letter knowledge prior to reading instruction has consistently been shown to be the best single predictor of first grade reading achievement currently available. Recent investigators have used letter-related tasks and response frequency (rate) as a measurement unit to provide better predictors than instruments based only on accuracy of response. The present study used a 30-second sample on a letter-naming task in January to predict May oral reading rate and reading achievement scores for first graders. In addition, a concurrent prediction was made using one-minute performance samples on five basic reading skills in May to predict May reading achievement scores. Data from each of these questions indicate significant results.

The importance of early prediction or identification of learning problems in children cannot be underestimated. There is a strong rationale and evidence in the literature supporting accurate early screening programs, and it will not be repeated here. Keogh and Becker (1973) have discussed problems associated with early prediction programs. One of the major problems is the accuracy of the predictions made. The purpose of this study was to assess the accuracy of prediction of first grade reading achievement from several direct measures of reading or pre-reading skills.

Selection of appropriate measures is critical to the accuracy of prediction instruments. In a review of studies concerning visual discrimination and first grade reading achievement, Barrett (1965) found that verbal visual-discrimination tasks (those related to letters, words or sounds) were better predictors than non-verbal tasks (those related to figures or designs). Bond and Dykstra (1967), in summarizing the results of the USOE First Grade Studies, reported correlations of .51 to .60 between letter identification and first grade reading achievement. They concluded that letter knowledge prior to reading instruction is the single best predictor of first grade reading achievement. This is the same conclusion drawn by Richek (1978) after reviewing the literature, and was supported by results from her study. It can be concluded from the above reviews and from a wealth of other information (e.g., DeHirsch, Jansky, & Langford, 1966; Mercer, 1979; Samuels, 1972), that a letter naming task is probably the single best predictor of first grade reading achievement currently available. It is important to note, as always, that correlation does not indicate a causal relationship. In fact, letter knowledge appears to be a g factor for reading, as Richek (1978) has indicated.

Results obtained from training in letter names do not indicate improved reading ability (Jenkins, Bausell, & Jenkins, 1972; Ohnmacht, 1969; Samuels, 1972). This point does not weaken support for the use of letter naming tasks for large scale screening purposes. However, a distinction must be made between "screening" and "prescriptive assessment." Screening does not necessarily yield prescriptive information, and none should be expected. A screening program should use the most efficient and reliable instruments available to locate children with potential problems.
These children are then referred for detailed, prescriptive assessment. Haring, Lovitt, Eaton and Hansen (1978) make a similar distinction between "screening assessment" and "placement" data, although they use the term screening to indicate a more detailed individual evaluation.

In recent years the letter naming task has been modified to include a more precise measurement procedure. The rationale for the use of frequency measurement need not be presented in this Journal. However, it should be mentioned that studies using frequency of response on letter-naming tasks (Biemiller, 1978; Speer & Lamb, 1976; Magliocca, Rinaldi, Crew, & Kunzelmann, 1977) have generally shown higher correlations than those using traditional, accuracy-based measurement. In addition, Biemiller (1978) and Samuels, Begy, and Chen (1976) found that frequency of response on reading tasks consistently discriminates between good and poor readers. Strong evidence exists, then, to support the two major characteristics of the present screening study: (a) the use of a letter-naming task and other word related tasks, and (b) the use of frequency as a measurement unit.

METHOD

Subjects
All three of the first grade classrooms of an elementary school located in Gainesville, Florida were used for this study. This provided a total n of 55.

Procedure
In early January, a 30-second performance sample of naming lower case random letters was obtained from all the first graders and served as a predictor measure. In May, a one-minute performance sample was obtained on the following skills: (1) consonant sounds; (2) short vowel sounds; (3) short vowel-CVC words; (4) long vowel words; and (5) oral reading frequency (rate) from the first passage on the Gray Oral Reading Test. The first 4 samples served as concurrent predictors, while the last sample served as both a concurrent predictor and a criterion measure. The Metropolitan Achievement Test (MAT) was also administered in May, with the total reading score used as a criterion measure.

This study was conducted as part of a larger project designed to assess the effect that direct practice in phonics has on reading. The phonics study will be described in a subsequent paper. However, because of treatment effects, results of this prediction study are presented separately for the control group, which had no additional practice. This fact, and missing data for some subjects resulted in a useable n for this study of 29 for question 1, and 37 for question 2.

RESULTS

Data are presented concerning two questions. First, can letter-naming frequency in January predict oral reading frequency and reading achievement in May? Second, can a frequency measure on one or more reading skills in May predict May reading achievement? The first question was answered using a frequency distribution on the Standard Behavior Chart and regression analysis. For the second question, two additional frequency distributions and the "Stepwise" multiple regression procedure
available in the SAS program (SAS Institute, Inc., 1979) were used. This procedure finds the single best predictor of the criterion variable, then successively builds the best predictive model for that variable. $R^2$ values are obtained by squaring the Pearson correlation coefficients. This squared correlation coefficient indicates the proportional reduction in the error variance as a result of adding each variable to the model.

To answer the first question, a frequency distribution of letter-naming frequency, the January predictor, was grouped by 3 levels of 2 criterion measures: (1) below, at (1.8 to 2.0) or above grade level on the total reading score of the Metropolitan Achievement Test (MAT); and (2) less than 40 words per minute (w.p.m.), 40-80 w.p.m., and more than 80 w.p.m. oral reading frequency on the Gray Oral Reading Test. Chart 1 illustrates these distributions.

Correlations and $r^2$ values between the predictor and the criterion measures are listed in Table 1.

