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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.

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IN MEMORY

On 11 July 1985, after a courageous battle with cancer, Eric Haughton passed away. As many of you know, Eric was one of the pioneers of Applied Behavior Analysis and Precision Teaching. He was "chart parent" and friend to many of you. He served as a contributing editor for this journal since its inception in 1980. Most recently, Eric served as a member of the Early Childhood Education faculty at Loyalist College in Belleville, Ontario, Canada.

Eric taught us that the little "guys and girls" really do know best. He also taught us the value of tool movements and fluency. Wherever Eric went, his enthusiasm for steep celerations and high-frequencies remained.

To this editor and to many of you, Eric was a valued friend and colleague. We will miss him.

Eric, this issue is dedicated to you. Thank you for sharing with us your friendship, your guidance, your enthusiasm, and your love for children and learning. Thank you for all that you taught us. As we work with children, we will try to remember.

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FREQUENCIES THAT ENSURE SKILL COMPETENCY

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Abstract: A review of the literature suggests that optimum proficiency criteria for specific academic skills have not been determined. Specifying relatively high frequency aims appears to be crucial to student competence and independence. To determine the optimum proficiency levels of particular skills, the effects of training to various standards on the subsequent acquisition of more complex skills has been examined. Single case designs were used in a series of investigations in which subjects were trained to either a high, medium, or low frequency of saying letter sounds or writing answers to math facts. Following this, each subject was evaluated in terms of growth on a subsequent skill. While some frequencies produced little growth in related skills, others were found to enhance skill acquisition. An analysis of these data suggest that optimum performance criteria may be established that will ensure an adequate rate of academic progress.

The issue of skill proficiency is one of the most important issues in education today. It involves the evaluation of all students, preschool through college. The issue is of such concern that laws have been enacted to ensure that students are proficient in certain skills. For example, minimum competency standards are required by various states for public school students and teacher education students.

Teachers make decisions daily concerning the advancement of a student from one skill to the next. Hopefully, the student will be "proficient" in the skill before he or she is advanced. Though there are many methods used to determine proficiency--norms, peer comparison, teacher judgment, etc.--a measurement system based on frequency yields more information than other units of measurement for most academic skills(White & Haring, 1980). Unlike percent, frequency correct and

incorrect measures both fluency and accuracy. Frequency is particularly crucial in that it can be used to discriminate between a child who has acquired a skill and one who is proficient. For example, one student may be able to recite the alphabet with 100% accuracy, but at a very slow frequency, such as 40 letters per minute. Another student may recite the alphabet with 100% accuracy, but a faster frequency of 175 letters per minute. Both students have acquired the skill of reciting the alphabet, but the second student is proficient.

Some disagreement exists concerning what constitutes the optimum proficiency in specific skills. However, enough data are now available to suggest tentative proficiency levels for many academic tasks. These data have resulted primarily from several Precision Teaching projects and are generally based on extensive samplings of student performance. Mercer, Mercer, and Evans(1982) compiled these data on suggested proficiency aims. Among many selected academic tasks reviewed are the following:

1. hear-write letters of the alphabet random-- 80-110 letters per minute
2. see-say isolated sounds-- 80-100 sounds per minute
3. see-say words in a list-- 80+ words per minute
4. see-write answers to math facts-- 55-75 digits per minute

Another way to establish proficiency criteria for a particular skill is to observe progress on the next related skill in a hierarchy of skills. Haughton(1972) found that the proficiency level a child attains on a particular skill makes a critical difference in the progress on the next related skill.

To determine the optimum proficiency levels of particular skills, the effects of training to various standards on the subsequent acquisition of more complex skills has been examined by Evans, Mercer, and Evans(1983). In this study, the effects of training three groups of learning disabled students to say consonant and short "a" sounds to frequencies of 40, 60, and 80 sounds per minute on the subsequent acquisition of saying CVC (consanent-vowel-consanent with "a" as the vowel) trigrams was investigated. Although the results seemed to favor the high frequency(80 sounds per minute) group, there was little difference between the groups. The authors concluded that the effects of higher frequencies should be investigated.

