JOURNAL OF PRECISION TEACHING

Volume VI **Spring, 1985** **Number 1**

Editor Patrick McGreevy

Contents

EDITORIAL POLICY

The **Journal of Precision Teaching** is a multidisciplinary journal dedicated to a science of human behavior which includes direct, continuous and standard measurement. This measurement includes a standard unit of behavior, **frequency**, a standard scale on which successive frequencies are displayed, the **Standard Celeration Chart**, a standard measure of behavior change between two frequencies, **frequency multiplier**, and a standard, straight-line measure of behavior change across seven or more frequencies, **celeration**. Frequencies, frequency multipliers, and celerations displayed on the Standard Celeration Chart form the basis for Chart-based decision-making and for evaluating the effects of independent variables.

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, Chart-sharing articles are considered for publication.

Materials submitted for publication should meet the following criteria: (1) be written in plain English, (2) contain a narrative that is brief, to the point and easy to read, (3) use the **Journal of Precision Teaching Standard Glossary and Charting Conventions**, (4) contain data displayed on the Standard Celeration Chart that justify conclusions made, (5) be submitted in quadruplicate to the editor, and (6) include one set of original charts or hand-drawn copies. Each formal manuscript will be reviewed by one consulting editor and two reviewers, two of whom must approve it prior to publication.

The **Journal of Precision Teaching** is published quarterly in April, July, October and January by Plain English Publications, P.O. Box 11335, Kansas City, Missouri 64112. Each volume begins with the April issue. Volume I began in April, 1980. The annual subscription rate is $20.00 to libraries, $16.00 to individuals and agencies, and $12.00 to full-time students, payable in U.S. funds. The single copy price is $5.00. Advertising rates are available upon request.

Subscriptions and submissions can be sent to the address above or to Patrick McGreevy, Editor, **Journal of Precision Teaching**, Louisiana State University, Special Education, 201 Peabody Hall, Baton Rouge, Louisiana 70803.

This Journal is published with the assistance of the College of Education, Louisiana State University.

Library of Congress ISSN number: 0271-8200

FUNCTIONAL COMMUNICATION SKILLS AMONG EXCEPTIONAL AND NORMAL EIGHT YEAR OLD CHILDREN

Bill Wolking
Gloria Branscum
Carol McKay
University of Florida

Language and communication skills are important for everyone. Our humanity is diminished in direct proportion to communication skill limitations. As we continue to move into the information age, verbal behavior (echoing, listening, speaking, reading, taking dictation, writing text, etc.) skills will be even more important in our daily lives. Both vocational and recreational activities will increasingly emphasize successful communication. Those with communication handicaps will pay a price in terms of participation, productivity and socio-economic advantages.

The fact that our culture has recently invented the construct "learning disability" to identify deficits in understanding or using spoken or written language, is an expression of increasing dependence on verbal communication skills in an information age society. In earlier agricultural and industrial periods there were many opportunities for young people to find their vocational and personal niches in society, even with deficits in listening, speaking, reading, or writing.

PROBLEM

Learning disabled children are assumed to be uniquely deficient in the verbal skills just mentioned. This study is a check of this assumption, using the measurement technology of Precision Teaching. Some researachers have been critical of the categorical approach to special education(Hallahan and Kauffman, 1978) and have studied the behavior characteristics of one or more of the categories of handicapping conditions(Sherry, 1979; Ysseldyke, Algozzine, and Epps, 1983) using other measurement methods.

This study extends the research which has examined the validity of the categorical approach to classification in special education. It asks the question, "are learning disabled students uniquely deficient in practical communication skills?" Since Precision Teaching measurement technology is new to this area of research, additional investigation is justified. Precision Teaching technology offers advantages that will show more clearly similarities and differences in communication skills among categories of exceptional students. Direct and frequent measures using frequency as the standard unit of measurement and the Standard Celeration Chart as the standard measurement scale are these advantages.

The results may be useful in several ways. In addition to discovering whether learning disabled students are uniquely deficient in language skills, we will provide data on the relationship of language skill development in categories of exceptional groups to the skill level of proficient adults. This makes it possible to get a feel for the size and importance of the deficits in these children. Also, the procedures used and results obtained may suggest ways to improve current methods for classifying mildly and moderately handicapped children by using Precision Teaching measurements and a functional orientation.

METHOD

Subjects and Setting. Table 1 presents data describing the samples by group, number of subjects, and sex. Children were selected from a school district in North-Central Florida with a base of 22,000 students. Four groups were included: learning disabled(L.D.), emotionally handicapped(E.H.), gifted, and regular program. All exceptional children in the study met the Florida Department of Education and local district special education placement guidelines.

Six schools agreed to participate and supplied lists of students by exceptionality, age, and classroom. Participants were randomly selected from the lists. Only students within plus or minus six months of their eighth birthday were selected.

A sample of adults was also included in the study to provide a criterion for proficiency. The adults were students in an undergraduate class in

the College of Education at the University of Florida.

TABLE 1

Subjects by Classification and Sex

Class.	Number	Female	Male
Adult	10	9	1
Gifted	16	10	6
Regular	23	9	14
L.D.	12	3	9
E.H.	18	4	14
TOTALS	79	35	44

Materials and Dependent Measures. Tasks selected for the study were designed to evaluate competence on four practical communication tasks with high functional value in day to day living. The tasks were: listening and then repeating spoken instructions (echoic speaking); reading a passage (oral reading); writing a spoken message (dictation); and writing about a picture viewed (composition) (Dunn, 1966). See Table 2 for a detailed description of the dependent measures.

Selection criteria were given to the principal of each school. They, in turn, prepared a list of all children meeting the age and exceptionality criteria. When we arrived at a school the first time we randomly selected children from the list, called them from their classrooms, explained the tasks, and administered eight timings. Cooperation was good, even though timings were new to almost all of the children.

Procedures. Five students and the authors administered all the timings and recorded the data. The procedure took 10 to 15 minutes per child.

Scoring. Frequency and accuracy scores were used wherever applicable, as shown in Table 2. The fluency is the sum of correct and error respond- ing.

RESULTS

For each category of student, the high, low, and median scores are reported for each component of each task(see Charts 1 and 2). By looking at the medians and ranges in Charts 1 and 2, it is easy to see the differences between groups and between communication skills within groups. Scores for adults may be used as a reference point for making judgments about the degree of proficiency attained by each group of students.

Table 3 displays the frequency multipliers for comparisons between the medians for each exceptionality group and for two reference groups--regular class students and adults.

Oral Reading. With this task, gifted and regular students were one third and one quarter, respectively, as accurate as proficient adults. Learning disabled (LD) and emotionally handicapped (EH) students were only one thirteenth and one fourteenth as accurate as the adults sampled. On reading fluency, the gifted and regular students were a divide by two of adult fluency, while LD were a /12.9 and EH a /4.3, while the median EH eight year old was only reading about 60 words per minute, the median LD student was reading over 90 words per minute.

Echoic Responding. Accuracy is the important aspect of this skill. Gifted students are a /2.4 of adults. LD students are only slightly less accurate with a /2.9 of adult accuracy. EH students were a /4 of adult accuracy.

Dictation. The gifted students were /1.4, and the LD and EH /2 and /2.1 less accurate than adults. Gifted students were x1.2 more fluent than regular students and /2.1 less fluent than adults. LD and ED students were /1.2 and /1.3, respectively, less fluent than regular students, and /2.9 and /3.3, respectively, less fluent than adults.

Composition. The main measure with this task is the number of words written within the allotted time--a fluency measure. Gifted students, on the average, wrote x1.2 more words than regular students and /1.2 fewer words than adults. LD students wrote only half as many words as regular students and only /2.7 as many as adults. The EH students wrote /1.5 fewer words than regular students and /2 fewer than adults.

Table 2
Description of Dependent Measures

Task	Learning Channel Set	Recording Plan	Components Measured
Oral Reading	See/say	5 30-second samples	Accuracy[1] Fluency[2]
Echoic Speaking	Hear/say	Time to say 3 sentences	Accuracy Fluency
Dictation	Hear/write	Time to write 4 short sentences	Accuracy Fluency
Composition	Think/write	5-minute sample	Fluency

[1] Accuracy= frequency correct/frequency of errors(Accuracy Ratio)
[2] Fluency= movements per minute

Table 3
Main Comparisons using Frequency Multipliers

ACCURACY			FLUENCY	
	Regular	Adult	Regular	Adult
Oral Reading				
Gifted	x1.2	/3.3	x1.0	/2.1
LD	/3.3	/12.7	/1.4	/2.9
EH	/3.7	/14.0	/2.0	/4.3
Echoic Speaking				
Gifted	x1.0	/2.4	x1.7	/1.6
LD	/1.2	/2.9	x1.0	/2.9
EH	/1.6	/4.0	x1.2	/2.4
Dictation				
Gifted	x1.4	/1.4	x1.2	/2.1
LD	x1.0	/2.0	/1.2	/2.9
EH	/1.1	/2.1	/1.3	/3.3
Composition				
Gifted			x1.2	/1.2
LD			/2.0	/2.7
EH			/1.5	/2.0