Table 1
Correlations and $r^2$ values for January Letter-Naming to May Reading Measures

<table>
<thead>
<tr>
<th>Total Reading Achievement Score (MAT)</th>
<th>Oral Reading Frequency (Gray)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$r$</td>
<td>.82*</td>
</tr>
<tr>
<td>$r^2$</td>
<td>.67</td>
</tr>
<tr>
<td>$r^2$</td>
<td>.42</td>
</tr>
</tbody>
</table>

$n = 29$, $p < .01$.

Results related to question 2 concerning concurrent predictors are presented in Chart 2 and Table 2. The first distribution in Chart 2 is the best May predictor, short vowel CVC words, and the second is oral reading frequency on the Gray Oral Reading Test. Both distributions were grouped by 3 levels of the total reading achievement score on the Metropolitan Achievement Test (MAT).

Multiple squared correlations between the May performance samples and MAT total reading achievement score are listed in Table 2. It can be seen that the first variable (short vowel-CVC words) accounts for most of the variance. While the other variables have high simple correlations, they do not add much to the variance reduction.

Table 2
Squared Multiple-Correlation Coefficients for May Performance Samples to May Total Reading Achievement Score (MAT)

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 4</th>
<th>Step 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVC</td>
<td>VOW</td>
<td>ORF</td>
<td>CON</td>
<td>LV</td>
</tr>
<tr>
<td>.70*</td>
<td>.725</td>
<td>.731</td>
<td>.735</td>
<td>.735</td>
</tr>
</tbody>
</table>

CVC--short vowel CVC words
VOW--short vowel sounds
ORF--oral reading frequency (GRAY)
CON--consonant sounds
LV--long vowel sounds
*p < .05
Chart 1. Can Letter-naming Frequency in January Predict Reading Achievement and Oral Reading Frequency in May?
Chart 2. Can a Frequency Measure on One or More Reading Skills in May Predict May Reading Achievement?
DISCUSSION AND CONCLUSION

Several general conclusions may be drawn from this study. First, direct measures of reading or pre-reading skills can be reliable predictors of reading achievement. These types of tasks can be used for quick and efficient school-wide screening, when the purpose is to locate children with possible reading problems. This screening operation would be considerably more efficient, in terms of cost, time, and results, than many of the longer, more traditional screening instruments. The second conclusion is that frequency (rate) is further validated as a useful measure of reading proficiency. This finding is in agreement with Biemiller (1978), who found that 49-96 percent of the variance in reading scores on the Metropolitan Achievement Test was accounted for by response frequency (rate) on letter names, words, and oral reading.

Several limitations should be mentioned. The sample used for this study was small, and may not be representative of all first grades. Also, other reading related tasks may prove to be better predictors than the ones chosen here. There are two main criteria for task selection. First, the tasks should be direct measures relevant to a specific curriculum. It may be that different skills would need to be sampled for each different reading series. Second, the performance measure should be frequency. This measure provides the sensitivity and range in scores necessary to best discriminate between proficient and non-proficient students.

One final caution needs to be mentioned, concerning the choice of achievement test scores as criterion variables. The inherent weaknesses of norm-referenced tests and the instability of their scores undoubtedly contribute to a decrease in the accuracy of prediction studies such as this one. It seems logical, then, that we consider the use of direct measures of school performance as criterion variables. Data such as presented in Chart 1 and Table 1 where the letter-names score was used to predict the oral reading rate, may be more useful. Also, we should perhaps evaluate the efficiency of achievement tests in predicting direct performance measures.

At a time when educators are required and expected to conduct school-wide screening to identify children with learning problems, there is much evidence, both within our own "precision" area, and in the traditional literature, to support the development of screening programs such as that described here. Educators proficient in precision teaching procedures are in a unique position to provide leadership and expertise to the rest of the profession in this area.

REFERENCES


Bond, G., & Dykstra, R. The cooperative research program on first grade reading instruction. Reading Research Quarterly, 1967, 2, 5-142.


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USING PRECISION TEACHING IN A SECONDARY SCIENCE CLASS

Joy E. Miller and Abigail B. Calkin
Capital City Schools

This paper will discuss the benefits of using Precision Teaching in a Personal-Social Adjustment (PSA) special education secondary science class, grades 7 through 12. These benefits include providing: 1) the student and teacher with a daily progress check; 2) the student with an opportunity to use science vocabulary; 3) teacher evaluation of individualized methods and materials; 4) learning pictures which may over time be related to other behaviors; and 5) a measure of accountability for the teacher.

DAILY PROGRESS CHECKS

The teacher used Precision Teaching in each of her science classes. The students had been enrolled in secondary science from zero to four years. There were a maximum of eight students per class, with reading levels from second to twelfth grade. Because the students were grouped heterogeneously, up to six different levels of science courses were taught within a 50 minute class period.

Each student completed a daily progress check. This check consisted of a one-minute timing, during which students responded as quickly as they could to a specific task. The results were charted on the Standard Behavior Chart. This Chart provided celerations and learning pictures used by teachers to make instructional decisions.

OPPORTUNITIES TO USE SCIENCE VOCABULARY

Learning science vocabulary is similar to learning a foreign language. Many words used in science have a foreign sound and must be used repeatedly to understand and retain their meaning. The various activities used were designed to increase each student's science vocabulary. We started with naming 53 pieces of science equipment and supplies frequently used in the laboratory. The intent was to familiarize the students with the different lab pieces they would be using. The teacher laid all the equipment on the table. The students named the equipment as quickly as they could for one minute--stethoscope, test tube, filter paper, beaker, alcohol burner, flask, geranium, meal worm, spatula, depression slide, etc.--53 pieces of equipment. If they completed naming them, they would start through them again. From this activity the students would then chart the number correct and the number wrong. Chart 1 shows Greg's celerations and learning pictures. On the first day he named 12 pieces of equipment correctly in one minute. As time went on, his correct responses increased by x1.5 per week to 80 per minute. Each day Greg also charted his misses and his skips. In the beginning he did not know 40 of the pieces of equipment, but, as Chart 1 indicates, he was able to decrease his errors and skips to zero.