STUDY I

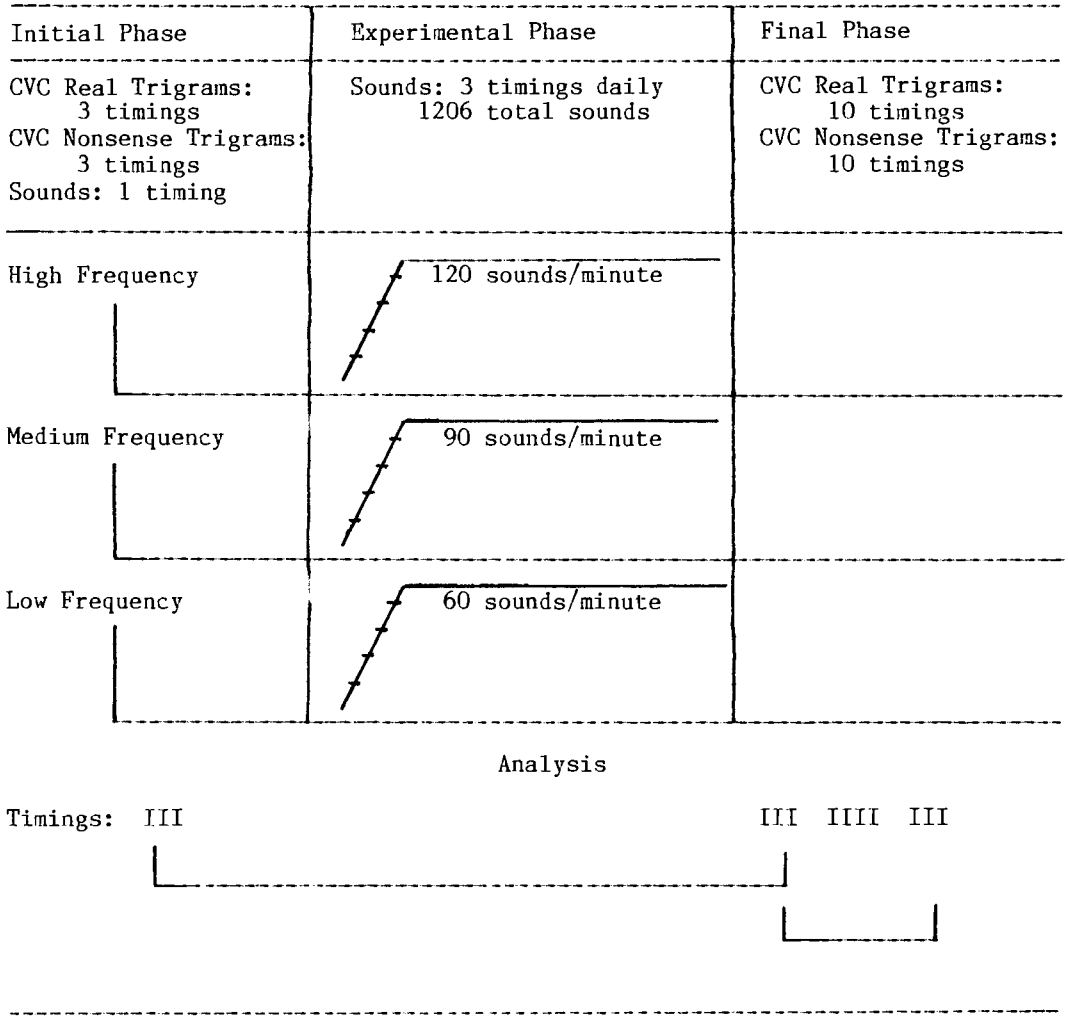
The first study was conducted to determine if there is a relationship between the frequency of saying letter sounds and performance on saying CVC real and nonsense trigrams when amount of practice is controlled. The procedure, similar that employed by Evans, Mercer, and Evans(1983), involved three phases(see Figure 1). During the initial phase, nine first graders were matched on saying CVC real and nonsense trigrams and randomly assigned to the high, medium, or low frequency experimental groups. During the experimental phase, each subject was trained to a different criterion: a low, medium, or high frequency of saying letter sounds, i.e. 60, 90, or 120 sounds per minute.