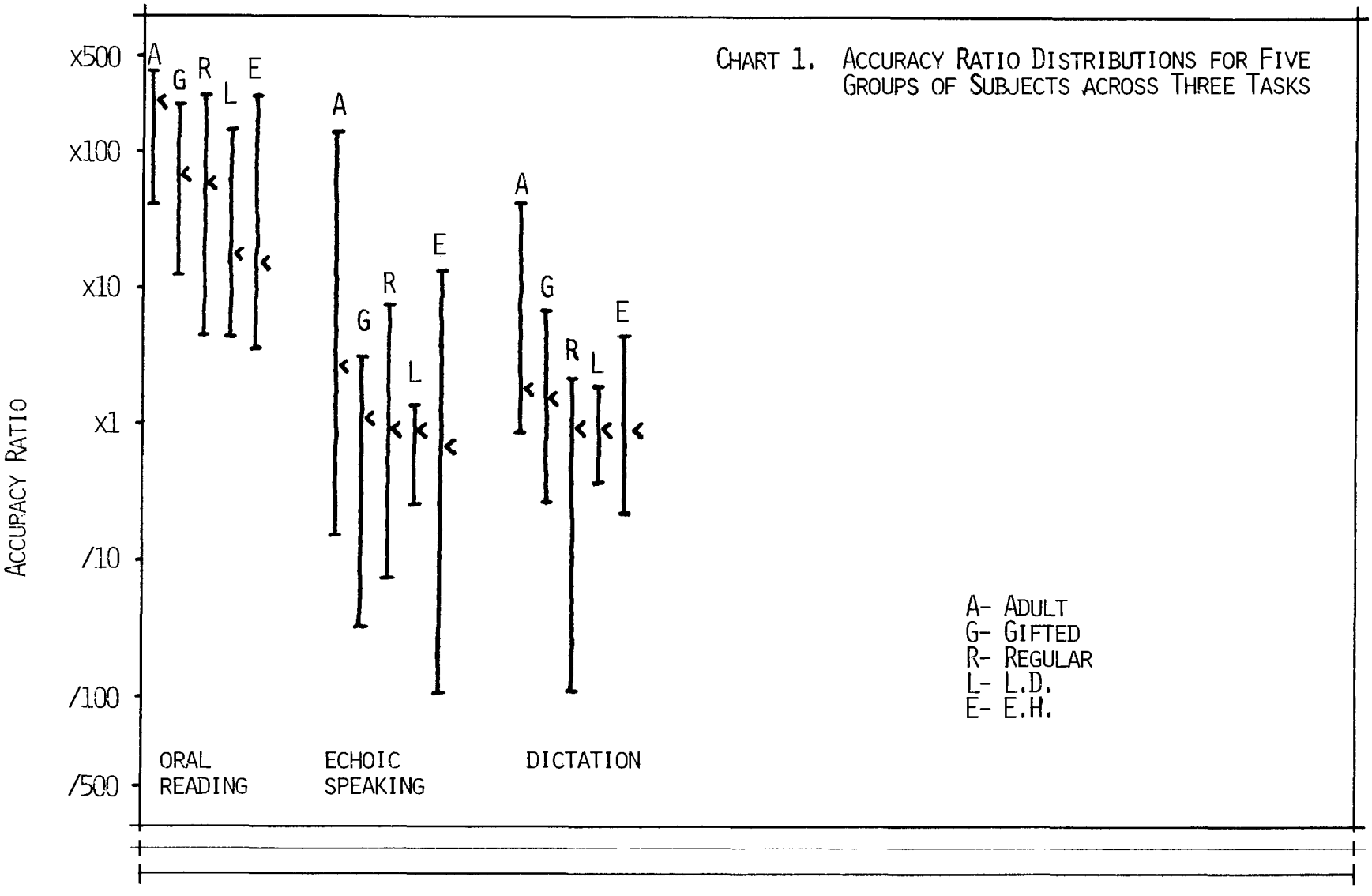


CHART 1. ACCURACY RATIO DISTRIBUTIONS FOR FIVE GROUPS OF SUBJECTS ACROSS THREE TASKS

WOLKING BRANSCUM MCKAY

FIVE GROUPS OF SUBJECTS PERFORM THREE

UNIVERSITY OF FLORIDA GAINESVILLE, FLORIDA

COMMUNICATION TASKS

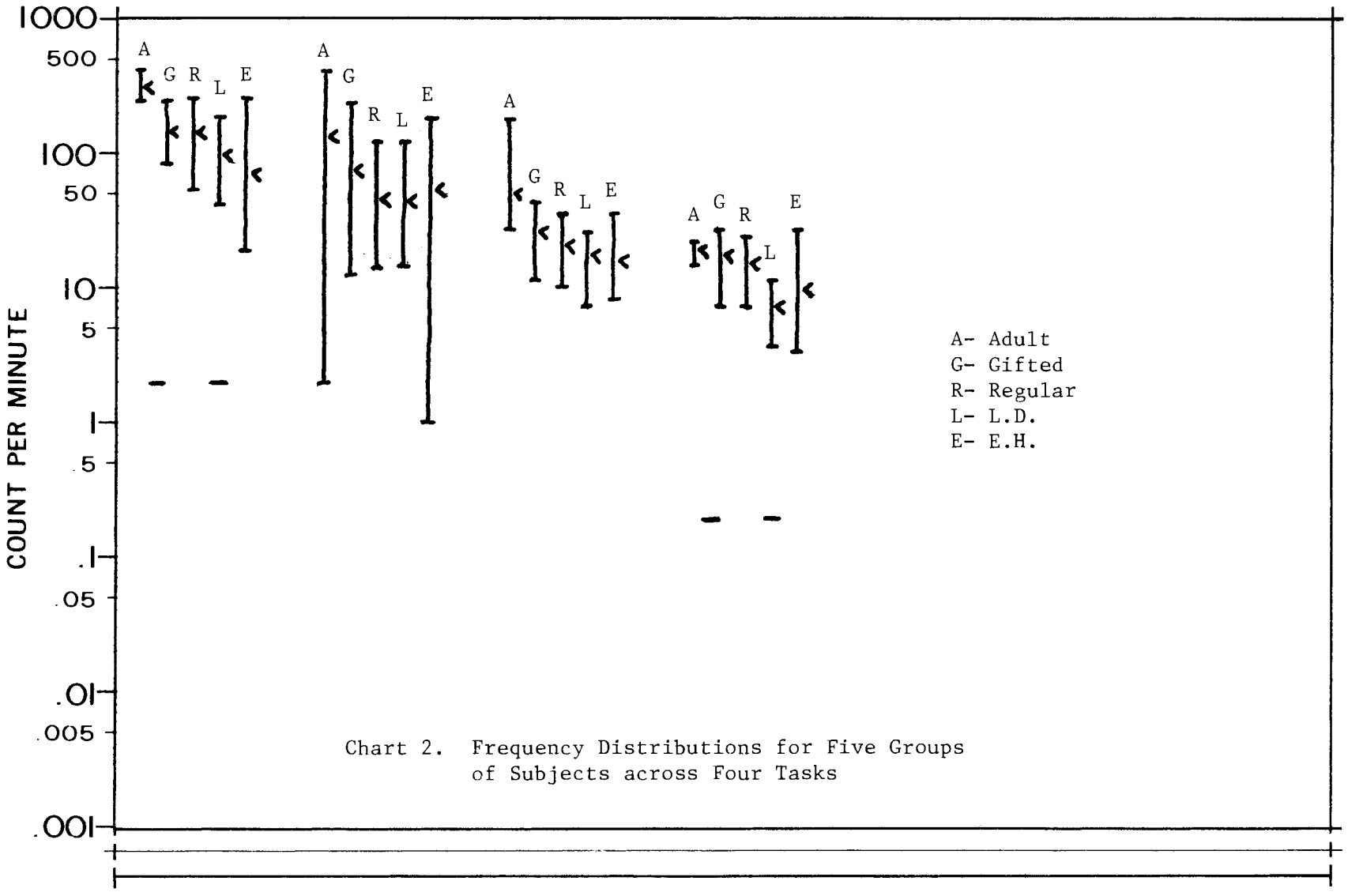


Chart 2. Frequency Distributions for Five Groups of Subjects across Four Tasks

Wolking Branscum McKay Five Groups of Subjects perform four

University of Florida Gainesville, Florida communication tasks

DISCUSSION

The results displayed in Charts 1 and 2 and Table 3 do not support the contention that LD students have unique language deficits, at least, not on the practical communication skills used in this study. In terms of median scores, LD and EH students are very similar, with LD students generally having slightly higher medians. Except for oral reading, neither LD nor EH students are much worse than regular students. However, regular students do have practical advantages on accuracy and fluency of oral reading. Comparing the ranges of scores for regular students, we see that the range of LD scores is, with minor exception, well within the range of scores for regular students. The overlap of score distributions between LD and regular student groups is almost complete. The range of scores for LD students is generally smaller than the range for any other student group. EH students generally have the largest score ranges, making them the least homogeneous group.

When compared with proficient adults, all student groups are least skillful in oral reading. In particular, they are less accurate, especially the LD and EH groups. The LD and EH group medians are a /2 to /3 of adult medians on echoic speaking, dictation and composition skills. Even the gifted students are a /2.1 of the adult median on dictation fluency. It is surprising how small the differences are between gifted and regular students. It is both a popular and professional belief that gifted students are superior in verbal communication skills. Our data do not lend much support to this belief.

It is also a popular belief, and a defining construct, that LD students are uniquely deficient in the use of spoken and written language. Within the limits of the skills evaluated and the Flordia DOE guidelines for selecting exceptional students, it appears that mild to moderate EH students have equally large functional verbal deficits. Neither group showed important practical deficits when compared with regular students.

These findings are one more piece of evidence that the definition of learning disability, based as it is on the concept of unique language deficit, is not tenable. The percent of overlap in the score distributions among regular, LD, and EH students is very high. And there is even major overlap with the distribution of scores for the gifted students. It's time to increase efforts to base the selection and placement of academically handicapped students on functional definitions. Some work has already been done(White, 1980). Classroom Precision Teachers are in a unique and powerful position to contribute to the development of a functional approach to initial placement and instruction for problem learners. They can provide data-based descriptions of performance and learning to replace traditional labels for hypothetical disabilities.

REFERENCES

Dunn, L. M., & Smith, J. C. (1966). **Peabody language development kit, level 2.** Circle Pines, MN: American Guidance Service.

Hallahan, D., & Kauffman, J. M. (1978). **Exceptional children: Introduction to special education.** Englewood Cliffs, NJ: Prentice-Hall.

Sherry, S. A. (1979). Behavioral characteristics of educable mentally retarded, emotionally handicapped, and learning disabled students. Unpublished doctoral dissertation, University of Florida.

White, O. R. (1980). Practical program evaluation: Many problems and a few solutions. **Evaluating handicapped children's early education programs.** Seattle, WA: WESTAR.

Ysseldyke, J., Algozzine, B., & Epps, S. (1983). A logical and empirical analysis of current practice in classifying students as handicapped. **Exceptional Children, 50,** 160-170.

AIM*STAR WARS

[Setting Aims that Compete]

Owen R. White
University of Washington

Episode IV: Scouts, Flankers and Rear Guard

In previous episodes we followed Uncle Owen's diary as he tried to unravel the mystery of the Learner-Force as it bore on terminal proficiency aims -- aims that will ensure a skill will be useful once all artificial instruction and support is withdrawn. In this episode, Uncle Owen returns to the consideration of more elementary intermediate proficiency aims -- aims that may not ensure the immediate usefulness of a skill outside instruction, but which will allow the Learner to move rapidly through a curriculum of related steps.