During the second activity the students named 11 basic parts of the microscope and 19 major bones of a skeleton model. The skeleton and the microscope had red tape on the parts the students identified. Again, the students were given one minute to point to and name each marked part or
Chart 1. Greg's Learning Pictures

<table>
<thead>
<tr>
<th>Successive Calendar Days</th>
<th>GREG</th>
<th>16th</th>
<th>10th</th>
<th>See-Say</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depositor Agency</td>
<td>Capital City High School</td>
<td>Topeka, Kansas</td>
<td>Supervisor</td>
<td>A. Calkin</td>
</tr>
</tbody>
</table>

Science Equipment
Microscope & Skeleton
Science Facts #1 (Flash Cards)
Science Facts #2 (Flash Cards)

No Study
5 Minutes of Study

COUNT PER MINUTE

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140

MIN HRS

Science, Equipment, Microscope, Skeleton, Science Facts #1, Science Facts #2, No Study, 5 Minutes of Study.
bone. Greg's progress on this task is also shown in Chart 1. The errors did not drop as rapidly as during the first phase, perhaps because of infrequent progress checks.

The third activity of the first semester involved reading questions on the front of flash cards and responding with single word answers for one minute. The answers were printed on the back of the cards. The science fact questions probed for general information needed for most of the science curricula to which the students were assigned. Samples of the questions include: 1) What is the metric unit for length? 2) What is the magnification of a microscope with a x10 eyepiece and a x40 objective lens? 3) What is the name for the study of living things? 4) Name the part of the cell which controls a cell's life processes.

The teacher first used the flash cards with no study, hoping that by reading the cards day after day and seeing the answer each student would learn this information. As we see in Chart 1, Greg's corrects were increasing, but his errors were remaining the same. The teacher decided to add 5 minutes of daily study. After about 5 days, Greg and the teacher began to see "JAWS" learning (corrects increasing and errors decreasing).

The fourth activity was then individualized to match the area of science in which the student was working and to intervene if he/she had not had a successful experience in the third activity. One group of students, who were studying biology, were timed on a second set of science fact cards, which contained questions specifically related to the material discussed in their textbook. A second group of students, who were studying life science, were timed on naming the organs of the various systems in the human body. The students had diagrams of the digestive system, nervous system, excretory system, and respiratory system with arrows indicating each organ to be named. A third group of students, who were using a primary level workbook, Land Animals, were timed on spelling the names of various animals which they were studying. Each correct letter written in the appropriate blank was counted as a correct response.

Greg continued with a second set of science facts flash cards. As seen in Chart 1, his corrects increased and his errors decreased to zero.

EVALUATING INDIVIDUALIZED METHODS AND MATERIALS

As seen in Chart 1, Greg showed double improvement (corrects increasing and errors decreasing) in 4 of the 5 phases. His greatest improvement occurred in the first phase, where his corrects increased x1.5 per week and his errors decreased by /4.5 per week. During the third phase, science facts #1 without study, Greg showed single improvement (corrects increasing). However, when 5 minutes of daily study was added, Greg showed double improvement.

Other students, such as Brian, were having problems with science facts, so we individualized. Brian's Chart (see Chart 2) indicates that during phases 1 and 2 he showed double improvement. The 2 learning pictures during science facts #1 indicated that these phases were difficult for Brian to do and to learn. It took four weeks of one minute timings (including no study and with study phases) before he reached the crossover point, the point where he had more correct responses than incorrect responses. Noting the extended amount of time for Brian to reach the
Chart 2. Brian's Learning Pictures

SUCCESSIVE CALENDAR DAYS

COUNT PER MINUTE

Science Equipment
Microscope & Skeleton
Science Facts #1 (Flash Cards)
Systems and Organs

No Study
5 Minutes of Study

BRIAN 14 8th See-Say Counted Answers

A. Calkin A. Calkin J. Miller
Supervisor Adviser Manager
Capital City High School Topeka, Kansas
Depositor Agency Timer Counter Charter
crossover point and observing his frustrations with the science fact cards, the teacher made the decision to switch Brian to a less frustrating learning experience. During phase 4, systems and organs, Brian's corrects and errors crossed over within one week of timings.

LEARNING PICTURES MAY BE RELATED TO OTHER BEHAVIORS

Teaching methods and interventions are not the only cause for abrupt changes in learning pictures. Circumstances outside the classroom may effect changes in the pictures. The charts can give information when a student may be experiencing some sort of change or problem. An example of this is Sarah's Standard Behavior Chart (see Chart 3). Sarah, a resident patient of the State Hospital, had double improvement learning pictures through the first three activities. During phase 5, science facts #2, her learning picture maintained until after Christmas vacation, when it showed single improvement. The holiday season is time of anxiety for many hospital residents. Sarah was going home during this time and the anticipation of getting away from the hospital to be with her family may have affected her learning. When things became more routine for Sarah after the holidays her learning again improved.

A MEASURE OF TEACHER ACCOUNTABILITY

The teacher summarized all the students' learning pictures. Sixty-one (61) phases showed double improvement, 14 single improvement, 9 maintaining and 8 worsening. The learning pictures were also superimposed to provide celeration collections. Charts 4 and 5 illustrate these collections for corrects and incorrects. The median celeration of each phase is represented by an extended line, while the value of that median is displayed below the celeration collection. Comparing Charts 4 and 5 indicates that the "widest JAWS" occurred during science equipment. From the celeration collections and the learning picture summary, the teacher concluded that the students' learning experiences had been successful.