The subjects in the high frequency experimental group were presented three one-minute timings daily until the criterion of 120 correct sounds per minute with five or less errors was attained. Praise and informational feedback were given upon completion of each timing. Once the criterion frequency was attained, it was held constant by using a controlled reader. After the first subject reached the criterion of 120 sounds per minute correct, his frequency was maintained by using the controlled reader for additional timings until he said a total of 1206 consonant sounds. This total was then used as a criterion for all other subjects during this phase so that each subject had an identical amount of practice saying sounds.

During the final phase, each subject was administered 10 one-minute timings on each of the subsequent skills of saying CVC real and nonsense trigrams.

Frequency multipliers were used to measure the gain from the median timing of the initial phase to the median of the first three timings

Figure 1
Study I: Experimental Design



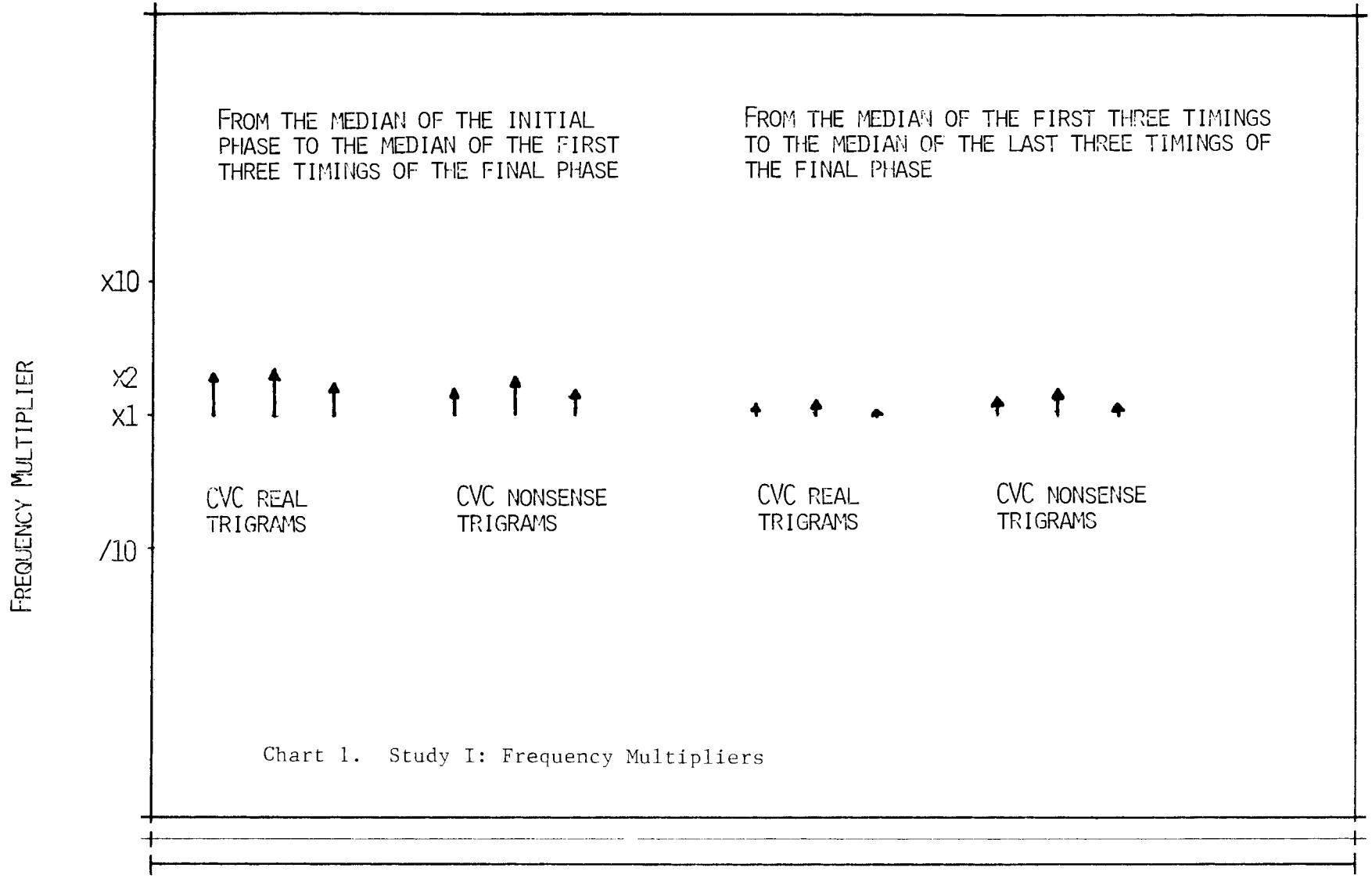


Chart 1. Study I: Frequency Multipliers

EVANS AND EVANS

NINE FIRST GRADERS SAY REAL AND NONSENSE CVC TRIGRAMS

Table 1
Study II: Data Summary

	"+1 facts"	"+2 facts"	Mean Number of Math Skills				
Timings:	III	IIIIIIIII	N.S.	Op.	P.S.	Mea.	S & G
Low Frequency Group(N=10)	Frequency Range- 11-30	Median Frequency: Initial- 8 Final- 9 Frequency Multiplier: x1.1	8	8	4	7	3
Medium Frequency Group(N=10)	Frequency Range- 31-48	Median Frequency: Initial- 19 Final- 30 Frequency Multiplier: x1.6	14	12	9	7	5
High Frequency Group(N=10)	Frequency Range- 52-82	Median Frequency: Initial- 28 Final- 50 Frequency Multiplier: x1.8	26	25	18	13	9

N.S.- Number Skills
Op.- Operations
P.S.- Problem Solving
Mea.- Measurement
S & G- Shapes & Graphs