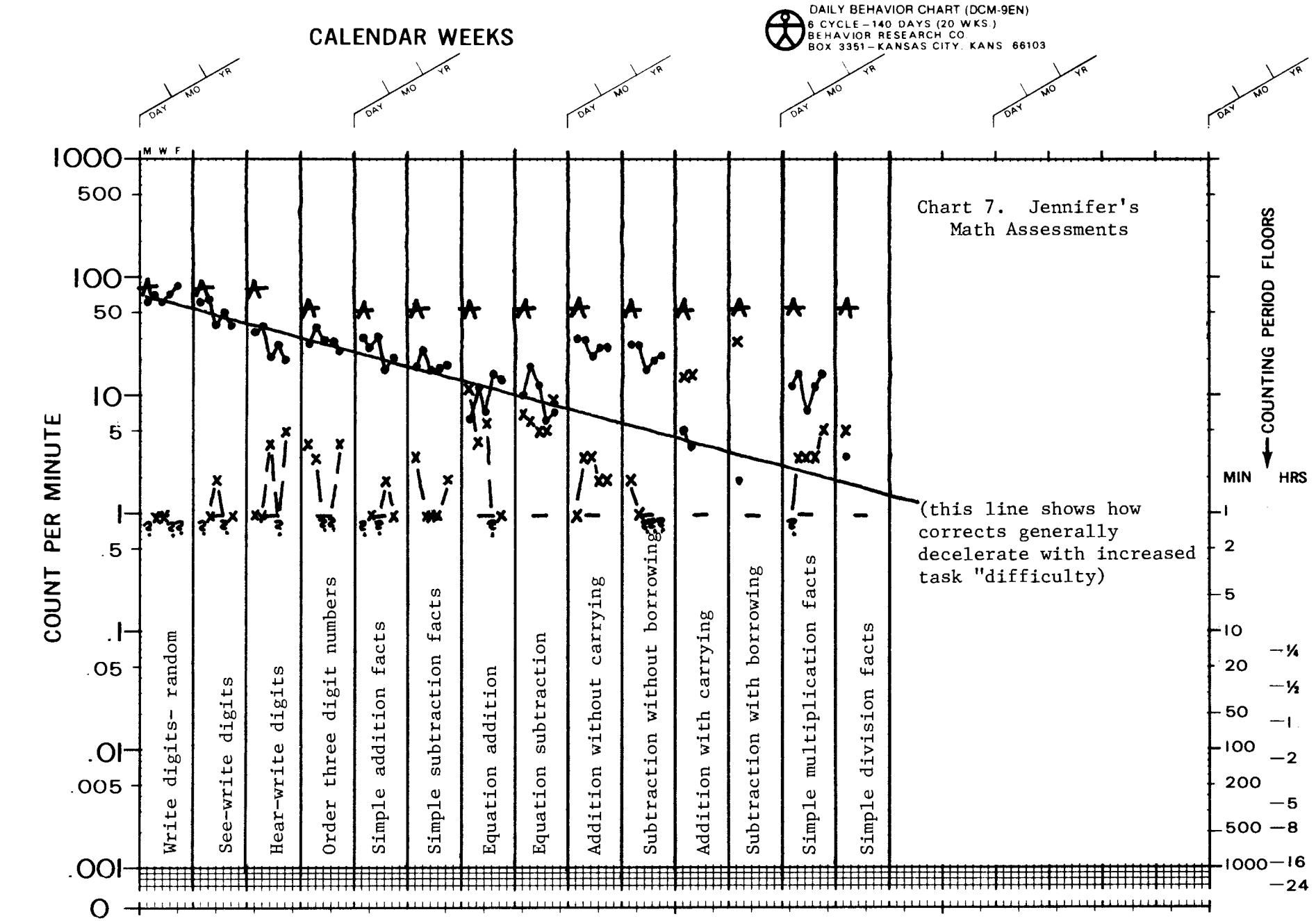
Advancement through a curriculum of related steps need not require complete mastery of each step along the way. Contrary to conventional wisdom, "leap ahead" to high levels in a curriculum without a concern for the development of "prerequisite skills" has proven quite successful in accelerating the progress of many learners (Lindsley, 1981; Eaton & Wittman, 1982; Bower & Orgel, 1981; McGreevy, 1980; Johnson & Jackson, 1980; Liberty, Haring & White, 1980). There might be many reasons for the success.

First, advancement to a higher level in the curriculum does not usually mean a complete abandonment of practice, assistance and feedback for earlier skills. The learner will still encounter, still practice and still receive feedback concerning most preprimer words even when they are embedded within the context of a third grade reader. Addition and subtraction skills will still be practiced and supported when the learner receives instruction in long division. Given that continued support, it seems reasonable that the fluency standards for advancement through a cumulative curriculum might not have to be very high.

Secondly, higher levels in any given curriculum or task sequence generally represent larger, more functional units of behavior. "Picking up a shoelace" in isolation is not likely to be very useful for a learner. Indeed, if the learner practiced such a small skill outside instruction, most people would think it was self-stimulation. Advancing rapidly through the curriculum to a point where the learner is working on the entire shoe-tying task(or better yet, an entire dressing sequence) provides the learner with greater opportunities to accomplish something of meaning and value -- something that has at least some chance of leading to accelerating consequences outside instruction.

The value of working with curricular units large enough or advanced enough to gain access to natural accelerating consequences should not be underestimated(Stokes & Baer, 1977). At times that will mean finding a level which provides the learner with a skill of personal value(e.g., buying something at the store without a special manager around, rather than practicing "see/say prices" with flashcards). At other times the value in working at a particular level will depend on the reactions evoked from other people in the learner's environment. Jennifer's inventory of math skills provides a good example (see Chart 7).

Jennifer, a third grade Learner-Rebel, was well below her classmates in all basic math skills. Five days were set aside to evaluate her frequencies more carefully in each of the 14 major skills she should have mastered by the end of the third grade. The inventory, one originally developed by Learner-Knight Liberty(1970), was very carefully designed to reveal deficiencies in a learner's demonstration of each skill and to highlight any unusual patterns in the relationships among skills. If a pupil is fluent, performances should be at or above typical Normie Aims(see the aim-stars on the chart). Moreover, since all the behaviors being assessed use the same basic tool movement(writing digits), the "conceptual" difficulty of each task should be directly


DAILY BEHAVIOR CHART (DCM-9EN)
6 CYCLE – 140 DAYS (20 WKS.)
BEHAVIOR RESEARCH CO
BOX 3351 – KANSAS CITY, KANS 66103
CALENDAR WEEKS
DAY MO YR
M W F
1000
500
100
50
10
5
1
.5
.1
.05
.01
.005
.001
0
COUNT PER MINUTE
Write digits- random
See-write digits
Hear-write digits
Order three digit numbers
Simple addition facts
Simple subtraction facts
Equation addition
Equation subtraction
Addition without carrying
Subtraction without borrowing
Addition with carrying
Subtraction with borrowing
Simple multiplication facts
Simple division facts
Chart 7. Jennifer's Math Assessments
(this line shows how corrects generally decelerate with increased task "difficulty)
COUNTING PERIOD FLOORS
MIN HRS
1
2
5
10
20
50
100
200
500
1000
¼
½
1
2
5
8
16
24
CALENDAR DAYS
White
SUPERVISOR ADVISER MANAGER
Jennifer
BEHAVER
AGE
performs numbers and computation tasks
COUNTED
University of Washington Seattle, Washington
AGENCY
COUNTER
CHARTER

related to the frequency of correct movements. As a task becomes more difficult, the learner's correct performances will slow down. (Note: All skills in the sequence are actually tested on the same five days, so simple "passage of time" could not account for performance increases or decreases across skill areas. The performance records are placed on a single chart to facilitate comparisons and analysis.)

Jennifer's performances confirm her lack of fluency in math. With the exception of the basic tool movement(free/write digits), correct frequencies are all below typical Normie Standards. Correct frequencies also fall off in a steady, predictable manner as task difficulty increases -- most of the correct frequencies fall quite close to the solid, dark, decelerating line drawn across the chart. Correct frequencies for three skills are well above that line, however. Jennifer is doing much better than expected in two-column addition without carrying, two-column subtraction without borrowing, and simple multiplication facts.

A comparison of Jennifer's two-column frequencies and her simple fact frequencies explains part of the mystery. Those frequencies are virtually identical. Jennifer is simply reacting to the two-column problems as if they were sets of two facts "scrinched together." However, Jennifer has never been provided with instruction in multiplication facts. How did she learn even a few of those facts?

It turns out that Jennifer's regular classmates are now studying multiplication. Jennifer is not even in the regular class during math period. She's off in the resource room studying addition and subtraction, but she knows what the "regular kids" are doing, and she wants to do it too. Somewhere, somehow, she's been sneaking away and teaching herself multiplication. How dare she do this without the guidance of a teacher?

Fortunately, Jennifer's teacher did not follow the tried and true method of "test up from the bottom until the child fails to meet aim and begin teaching there." If she had, Jennifer would be studying "hear-to-write," or possibly "ordering three digit numbers" with a sprinkling of add facts. Jennifer's teacher recognized her need to gain access to the natural accelerating consequences of learning what the others are learning, even if she's "not ready." So Jennifer got time to practice multiplication facts. She also worked on addition and subtraction, because she needed those skills too, at least in the long run.

This brings us to the last reason why leap aheads without fluency on intermediate steps may work. Quite simply, what WE might believe is "prerequisite" or the "natural order of things" may not be necessary or natural at all. Gary, a fourteen year-old severely mentally retarded and physically handicapped Learner-Rebel, will scout the point and show us the way.

Gary needed to develop a wider range of "self-help" skills. One skill in particular would provide Gary with a bit more dignity and would be very helpful to his managers -- moving from the toilet to a walker(or vice versa) without assistance. John Holliday, Gary's manager, began as all good behavior analysts begin. He developed a detailed outline of the steps "required" to perform the desired task. Unlike many teachers, however, he recognized the advisability of working with skills within a functional context, so he worked with all the steps in their proper sequence during each session. The results are shown in Chart 8.

The first day was depressing. Gary failed to perform even a single step in the sequence correctly. John had faith. The next day Gary performed two of the steps correctly. By the end of the ninth day Gary's correct-steps-in-sequence were better than 20 per minute and errors were down to 10 per minute. Things were going so well, John reduced the level of assistance provided for each step.