A COMMENT

A comment taken from Greg's report on timings summarizes Precision Teaching from a student's viewpoint. Greg wrote, "I feel that all these tests help me in understanding my science work. I understand technical words and meanings. They have helped me to use the right equipment for experiments and how to use a microscope properly. Also, I can see these timings helping other kids. Since these kids are competing, it makes them study so they can beat their classmates. I feel that is good incentive because the kids have fun doing it."

Joy Miller is the science teacher and Abigail Calkin is the assistant principal of Capital City High School, 2700 West Sixth, Topeka, Kansas 66606.
Chart 3. Sarah's Learning Pictures

SUCCESSIVE CALENDAR DAYS

A. CALKIN  A. CALKIN  J. MILLER
SUPERVISOR  ADVISER  MANAGER
CAPITAL CITY HIGH SCHOOL  TOPEKA, KANSAS
DEPOSITOR  AGENCY  TIMER  COUNTER  CHARTER

SARAH 14  9th
BEHAVIOR  AGE  LABEL  COUNTED
SEE-SAY  ANSWERS
Chart 5. Celeration Collection- Incorrects

SUCCESSIVE CALENDAR DAYS

A. Calkin  A. Calkin  J. Miller
SUPERVISOR  ADVISER  MANAGER

CAPITAL CITY HIGH SCHOOL  TOPEKA, KANSAS

DEPOSITOR  AGENCY  TIMER  COUNTER  CHARTER

STUDENTS IN SCIENCE CLASS
BEHAVIOR  AGE  LABEL  SEE-SAY  COUNTED

ANSWERS
THE USE OF CONTINGENT NONVERBAL TEACHER-ATTENTION
TO DECREASE OUT-OF-SEAT BEHAVIOR

Elliott I. Lessen
Northern Illinois University

Abstract: An ABAB design was used in the present study to evaluate whether contingent verbal or contingent nonverbal teacher-attention could weaken inappropriate i.e., out-of-seat, student behavior. The results indicate that nonverbal teacher-attention to inappropriate student behavior may be a more potent deceleration technique than verbal teacher-attention. Implications for teachers and researchers are discussed.

A major task in changing behavior is selecting an appropriate behavior change technique. One of the most common, perhaps because of its occurrence in natural settings, is the use of teacher-attention.

Teacher-attention, in the form of social reinforcement, has been used in maintaining appropriate student behavior (e.g., Schutte & Hopkins, 1970). Several other investigators have demonstrated the effect of verbal teacher-attention on increasing academic performance while having a concomitant effect on decreasing disruptive behavior (e.g., Aylon & Roberts, 1974). Kazdin and Klock (1973), discussing increases in appropriate behavior, noted that the issue of whether nonverbal teacher-attention, independent of verbal teacher-attention, could be assumed to contribute to changes in behavior, remains unresolved. They did, however, find that nonverbal teacher-attention was related to an increase in appropriate student behavior. This finding may assume greater significance when one considers that as little as 15% of teacher-attention behavior may be nonverbal (Madsen, Becker, & Thomas, 1968).

Verbal teacher-attention, in the form of punishment (e.g., reprimands, saying "no"), may decrease inappropriate student behavior (e.g., Hall, Axelrod, Foundopoulos, Shellman, Campbell, & Cranston, 1971). This same aversive verbal teacher-attention may result in the (a) maintenance of inappropriate behavior (e.g., Becker, Madsen, Arnold, & Thomas, 1967) or (b) increase of inappropriate behavior (e.g., Madsen, Becker, Thomas, Koser, & Plager, 1970).

Aversive verbal teacher-attention followed by aversive nonverbal teacher-attention has been shown to decrease inappropriate behavior (e.g., Doleys, Wells, Hobb, Roberts, & Cartelli, 1976; Moore & Bailey, 1973). However, the separate effects of verbal and nonverbal teacher attention in reducing inappropriate behavior appear undetermined. The purpose of the present study was to determine whether contingent verbal or contingent nonverbal teacher-attention could weaken or decelerate inappropriate, i.e., out-of-seat, student behavior.

METHOD

A 12 year old, severely retarded male, was the subject of the study. He was attending the school program of a mid-west residential, intermediate care facility for the retarded. The subject attended school for two and
one-half hours per day, out of which data for the study were collected for the same 30 minute period each day. It was reported anecdotally that the subject responded to verbal teacher- or adult-attention with inappropriate verbalizations.

An ABAB design was employed to evaluate the relative effectiveness of verbal teacher-attention (A phases) and nonverbal teacher-attention (B phases). A baseline phase was not implemented as verbal teacher-attention had been implemented from the beginning of the school session (two weeks). It was during this two week period that pilot data were collected to determine the target behavior, that is, gets out-of-seat or remains out-of-seat after teacher attention.

Verbal teacher-attention consisted of a command to sit down followed by verbal reinforcement if the command were followed. The non-verbal teacher-attention behaviors employed were a combination of facial expression (scowl) and physical gesture (pointing to the chair) followed by verbal reinforcement if the command were followed. The use of verbal praise for appropriate responding was used in all phases to aid the subject in differentiating appropriate from inappropriate behavior. In addition, if the subject did not respond appropriately, a 30-second delay occurred before the next teacher-attention behavior.

RESULTS

Chart 1 indicates that during the first A phase (verbal teacher attention), the subject got or remained out of his seat about 6 times every 10 minutes with a tentative celeration (5 frequencies) of x1.0. Non-verbal teacher attention (first B phase) effected a frequency step down (divide) of /1.3 and a celeration turn down (divide) of /1.6. The second A phase resulted in a x4.5 frequency step up (multiply). Finally, the second B phase produced a /2 frequency step down and a tentative deceleration (4 frequencies) of /4, resulting in a final frequency of 1 every 10 minutes.

DISCUSSION

The results indicate that nonverbal teacher-attention to inappropriate student behavior may be a more potent deceleration technique than verbal teacher-attention. This technique would seem to be less disruptive and distracting to other students.

One apparent limitation of the present study was the limited length of a second A phase, i.e., one session. This was due to a marked increase in out-of-seat behavior, and consequently, disruption that limited the opportunity for learning for the subject and his classmates. It was, then, an ethical consideration which prompted the immediate return to the second B phase.

The use of verbal teacher-attention may maintain deviant behaviors due to the probability that these attentional responses from adults may be positive reinforcers of these deviant behaviors (Becker et al., 1967). Individuals for whom verbal teacher-attention may have reinforcing properties, may be considered as susceptible to the use of nonverbal teacher-attention to decrease inappropriate behavior. Contingent nonverbal teacher-attention may, then, be a more advantageous and propitious technique to employ.
Chart 1. The Effects of Verbal and Nonverbal Teacher-attention

A. Verbal Teacher-attention
B. Nonverbal Teacher-attention
Implications of this study for researchers and teachers include: (a) employing one type of nonverbal teacher-attention per phase; (b) using nonverbal teacher attention to reduce other types of inappropriate behavior; and (c) using nonverbal teacher attention to reduce inappropriate behavior with other types of handicapped individuals.

REFERENCES


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*Elliott Lessen is Assistant Professor and Coordinator of Undergraduate Training Programs, Faculty of Special Education, Department of Learning and Development, Northern Illinois University, DeKalb, Illinois, 60115.*
The Standard Behavior Chart has been used to measure a variety of human performances in various intervals of time. A novel use of the Chart is to employ it as a feedback mechanism to evaluate the effects of a change agent on a client's learning during a 20 minute session. The aim of the session is to at least double (x2) an individual's level of performance on some specifically measurable topic. The technique holds particular promise for people who work in one-to-one situations such as withdrawal special education programs, speech therapy programs, physiotherapy programs and behavioral counselling interviews. The "teacher" can immediately and continuously assess the effects of whatever tactics are brought to bear on the problem at hand. Used with a number of similar clients, trends can be ascertained to help pinpoint the most effective strategies, given a particular situation, client or behavior. Used as an observation report, it can help pinpoint the strengths and weaknesses of performances by students, team members and teaching techniques.

METHOD

In this instance, the Standard Behavior Chart is considered to span an interval of twenty minutes, rather than the usual twenty calendar weeks. Each Sunday line indicates one minute of the twenty minute period.

The session begins with a measurement of the particular topic in question. This measurement becomes the base frequency of the behavior, which is to be at least doubled in the remaining nineteen minutes. The first intervention begins. The "teacher" notes the time that the exercise begins. At the end of a period of time, a second measurement of the behavior is taken. The results of this measure act as a feedback to determine whether or not that procedure will double the performance in the time remaining. A data point for this measure is plotted on the appropriate minute (Sunday) line. If the estimated celeration (2 data points) is sufficient, further application of the technique may be all that is required. If this estimated celeration appears inadequate to double the performance in the time remaining, a second strategy is invoked. The effects of the second strategy are measured and a decision reached on the next option, should one be needed. The number and variety of techniques used in any one session will be determined by the effectiveness of preceding techniques, by the doubling of the learner's performances, or by the lapse of time. It may be useful before beginning a session to think-write possible alternatives that may be used during the twenty minutes.

RESULTS

This technique has been used to assess the effects of a "teacher's" performance in a number of instances. An example is included here as an illustration of the technique.

Chart 1 shows attempts I made to teach a parent to assist her son to decode words by improving his blending skills.
Minute 1. Measurement: see-say stop sounds (b,c,d,g,h,j,k,p,t)

In order to assist her son to blend sounds, the mother needed to learn to discriminate stop sounds from continuous sounds. Sounds were designated stop or continuous, using Englemann's direct instruction reading program as a model. Chart 1 indicates that the parent could discriminate (see and say) 14 stop sounds per minute, with one learning opportunity.

Minute 3. Instruction and Practice: stop vs. continuous sounds

In minute 3, instruction on the discrimination of stop versus continuous sounds commences. Stop sounds are modelled for the parent. For the next six minutes the parent and I practiced stop sounds.

Minute 9. Measurement: see-say stop sounds

As seen in Chart 2, the parent was able to see and say 90 stop sounds per minute with 2 learning opportunities.

Minute 10. Instruction: blending skills

The teacher shows the parent how to blend words, emphasizing those such as "cap," which have a stop sound as the initial letter. Again Englemann's Distar technique "sound it out, say it fast," was used.

Minute 11. Measurement: see-sound out and say words (blends)

Chart 1 shows that the mother was able to successfully sound out and 20 words (blends) per minute, half of which were instances of stop sounds as the initial letter.

Minute 12. Instruction and Practice: blending sounds

For the next two minutes, the parent and the teacher practiced words with and without stop sounds in various parts of the word.

Minute 14. Measurement: see-sound out and say words (blends)

As indicated in Chart 1, the mother was able to sound out and say 31 words (blends) per minute.

Minute 15. Practice: blending sounds

For the next 4 minutes the parent and the teacher continued to practice words with and without stop sounds.

Minute 19. Measurement: see-sound out and say words (blends)

As seen in Chart 1, the parent successfully sounded out and said 35 words (blends) per minute with no learning opportunities. A learning opportunity was defined as a break between the sounds in any word. Results indicate a frequency jump up of x1.7.