Gary's correct frequencies are still accelerating, but at a much slower pace, and the errors are accelerating much faster. Turn to the "Traditionalist's Normie Empire Handbook." Things are not going well? You tried too move to fast. Slow down. Back

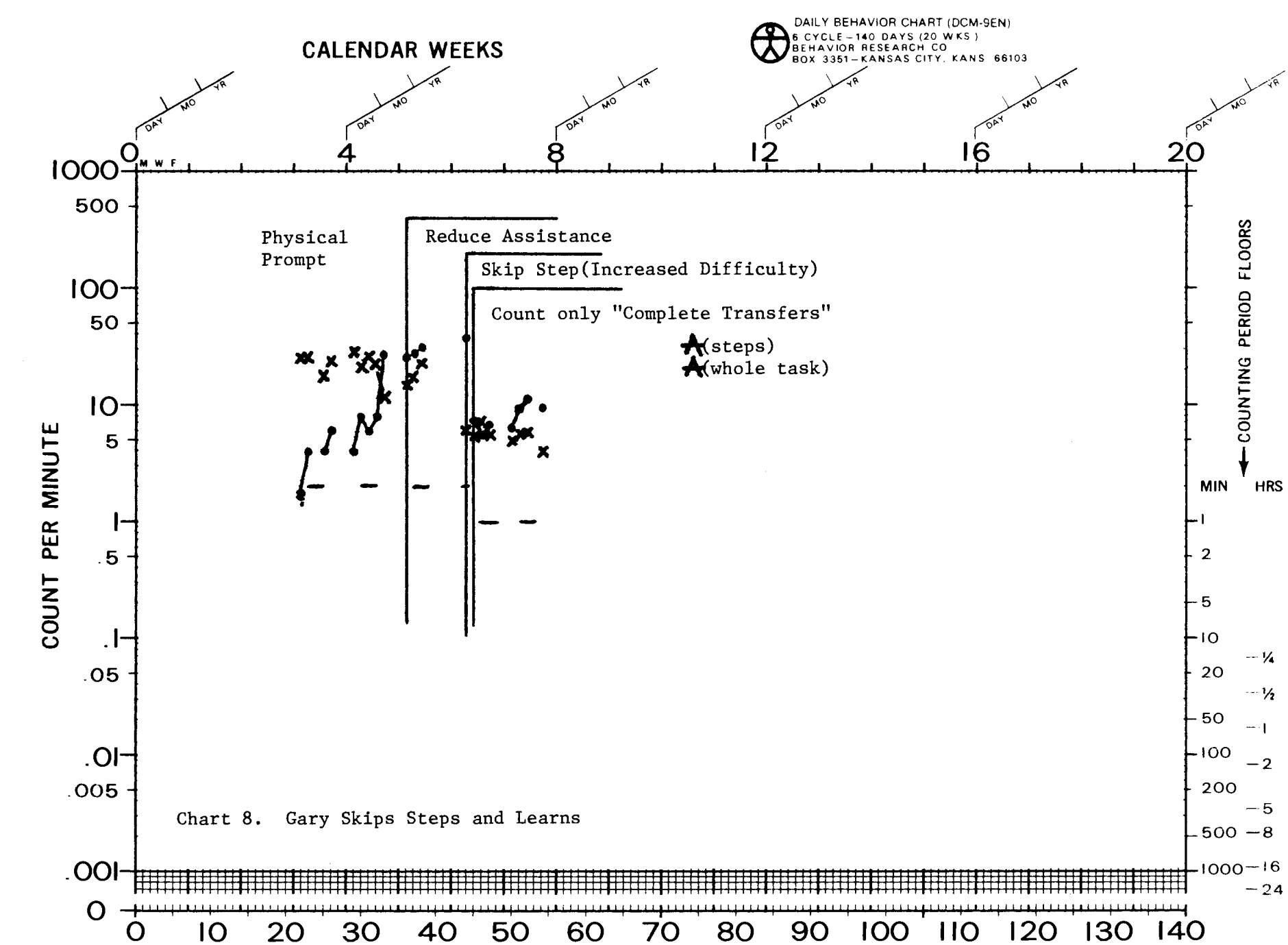


Chart 8. Gary Skips Steps and Learns

performs steps of transfering from walker

SUPERVISOR	ADVISER	MANAGER		BEHAVER	AGE	COUNTED
	White	Holliday		Gary	14	

University of Washington Seattle, Washington

AGENCY COUNTER CHARTER

to railing during toileting

up. Put back some of the assistance you took away, at least for the more difficult steps.

"No," cried John, aspiring Learner Knight that he was. "If I have but ONE correct performance in five days I shall not retreat!"

He put his faith in the Learner Force and thought about the type of error that Gary seemed to be making. Was there a message there?

Gary wasn't following the rules. John's task analysis(developed with Gary's special needs in mind) called for Gary to transfer each hand, one at a time, to the side of the walker closest to the railing, then(again, in two separate steps) transfer each hand to the wall railing. When he thought about it, John decided that most of Gary's errors occurred when his hand seemed to "overshoot" the walker and begin to go directly to the railing. John had reacted to such tendencies as any good teacher would. He grabbed Gary's hand before it got very far, plunked it down on the walker where it belonged, and recorded an error.

John cared more for Gary than the task analysis. If Gary wanted to perform the task in one step instead of two, that was alright. He began to allow Gary to skip any step he wanted. The next day the correct frequency edged up a bit and the error frequency plummeted. Seeing the futility of counting steps in a sequence which Gary apparently did not need, John began to count only "whole transfers" and provide assistance only when Gary really got off track. Things were confused for a few days, but moved along rather nicely thereafter.

What WE believe to be a logical, perhaps necessary sequence of tasks may not be logical or necessary at all. Addition and subtraction do not have to be mastered before multiplication. Two stops for each hand is not necessarily easier for a physically handicapped child than one stop for both hands. Send out the scouts! Take the point!

Work at the very highest level possible. If the child can progress on a mixed sheet of math problems containing all types of problems, then it really doesn't matter whether addition comes before multiplication -- it can all come at once. If the child can work out his or her own task analysis and achieve the desired end (like Gary getting to the toilet), then it really doesn't matter whether it is the way WE would choose to do it. If the fifth grade "learning disabled" child can make progress by reading from a fifth grade book, even though the tests say a second grade reader would be "better," then let the little learner-rebel go!

Is this too much of a leap ahead? An "all mixed" math probe might confuse the child, or one type of problem might be consistently skipped and, therefore, never practiced. A severely handicapped child may need as least some guidance in figuring out a reasonable task sequence. The fifth grade child may still need drill in some particularly difficult blends in order to make the best progress possible in the fifth grade reader.

If it does seem more reasonable to work on certain subskills in a definite sequence, there are at least two ways we might avoid a lock-step, "do it my way, one step at a time" catastrophe.

First, although we might be working at one intermediate level of the curriculum, we can still scout ahead. Work on blends, assess on blends, assess again using the fifth grade reader. When climbing the ALPs (Advanced-Learning-Probes) indicates that blending errors are dropping out of fifth grade reading, stop working on blends in isolation. Feedback for the few remaining errors can continue in the context of the fifth grade reader. Progress on the "leap up" ALPs assessment is the most appropriate and functional aim for intermediate skill instructional programs.

Second, if it simply seems unmanageable to probe all skills in a sequence at once(the ALPs are too big), then at least move through cumulatively dependent substeps in the sequence as quickly as possible -- probably whenever the pupil shows flagging interest by going flat. Get to the highest level possible as quickly as possible, and then begin to build "terminal" fluency.

This strategy makes sense. However, with almost everything, there are a few caveats. An all out charge can leave one's flanks and rear exposed.

Precisely because not all skills ARE strictly hierarchical, there is sometimes a danger of leaving something behind that won't be incorporated into what appear to be related, higher-level skills. Judy's inventory demonstrates the wisdom of sending out flankers and a rear guard (see Chart 9).

Judy is reading reasonably well in her grade level text. She's just a bit below aim. Just to be safe, though, send out the flankers and check the perimeters.

We've found a weak spot. Her blending skills are almost non-existent. Judy's teacher has to decide whether it's wise to try and turn a reasonably fluent sight-word reader into a phonics reader. That would require a controlled withdrawal to a lower frequency in order to regroup, but it might make all the difference when the final assault on functionality begins. A tough decision. If Judy's teacher had not sent out flankers to check all perimeters, however, the possibility that a controlled withdrawal might be advisable would never have been discovered.

Commander, Commander, there's another report from the flankers. Judy's math skill defenses are even weaker. She's certainly a long way from fluency in addition and subtraction, but she's not exactly out of the ballpark either. Now take a look at the flanker's report concerning her skill in writing numbers in order("...Judy, here are three numbers...9, 13, and 2...I want you to write the smallest number first, then the next number, and then the largest number..."). Judy can add. Judy does not know that 9 is bigger than 2. If we had charged blindly on and assessed only mixed addition facts, we might never have found out that judy was memorizing otherwise totally meaningless material. It's time to REGROUP.

Don't withdraw! Reinforce the weak flank. Continue the drive on Judy's higher math skills, but begin additional work on her more rudimentary number concepts. Then leap ahead again!

Work at the highest level possible. Move from one step in a sequence to another as soon as possible. But keep looking back(rear guard) and around (flankers). Unless it is very obvious that all relevant skills are completely contained and adequately assessed in higher-level material, make sure those other skills get the attention they deserve. If necessary, work with high and low skills at the same time.

The second caveat concerning leap-aheads comes from a notion shared by Young Eric(Haughton, 1980). It may be advisable to have the learner practice high frequencies -- get used to the "feel" of fluency, as it were, prepare the troops for the long battle to come. If constant leap-ups produce rapid movement through the curriculum and high rates of progress, but low frequencies, we may be teaching our pupils that it's o.k. to be SLOW (Slothful, Lethargic and Obviously Worthless). We must remember that there are several forms of "competition," and that FAST (Fluency At Skill-instruction Termination) will ultimately determine whether the skill will prove useful to the Learner. The battle is joined.

The simplest way to reach the end of a curriculum is to begin at the end. Teach the final, ultimate performance from the start.

If that does not seem possible, then at least send out the scouts. Provide instruction for whatever intermediate steps seem appropriate, but keep trying to gain the vantage of the ALPs(Advanced-Learning-Probes) to assess the impact of your instruction on higher-level skills.

Leap ahead in the curriculum as quickly as possible, even if the fluency achieved at intermediate steps is less than what you know will be necessary in the long run.