Minute 20. Measurement: see-say stop sounds

Chart 1 shows that the parent was able to see and say 95 stop sounds per minute with no learning opportunities, a x6 frequency jump up during the 20 minute session.
Measurement: See-say stop sounds (b, c, d, g, h, j, k, p, t)

Instruction: See-hear stop sounds

Practice: See-say stop sounds

Measurement: See-say stop sounds
Instruction: Blending skills

Measurement: See-sound out and say words (blends, such as "cap")
Instruction and Practice: Blending sounds

Measurement: See-sound out and say words (blends)
Practice: Blending sounds

Measurement: See-sound out and say words (blends)
DISCUSSION

The use of the Standard Behavior Chart as a record of behavior change during a short interval demonstrates once again the flexibility and wide utility of the Chart. Used in this fashion, the Chart could be a very useful device to ascertain the effectiveness of programs and/or personnel in a host of settings. Such information as can be derived from this format could demonstrate to the client the changes he is producing in his own behavior during the setting. The data will confirm progress where it is made or highlight difficulties which are to be worked on by the client and his change agent. The Chart, used in this manner, could be employed in case conferences and sharing sessions as a basis for discussion of successful and less than successful treatment techniques with clients having the same problem or learning deficit. Such discussions would assist in determining the efficacy of existing treatment, and the development and refinement of new techniques. Data from the Tender Loving Care Chart could be produced by students in educational placement settings as an aid to determining their level of proficiency on selected topics. Results of multiple T.L.C. Charts would provide an insightful perspective on the strengths and weaknesses of training regimens for students in a variety of programs.

Michael Maloney is the Director, Anne Desjardins is a teacher, and Eric Haughton is a consultant to the Quinte Learning Center, 28 Isabel Street, Belleville, Ontario K8P 3N3.
"MOM, PUT IT DOWN ON MY CHART BEFORE YOU FORGET IT."

Carol Hoffman and Perry Hoffman, Jr.
Rolla, Missouri

My son, Perry, has just finished the first grade. His teacher told me that he needed help with reading.

I recently attended a workshop on Charting and learning opportunities at the Rolla Regional Center for Developmental Disabilities, where I work as a Developmental Assistant. I learned to chart children's progress and treat mistakes as chances to learn.

I decided to use what I learned at home with Perry. I picked out some words he didn't know and started working with him. Each day I ask him to read a word list for one minute. He and I count how many he gets correct and how many are chances to learn. Then we put dots for corrects and x's for chances to learn on his Chart. We then practice for a few more minutes. The first day he and I started with twenty words he didn't know. Some days I added words. His word list is now about 200 words.

The workshop encouraged me not to look at Perry as "slow," but as having many chances to learn. The Chart (see Chart 1) is showing Perry and me that his chances to learn are turning into learning. He is heading toward a goal of 100 words in one minute.

Perry is also more excited about learning other things. He also likes to watch his Chart. After we check his one minute timing, he will often say, "Mom, put it down on my Chart before you forget it."

Carol Hoffman is a Developmental Assistant at the Rolla Regional Center for Developmental Disabilities, 105 Fairgrounds Road, Rolla, Missouri 65401. Perry Hoffman, Jr., is her seven-year-old son.

YOU GET WHAT YOU REINFORCE--THE EFFECTS OF REWARDING PERFORMANCE

Belinda Vitale and Eugene "Skip" Berquam
Orange County Schools

Reward stickers on papers had been used in a resource room throughout the school year to reinforce improved performance on one-minute math samples. Seven students who had shown inconsistent performance on a multiplication probe were given reward stickers contingent upon daily improvement of number correct. The contingency was implemented after two days of performance (on number correct) below a previous frequency. Each phase lasted approximately two weeks. Error frequencies were at or below the record floor.
Chart 1. Perry's Chart

CAROL HOFFMAN
SUPERVISOR
ADVISER
MANAGER
DEPOSITOR
AGENCY
TIMER
COUNTER

PERRY HOFFMAN, JR.
BEHAVER
AGE
LABEL
COUNTED WORDS

Carol and Hoffman, Perry (Jr.). Mom, put it down on my chart before you forget it.

Journal of Precision Teaching, Volume 1, Number 2, July, 1980.

Daily Behavior Chart (DCM-GEN)
6 Cycle - 140 Days (20 Wks)
Behavior Research Co.
Box 3351 - Kansas City, Kans 66103
The effectiveness of this reward contingency was evaluated by observing the direction of change in three basic measures of behavior: (1) frequency (frequency multipliers or jump), (2) bounce (variability), and (3) celeration (celeration multiplier or turn). Chart 1 shows data for two students showing different effects. In moving from the baseline to the reward period, student #1 demonstrated a frequency multiplier (jump up), a decrease in bounce and a celeration divider (turn down). Student #2 experienced a frequency multiplier (jump up), a decrease in bounce and a celeration multiplier (turn up). Chart 1 also illustrates the summary data for all 7 students, showing the number and direction of changes in frequency, bounce and celeration.

These data indicate that "you get what you reinforce." The contingency was for any daily performance improvement. The summary data for frequency and bounce show that the contingency had the desired effect, frequency multipliers (jump ups) with less bounce. However, there was a celeration divider (turn down) on four of the seven charts.

Interpretation of these data leads to several conclusions: (1) to get significant celeration multipliers (turn ups), we may have to accept some bounce, (2) if we reinforce small, daily performance improvements, we may inadvertently limit celeration, and (3) if improved learning and lasting performance is desired, the daily performance change reinforced should be large enough to produce significant celeration multipliers (turn ups).

Belinda Vitale is a resource room teacher at Chickasaw Elementary School and Eugene "Skip" Berquam is the Project Administrator, Precision Teaching Project, Orange County Schools, 800 South Delaney Avenue, Orlando, Florida 32801.

TRENDS IN EDUCATION: A CELERATION ANALYSIS

Robert Bower
Lawrence, Kansas

METHOD

A graphic representation of trends can be obtained by plotting yearly data on the yearly Standard Behavior Chart. In this study the researcher counted the number of yearly references to topic headings in Education Index. It was assumed that Education Index provided a representative sample of educational publications, indicating the interests of the educational community. Yearly frequencies were placed on the Standard Behavior Chart. The "trend-following" celeration technique was employed in drawing and analyzing celeration lines. A Histolay was constructed to observe the relationships of 3 educational events and charted educational interests. These 3 events were the National Defense and Education Act of 1958, the Elementary and Secondary Education Act of 1965, and Public Law 94-142 (the special education mandate) of 1975 (NDEA, ESEA, and 94-142).
Chart 1. The Effectiveness of a Reward Contingency
RESULTS

Reinforcement and Behavior Modification—After two decades of x4 acceleration, a deceleration turn-down has resulted in a period of no growth for the last eight years.

Educational Laws and Legislation—Corresponding acceleration trends preceded the NDEA, ESEA, and PL 94-142. Deceleration trends followed NDEA and ESEA, however an acceleration trend follows PL 94-142. The steep deceleration trend following ESEA took the frequency to a level fitting the overall deceleration trend of a 40 year period, from 1935-1975.

Legal Actions and Defenses—A 12-year deceleration trend was reversed with the ESEA. The acceleration trend (x2), beginning in 1966, is confirmed with the reaction to PL 94-142. It looks like educators will be preoccupied with legal actions and defenses as we enter the next century. Although topographically related Legal Actions and Defenses and Educational Laws and Legislation are functionally independent. They counterbouncing, counteraccelerate, cobounce, and cocelerate.

Accountability—An extremely rapid initial acceleration (x100) is followed by a deceleration trend. A newer topographical category, Competency Based Education, may have usurped some numbers in its acceleration trend.

Competency Based Education—Beginning acceleration is rapid with some leveling off in the mid-1970's. A new acceleration trend corresponds temporarily to PL 94-142 and confirms the overall acceleration trend.

Education Evaluation—A frequency multiplier (jump-up) occurred in 1966. However the shift was accompanied by only a slight change in celeration, as it remains relatively flat.

Robert Bower is a post-doctoral student at Kansas University, Room 9, Bailey Hall, Lawrence, Kansas 66045.

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PERFORMANCE AND LEARNING WORLD RECORDS

To emphasize performance aims/standards and to encourage learning above x2.0, Michael Maloney has suggested that we initiate this world records section. Two (2) performance records follow. They will stand as world records until someone "beats them." If you are aware of potential world records, especially learning records, send them to the editor.

Performance World Records

Tanya Kelb (Belleville, Ontario) See-think 1470 words per minute (silent reading)

Vicky Vachon (Belleville, Ontario) See-write 146 subtract facts of 18 per minute

Learning World Records

(yet to be submitted)
Chart 1. Reinforcement and Behavior Modification
RESULTS

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Learning World Records

(yet to be submitted)
Chart 2. Educational Laws and Legislation

References in Education Index to Educational Laws and Legislation

Supervisor: Adviser: Manager: Depositor: AGENCY: TIMER: COUNTER: CHARTER:
Chart 3. Legal Actions and Defenses
Chart 4. Accountability

Chart 5. Competency Based Education
Chart 6. Education Evaluation

REFERENCES IN EDUCATION INDEX TO EDUCATION EVALUATION

SUPERVISOR	ADVISER	MANAGER
DEPOSITOR	AGENCY	TIMER	COUNTER	CHARTER

SUCCESSIVE CALENDAR YEARS	REFERENCES IN EDUCATION INDEX TO EDUCATION EVALUATION

YEARLY BEHAVIOR CHART (YCM-1EN)
6 CYCLE — 100 YEARS (10 DECADES)
BEHAVIOR RESEARCH CO
BOX 3351 — KANSAS CITY KANS 66103

ANNOUNCING A PRECISION TEACHING CONFERENCE

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February 6-7
Practitioner's Conference, General Sessions,
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For more information, and to submit papers for possible presentations, contact:

Skip Berquam, Project Administrator
Precision Teaching
800 South Delaney Avenue
Orlando, Florida 32801
Telephone: 305-423-9278

JOURNAL ANNOUNCEMENT

The Learning Disability Quarterly is the official journal of the Division for Children with Learning Disabilities of the Council for Exceptional Children. The major purpose of the Quarterly is to publish educational articles with an applied focus. Furthermore, each article emphasizes learning disabilities rather than topics or studies which incidentally use learning disabled subjects. Submissions are invited in the following categories: (1) reports of techniques in identification, assessment, remediation, and programming; (2) interpretive reviews of the literature; (3) papers advancing theory and the discussion of pertinent issues; (4) reports of original research with an applied focus; and (5) papers advancing practices in personnel preparation. Four typed, double-spaced copies of manuscripts should be submitted to the editor. The annual subscription rate is $12.50 ($16.00 foreign). Submissions, subscriptions, and requests for further information should be sent to: Dr. Mary S. Poplin, Editor, Department of Special Education, University of Kansas Medical Center, 39th and Rainbow Blvd., Kansas City, Kansas 66103 (913/588-5944).