But as you leap ahead, protect your flanks and establish a rear guard to make sure that all related skills are really brought to a level which will make them useful after instruction is terminated. Blind faith that skills are truly "hierarchical" or "prere-

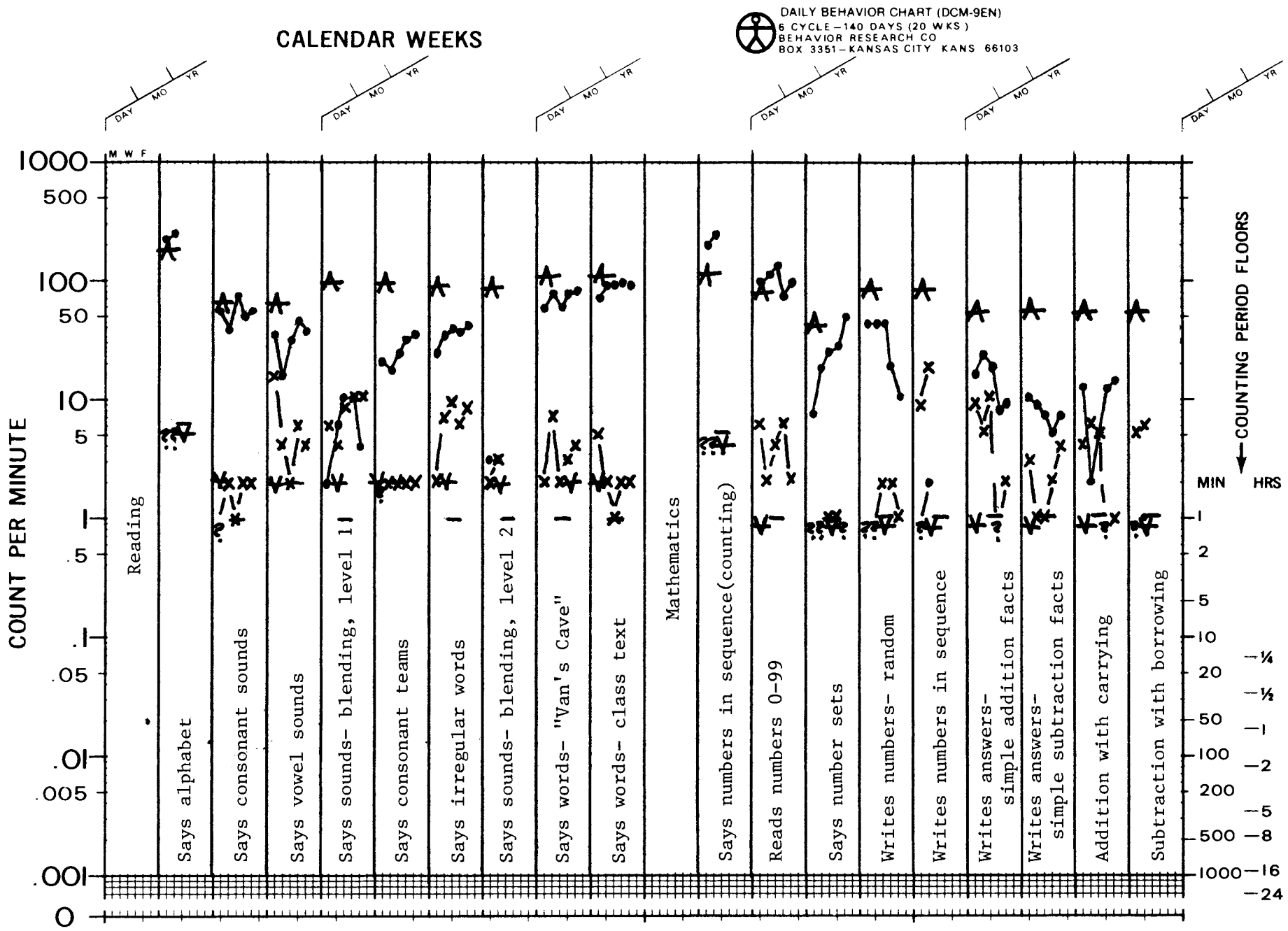


Chart 9. Judy's Reading and Math Assessments performs reading and math tasks

CALENDAR DAYS

SUPERVISOR	ADVISER	MANAGER	BEHAVER	AGE	COUNTED
	White		Judy		

AGENCY	COUNTER	CHARTER
University of Washington Seattle, Washington		

quisite" to one another in sequence is rarely justified. Look around, behind and ahead.

In the next episode, Uncle Owen's diary draws to a close as he attempts to summarize his thoughts and describe the "Uneasy Truce" which appears to have been established between the Learner Rebels and the Evil Normie Empire.

REFERENCES

Bower, R. & Orgel, R. (1981). To err is divine. **Journal of Precision Teaching, 2**(1), 3-12.

Eaton, M. & Wittman, V. (1983). Leap Ups: Acceleration of learning through increasing material difficulty. **Journal of Precision Teaching, 3**, 29-33.

Haughton, E. C. (1980). Practicing practices: Learning by activity. **Journal of Precision Teaching, 1**(3), 3-20.

Johnson, J. & Jackson, J. (1980). Stepping ahead results in improved learning. **Journal of Precision Teaching, 1**(1), 29-30.

Liberty, K. (1970). **Regional resource center diagnostic inventories.** Eugene, OR: University of Oregon Regional Resource Center for Handicapped Children, Project No. 472917, Department of Special Education, Clinical Services Building.

Liberty, K., Haring, N. & White, O. (1980). Rules for data-based strategy decisions in instructional programs: Current research and instructional implications. In W. Sailor, B. Wilcox, & L. Brown (Eds.), **Methods of instruction with severely handicapped students.** Baltimore, MD: Paul H. Brookes.

Lindsley, O. R. (1981). Current issues facing standard celeration charting. An invited address to the Precision Teaching Winter Conference, Orlando, FL.

McGreevy, P. (1980). Hard to do becomes easy to learn. **Journal of Precision Teaching, 1**(2), 27-29.

Stokes, T. F. & Baer, D. M. (1977). An implicit technology of generalization. **Journal of Applied Behavior Analysis, 10**, 349-368.

Owen R. White is a member of the Special Education faculty at the University of Washington, CDMRC, WJ-10, Seattle, WA 98195.

SELF-CHARTING: GIVING KIDS A CHANCE

Robert Bower
Wayne State College

> Most things we can record. But still some thing you can't record. Something we can record by tape recorder camera charts or pictures. When we ues a tape recorder we can here the sounds of anamills or people. When we uos a camera we can see howses bridges and parcks. If you yous a ckart you can see how mach you'v grou. But almost all things you can record one of these was.
>
> (William Northey in Lovitt[1982, p. 282.])

RATIONALE AND HISTORICAL PERSPECTIVE

A function of education is to shape children's sense of responsibility and independence in both social and academic settings. Self-recording and self-assessment procedures have been used for such purposes. Self-recording alone has been found to be effective in producing change in classroom and non-classroom settings with children of varying ages (Rosenbaum and Drabman, 1979; Broden, Hall and Mitts, 1971; Jones, Fox and Billingsley, 1972). Positive effects of self-recording have been demonstrated for both accelerating and decelerating targeted behaviors (O'Leary and Dubey, 1979). According to Lovitt(1984), self-counting and self-recording ought to be part of any teacher's operating tactical repertoire.

Self-recording procedures can be extended to include self-assessment or self-monitoring. An evaluative element is added where the student assumes a more active role as co-teacher or co-therapist(Hallahan, Marshall, and Lloyd, 1981). Self-

assessment procedures have functioned as change agents in a variety of settings and with a variety of behaviors and subjects (Rosenbaum and Drabman, 1979). Visual records of behavior changes are provided when self-charting is employed. Self-charting allows children to see their present behavior and assess changes in their behavior over time(Eaton and Hansen, 1979). Lindsley(1971) suggested that self-recording and self-charting are answers to teachers' economic and time problems.

The integrity of the records or reliability of self-recorded data may be an issue with some practitioners. Researchers have reported high reliability coefficients of self-reported data(Alberto and Troutman, 1982; Sokolove, 1973). Rosenbaum and Drabman(1979) reported that even when low correlations between self-recording and observer records occurred, behavior changed in the desired direction.

The idea of self-recording is not new. Skinner's invention of the cumulative recorder permitted the laboratory animal to record its own behavior. In **The Behavior of Organisms**, Skinner (1938, p. 60) stated that "all the curves given in the book... are photographic reproductions of records made directly by the rats themselves." Pictures of human psychotic behavior were collected and displayed during the 1950's and 1960's in a similar manner by Lindsley at Metropolitan State Hospital, Waltham, Massachusetts (Lindsley, 1964; Skinner, 1972).

It is no wonder that individuals who practice the conventions of Precision Teaching encourage and support a self-reporting and self-assessment environment for their students. Lindsley(1984) insisted that the integrity of the child's chart should be maintained by teachers, administrators, and publishers. He suggested that the **Journal of Precision Teaching** is unique in that respect, because the charts in this journal are simply traced reproductions of the charts produced by the behaviors.

Many educators tend to assume that children, especially young children, are unable to self-graph and self-assess. This assumption is often without foundation, since these procedures are infrequently made available to children. Recording and assessment chores are typically assumed by the teacher. While evidence exists that young children can self-monitor social and academic behavior(Duncan, 1971; Shryock, Eaton and Bogert, 1981; Maloney, 1982; Holden, 1982), more documented evidence is needed.

A teacher's concern for precision and neatness of data collection and data display may prevent the child from assuming an active role in recording and management activities. However, a worthwhile goal in the humanization of management programs is to permit the child's active participation in the total process. Children should be permitted to personalize the charts displaying their own behavior. This is a right which should not be violated by educators at the expense of "cleaning up" a chart. It is gratifying and refreshing to see children claim ownership of behavior by individualizing and personalizing their own charts.

THE CHILDREN'S CHARTS

The following charts are children's charts and are a result of projects completed as partial requirement for an undergraduate educational psychology class. The students conducting the projects were elementary education majors. The data were collected during their student teaching experiences. Self-monitoring and self-recording were employed. Although the use of standard charting conventions is not consistent, the children's charts are presented in an unaltered state. The children's charting does not inhibit the function or interpretation of the data.