AN ARTICLE WORTH READING

Haring, Norris G., Liberty, Kathleen A., & White, Owen R. Rules for data-based strategy decisions in instructional programs (chapter 6 of Sailor, W., Wilcox, B., & Brown, L. Methods of instruction for severely handicapped students. Paul H. Brookes Publishers, P.O. Box 10624, Baltimore, Maryland 21204. The price is $16.95 + .81 for postage and handling. (shared by Dr. Christine Salisbury)
Quinte Learning Centre
28 Isabel Street,
Belleville, Ontario K8P 3N3
(613) 966-5603

Michael Maloney — Director

The Quinte Learning Centre provides:

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- skill development programs in reading, writing, spelling and arithmetic
- assessment of academic skills of children (K—13)
- assistance for children with learning disabilities
- assistance for parents with problem children
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  - performance measurement
  - behaviour problem management
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Accelerating Target—a movement the behaver, manager, advisor of supervisor expects to accelerate; the frequency is symbolized by placing a dot on the Chart.

Accuracy Improvement Multiplier—a measure of change in accuracy over time; celeration correct/celeration incorrect.

Accuracy Multiplier—measure of accuracy: frequency correct/frequency incorrect; distance from frequency incorrect to frequency correct.

Accuracy Pair—two movements, usually correct and incorrect, charted simultaneously.

Add-subtract Scale—any measurement scale on which adding and subtracting by a constant amount is represented by a constant distance.

Advisor—person who advises a manager, usually viewing Charts on a weekly basis.

Behaver—person whose behavior is displayed on the Chart.

Behavior Floor—the lowest daily frequency possible for a particular behavior; 1/number of minutes behavior can occur; symbolized by drawing a solid horizontal line on the Chart.

Bounce Around Celeration—up bounce and down bounce combined; the range of deviations of frequencies from the celeration line.

Celeration—basic unit of measurement of behavior change; change in frequency per unit time.

Celeration Aim—the expected celeration for a given movement.

* Celeration Line—a best-fit, straight line constructed through seven or more continuous frequencies of a given movement on the Standard Behavior Chart.

*Celeration Multiplier (turn up or turn down)—value by which one celeration is multiplied or divided to obtain a second.

Change Day—first day of a phase change; symbolized by drawing a vertical line covering that day line on the Chart.

Counting Period Ceiling—the highest frequency observable under a given counting procedure; symbolized by drawing a dash line on the Chart connecting the Saturday and Monday lines.

Counting Period Floor—the lowest frequency detectable by a given counting procedure; 1/number of minutes spent counting; symbolized by drawing a dash line on the Chart connecting the Tuesday and Thursday lines.

Cycle—distance on the Chart between consecutive powers of 10.


Decelerating Target—a movement the behaver, manager, advisor, or supervisor expects to decelerate; the frequency is symbolized by placing an "x" on the Chart.

*Double Improvement Learning Picture—both movements of an accuracy pair with celerations in the expected direction; for example.

Down Bounce—the distance from the celeration line to the frequency farthest below it.

Duration—the amount of time it takes to complete one occurrence of a behavior; 1/number of minutes spent behaving.

Event-following Celeration Line—a celeration line drawn through all frequencies for a given movement just prior to a phase change.

Freehand Method—a method of visually estimating and drawing celeration lines.

Frequency—basic unit of behavioral measurement; the number of movements per unit time.
**Frequency Aim**—the expected phase-ending frequency for a given movement; symbolized by drawing "A" at the expected frequency on the day the aim was set.

*Frequency Line*—a horizontal line on the Chart; also called a counting line.

*Frequency Multiplier (jump up or jump down)*—value by which one frequency is multiplied or divided to obtain a second.

**Geometric Mean**—the appropriate method for obtaining an average on a multiply-divide scale.

**Ignored Day**—a day on which the behavior being measured occurs but is not charted.

**Latency**—the amount of time between the occurrence of a signal and the beginning of a movement; 1/time from signal to start of movement.

*Learning*—a change in performance per unit time; also called celeration.

*Learning Picture*—the celeration lines of both movements of an accuracy pair viewed together; for example.*

**Manager**—person who works with the behaver on a daily basis.

**Median Celeration**—the middle celeration in a celeration distribution; symbolized by drawing a "<" on the Chart.

*Median Frequency*—the middle frequency in a frequency distribution; symbolized by drawing a "<" on the Chart.

**Most Recent Celeration Line**—a celeration line drawn through the last 7-10 frequencies for a given movement.

**Movement**—recorded behavioral event; usually specified in terms of a movement cycle with a beginning, middle and end.

**Multiply-divide Scale**—any measurement scale on which multiplying and dividing by a constant amount is represented by a constant distance, the "up the left" scale on the Standard Behavior Chart.

**No Chance Day**—a day on which the behavior being measured has no chance to occur.

**Overall Celeration Line**—a celeration line drawn through all frequencies for a given movement.

*Performance**—the number of movements per unit time; also called frequency.

**Periodic Celeration Line**—a celeration line drawn through all frequencies for a given movement in a specific time period, such as bi-weekly or monthly.

**Phase Change**—a deliberate alteration made to the behaver's environment in an effort to improve the behavior being measured.

**Quarter-intersect Method**—a method for computing and constructing celeration lines.

**Recorded Day**—a day on which the behavior being measured has the opportunity to occur and is recorded.

*Single Improvement Learning Picture*—one movement of an accuracy pair with a celeration in the expected direction; for example.*

**Standard Behavior Chart**—a standard, six-cycle semi-logarithmic chart that measures frequency as movements/time and celeration as movements/time/time; Daily, Weekly, Monthly, Yearly and Summary versions are available.

**Supervisor**—person who views the Charts on a monthly basis.

**Total Bounce**—distance from the highest to the lowest frequency; analogous to range of an add-subtract scale.

**Trend-Following Celeration Line**—a celeration line drawn through visible trends for a given movement.

**Up Bounce**—distance from the celeration line to the frequency farthest above it.

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*additions or changes in the July, 1980 draft.

Dedicated to Mrs. Irene McGreevy, a very special person, and to the children, who, by sharing their Charts, taught us what we know.