Chart 1 is Ray's chart. Ray is a five-year old kindergarten student. The pinpoint of chair rocking was selected because Ray frequently spilled his milk on the table, chair and floor during the milk break. A chair rock was defined as each time the front legs of Ray's chair left the floor. Ray volunteered to help with the project. Treatment 1 consisted of the teacher encouraging Ray to sit anywhere but at the head of the table.

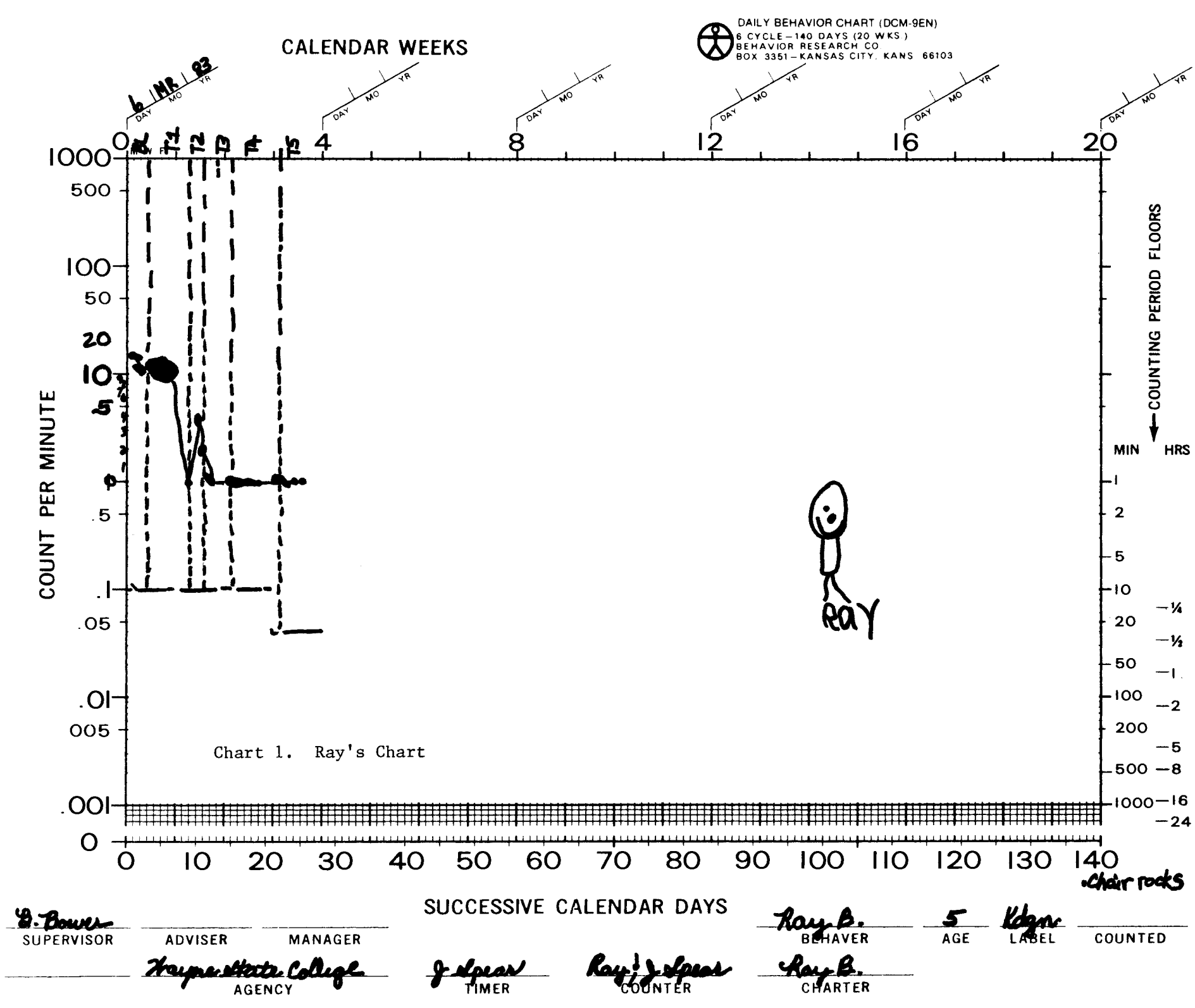


Chart 1. Ray's Chart

Prior observation suggested that Ray was most disruptive when at the head of the table. This treatment was ineffective. During treatment 2, Ray was involved in counting chair tips and rewarded with stickers for five or less tips during the 10 minute period. The schedule of reinforcement was leaned during the next two treatment phases to a criterion of zero tips in treatment 4. The counting period was extended to thirty minutes in phase 5 to include break and reading periods. The criterion was zero chair tips.

With the help of his teacher, Ray placed the dots on Chart 1. Some individuals may be concerned that the dots are not drawn precisely. Some are in fact quite large. The counting period is appropriately indicated by horizontal lines. In order to facilitate Ray's charting behavior, the behavior scale represents total counts - not count per minute. The frequencies are certainly retrievable. Ray has claimed his chart by placing a pictorial and semantic signature on the right.

Chart 2 provides a recharted display of Ray's behavior according to Standard Celeration Chart conventions. The most dramatic change is reflected in the counts below the counting period floor. However, the downward trend in Chart 1 is clearly visible. A teacher who is interested in behavior change can readily see change on the chart drawn by Ray. The effects of the interventions are not included in Ray's version of the chart. The benefits of allowing Ray to keep his own chart at the expense of ignoring some charting conventions may be worthwhile.

Theresa's chart is Chart 3. Theresa is a six-year-old first grader who was working on a 35 sight word curriculum. The teacher worked with Theresa before the beginning of every school day. One see/say timing was taken at the end of this session. The word card deck contained 70 cards or two samples of each sight word. Theresa was given the flashcards to practice during free time and at home for the first intervention. Phase 2 consisted of 5 minutes of a "go fish" game. The game was played with a peer partner. The sight words were written on fish shaped cards. The child was required to pronounce the pair of words correctly after finding them. The game was followed by a one minute timing. Intervention 3 included a 10 minute "bingo" learning activity, where the child would locate one of the pronounced sight words on a bingo card.

The integrity of the data is not compromised by Theresa's charting ability. The data clearly show Theresa's performance and learning during each intervention over the four week period. Theresa's goal of 35 words per minute was surpassed. It is apparent, however, that Intervention 2 was producing learning and should have been continued. Intervention 3 decreased her learning and thus her final performance.

Theresa's label clearly shows pride and ownership in her chart. Anecdotal data collected by the student teacher indicated that Theresa improved in her reading, volunteered in reading group, and read more independently towards the end of the project. Tape recorded reading samples were periodically taken and later played back so Theresa could hear her improvement.

ACKNOWLEDGEMENT

The author extends his thanks and acknowledges the contributions of Jennifer Spear Long and Amy Pelster, the student teachers, as well as, Ray and Theresa. The children's charts give testimony to a genuine respect for the right of children to participate fully in the learning process.

REFERENCES

Alberto, P. A. & Troutman, A. C. (1982). **Applied behavior analysis for teachers.** Columbus, OH: Charles E. Merrill.

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

Duncan, A. D. (1971). The view from the inner eye: Personal management of inner and outer behaviors. **Teaching Exceptional Children, 3,** 147-151.

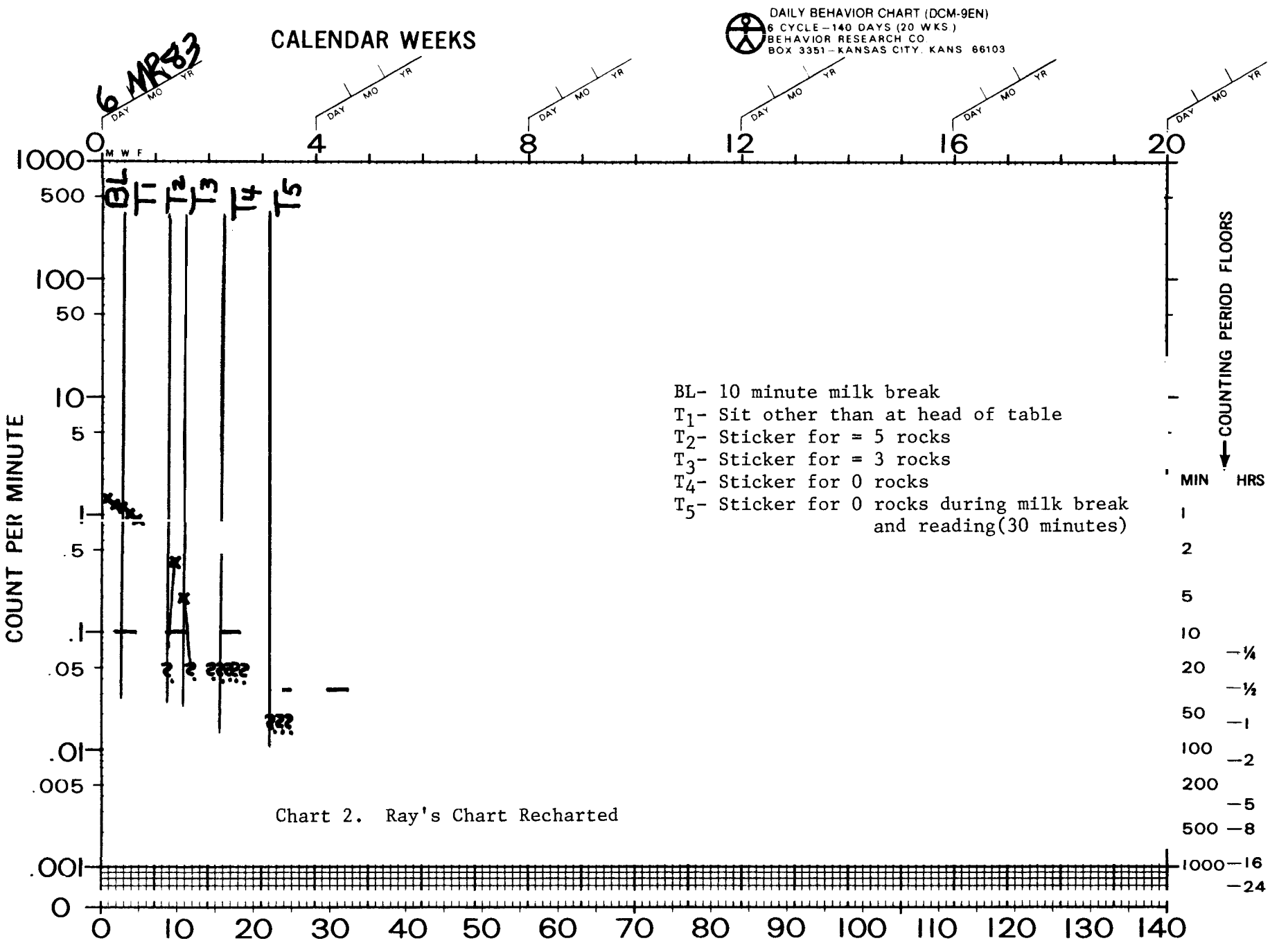


Chart 2. Ray's Chart Recharted

Bower / SUPERVISOR — Spear-Long / MANAGER (ADVISER)

Ray B. / BEHAVER — 5 / AGE — LABEL — rocks chair / COUNTED

Wayne State College and West Point Elementary Wayne, Nebraska / AGENCY

CHARTER

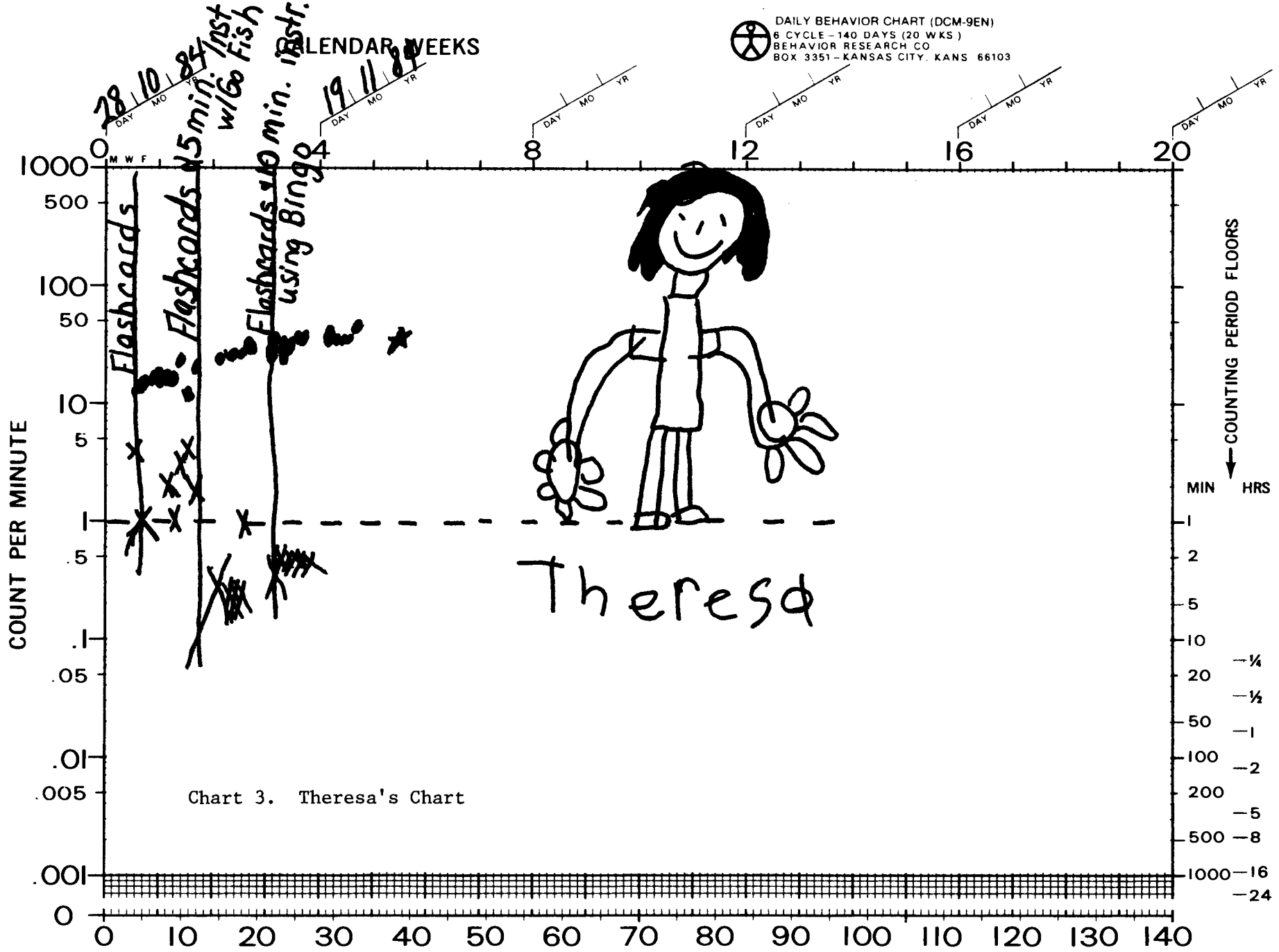


Chart 3. Theresa's Chart

Bob Bower (SUPERVISOR) | (ADVISER) | Amy Pelster (MANAGER) | Theresa (BEHAVER) | 6 (AGE) | (LABEL) | sight words (COUNTED)

WSC (AGENCY) | Amy Pelster (TIMER) | Amy Pelster (COUNTER) | (CHARTER)

. correct - •
incorrect x

Eaton, M. & Hansen, C. (1979). When classroom control is slipping away, ask yourself...(behavioural control through naturalistic solutions). **B. C. Journal of Special Education, 3,** 335-356.

Hallahan, D. P., Marshall, K. J., & Lloyd, J. W. (1981). Self-recording during group instruction: Effects on attention to task. **Learning Disability Quarterly, 4,** 407-413.

Jones, R., Fox, S., & Billingsley, F. (1972). Self-marking and the reduction of talk-outs. **Teaching Exceptional Children, 5,** 25-26.

Lindsley, O. R. (1964). Direct measurement and prosthesis of retarded behavior. **Journal of Education, 147,** 62-81.

Lindsley, O. R. (1971). Precision teaching in perspective: An interview with Ogden R. Lindsley. **Teaching Exceptional Children, 3,** 114-119.

Lindsley, O. R. (1984). Keynote address at the 1984 National Precision Teaching Conference, Park City, UT.

Lovitt, T. C. (1982). **Because of my persistence, I've learned from children.** Columbus, OH: Charles E. Merrill.

Lovitt, T. C. (1984). **Tactics for teaching.** Columbus, OH: Charles E. Merrill.

O'Leary, S. G. & Dubey, D. R. (1979). Applications of self- control procedures by children: A review. **Journal of Applied Behavior Analysis, 12,** 449-465.

Rosenbaum, M. S. & Drabman, R. S. (1979). Self-control training in the classroom: A review and critique. **Journal of Applied Behavior Analysis, 12,** 467-485.

Skinner, B. F. (1938). **The behavior of organisms.** New York: Appleton-Century- Crofts.

Skinner, B. F. (1972). **Cumulative record: A selection of papers.** New York: Appleton-Century-Crofts.

Sokolove, H. E. (1973). Inner behavior: The private I becomes public information. Unpublished master's thesis, University of Missouri-Kansas City. Kansas City, KS: Precision Media.

Bob Bower is an assistant professor at Wayne State College, Wayne, NE 68787.

[Editor's Note: Thank you, Theresa and Ray for sharing your "original" charts with us and allowing us to trace them for printing in **JPT**. Our tracing does not "do justice" to them. By the time you read this, you should have received your returned originals.]

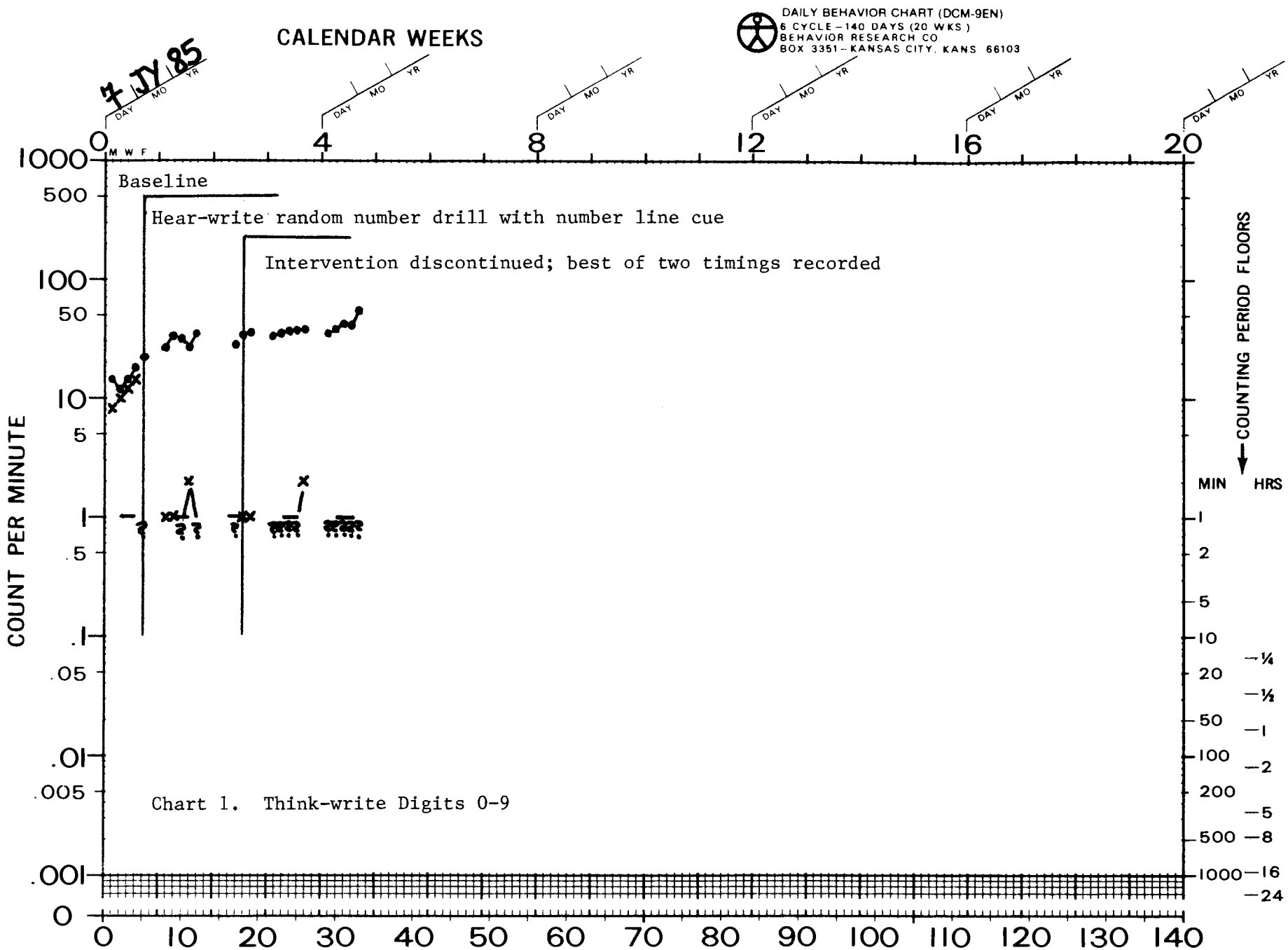
Chart-sharing

NUMBER REVERSALS: AN EFFECTIVE INTERVENTION

Susan K. Peterson
University of Florida

The Multidisciplinary Diagnostic and Training Program (MDTP) housed in the College of Education at the University of Florida, was established in October, 1981 to assist kindergarten through sixth grade students who exhibit complex learning, behavioral, and/or medical problems. The program has contractual agreements with 13 northern Florida school districts. One service the program provides is placement in a diagnostic classroom. Children who are staffed into this component of the program attend the MDTP class for one to six weeks. During this time intervention strategies are developed for the home school personnel and the parents of the child.

The student in this investigation was a seven year old first grader who was referred to the MDTP due to academic and behavioral difficulties. The home school teachers expressed a specific concern regarding the frequency of this student's verbal and written reversals. The following discussion addresses an effective intervention



SUPERVISOR	ADVISER	MANAGER	BEHAVER	AGE	LABEL	COUNTED
		Peterson	S.	7		think-write digits 0-9

AGENCY	TIMER	COUNTER	CHARTER
University of Florida	Gainesville, Florida		

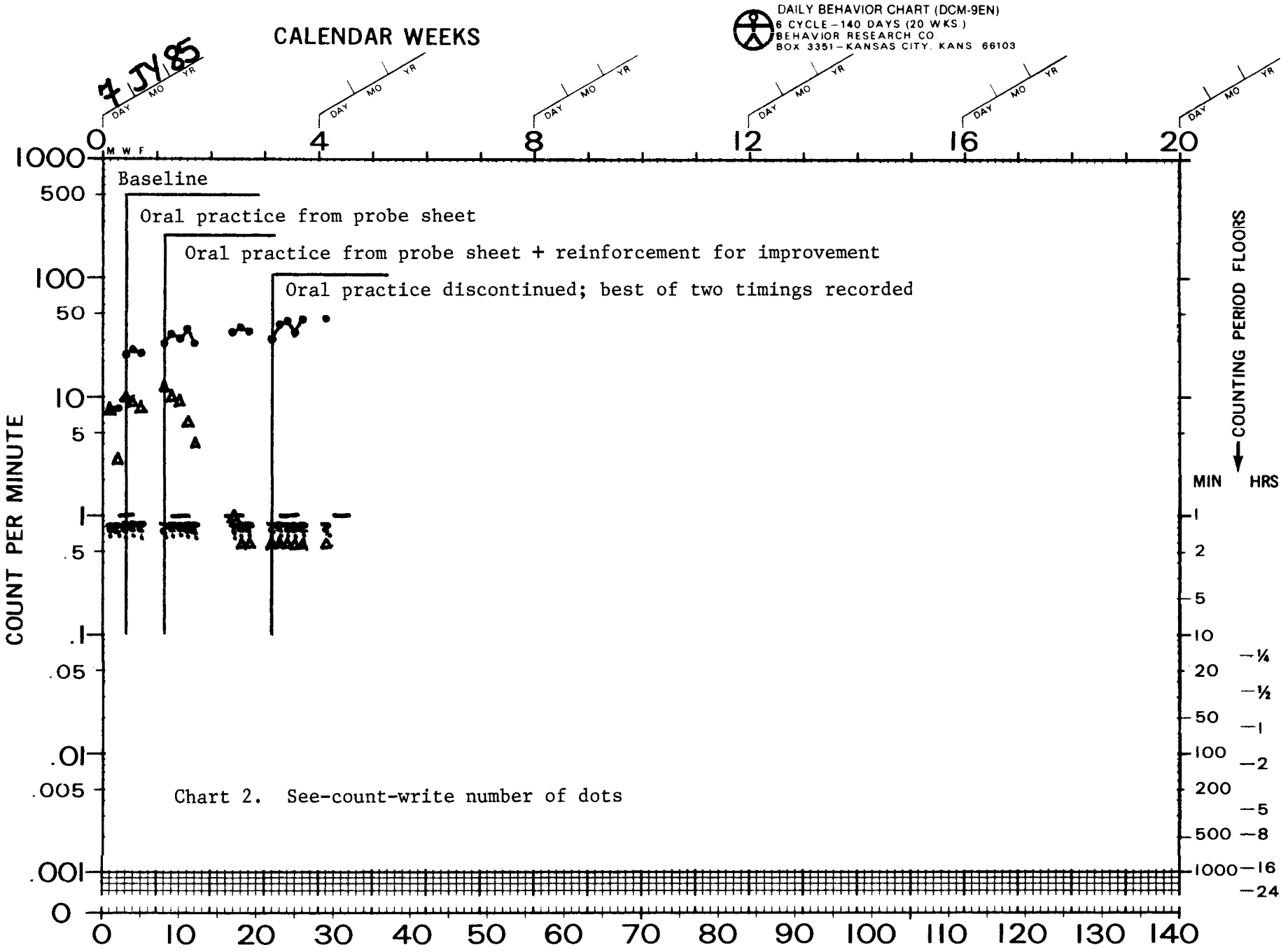


Chart 2. See-count-write number of dots

SUPERVISOR	ADVISER	MANAGER		BEHAVER	AGE	LABEL	COUNTED
		Peterson		S.	7		see-count-write number of dots

AGENCY	TIMER	COUNTER	CHARTER
University of Florida Gainesville, Florida			

used to eliminate written number reversals on a "think-write digits 0-9" probe. Moreover, a concurrently administered probe, "see-count-write number of dots", is shared with the reader.

Baseline data for "think-write digits 0-9" were taken on four days(see Chart 1). All recorded errors were number reversals. This student consistently reversed the numbers 2, 3, 5, 7, and 9.

During phase one an intervention for correcting reversals was introduced. The teacher placed a desk number line in front of the student to serve as a visual cue. Then the teacher randomly named the commonly reversed numbers. The student's task was to hear the number and write it. If correct, the teacher named another number. If incorrect, the teacher pointed to the number on the number line and the student self-corrected the error. This practice occurred for five minutes. Then the number line was removed and a one minute timing was administered. Reversal errors immediately disappeared. During phase two, the five minute practice was discontinued. The student was given the option of performing the timing twice with the highest score recorded. Correct number formation was maintained throughout this phase.

Counting was another skill targeted for the student in this investigation. Concurrent to the "think-write digits" probe, the teacher also administered daily timings on "see-count-write number of dots"(see Chart 2). The student's initial counting frequencies were very slow. During phase one, oral practice using the probe sheet was introduced. Phase two involved pairing a reinforcer with the oral practice. If the student beat her previous day's score she earned a sticker. During phase three the oral practice was withdrawn and the student was again given the option to perform the timing twice with the best score recorded.

Number reversals were not mentioned to the student during any phase of this counting probe. Reversals were recorded as correct responses provided the student had counted the dots accurately. The teacher, however, kept track of the reversals without the student knowing. The number of reversals are designated with triangles on Chart 2. It is interesting to note the reduction of reversals during week two even though reversals on this specific probe received no teacher attention and were counted correct. The intervention used for "think-write digits 0-9" seemed to have a carry-over effect with "see-count-write number of dots."

After five weeks of instruction in the MDTP classroom, these and other effective teaching interventions were shared with the home school personnel. They were pleased with the documented progress and began making plans to implement the same techniques in their setting.

Susan K. Peterson is a diagnostic teacher and assistant instructor at the University of Florida Multidisciplinary Diagnostic and Training Program, JHM Health Center, Gainesville, FL 32610.

About PT

NOTES FROM THE EDITOR

Patrick McGreevy

Welcome to Volume VI of **JPT.** I apologize for the long delay. Coordinating the review and revision of manuscripts often takes much longer than anticipated and I have been without secretarial help for some time.

If you know of people who have not renewed their subscription, please encourage them to do so. Also, please share the enclosed order form with potential new subscribers. If you have an idea for a chart-sharing article or manuscript, please get your pencil or micro-computer going and send it along. We are in need of good manuscripts and chart-shares.

If you could use back issues of **JPT** for yourself or your class, just use the enclosed order form. Volumes III(1982)- present are available. If you need reprints of articles from Volumes I or II, let me know and I will send them to you for a nominal charge(the cost of photo-copying).

Some time ago, I indicated that black copies of truncated charts for publication in other journals would soon be available. This project has been delayed, but should be finished within one month. Send along your requests. They will be filled as soon as possible.

I would like to encourage you to subscribe to **PT Times**, a newsletter edited by Gary Myerson. It's for teachers and it's disseminated free-of-charge by regional volunteers. Contact Gary for the name of your regional person: Gary Myerson, 13626 Twin Peaks Road, Poway, CA, 92064-3098.

A new feature of **PT Times** is "Uncle Frank's Common Sense Kwestion and Answer Column about Performance and Learning". If you have a question about PT, send it to: Uncle Frank, %Jim Pollard, Merrimack Education Center, Howe Bldg. Annex, 363 Boston Road, Billerica, MA 01821. Uncle Frank's current whereabouts is unknown. However, he checks in with Jim Pollard periodically to pick up his mail.

Uncle Frank, we know you're out there. The last we heard, you were hiding behind a coat rack in Filene's basement, refusing to let go of two cardigan sweaters. Frank, no one wears cardigan sweaters anymore. Besides, it's only a rumor that the Boston Celtics were traded to Orlando for 12 cases of oranges and a lifetime pass to Disney World. Please come out and write another column for **PT Times**. We have lots of questions.

Journal of Precision Teaching
Louisiana State University
201 Peabody Hall
Baton Rouge, LA 70803

Non-Profit
U.S. Postage
P A I D
Permit No. 733
Baton Rouge, LA