during the final phase of CVC real and nonsense trigrams. Frequency multipliers were also used to measure the gain from the median of the first three timings to the median of the last three timings during the final phase of CVC real and nonsense words. In both measures, the most growth occurred in the medium frequency experimental group and the least amount of growth occurred in the high frequency experimental group(see Chart 1).

These data suggest a relationship between the frequency of saying letter sounds and progress on saying CVC real and nonsense trigrams. In this study, it appears that the optimum rate of saying letter sounds in relationship to subsequent progress in saying CVC trigrams is 90 sounds per minute.

STUDY II

A second study was completed with a class of first grade students. Each student was administered three one-minute timings on writing answers to addition facts (+1's with sums to 10). The students were assigned to a high, medium, or low group depending on the frequency of answering addition facts. Students were then administered nine one-minute timings on writing answers to addition facts (+2's with sums to 10). Frequency multipliers were determined based on the median of the first three timings and the median of the last three timings on +2 addition facts. Information was also summarized concerning the average number of math skills mastered by each group in the school math program(see Table 1).

Although optimum aims were not established in this second study, it was clearly demonstrated that the proficiency level a child attains on writing answers to addition facts makes a significant difference in progress on subsequent related math skills.

CONCLUSION

The proficiency levels that children attain on specific skills do make a critical difference in progress on related skills. A relationship between rate of saying letter sounds and progress on saying CVC real and nonsense trigrams was demonstrated in this research. A relationship between rate of writing answers to math facts and progress on related math skills was also demonstrated.

The conclusions from these studies suggest that there is a need for further investigation of the specific role that frequency plays in subsequent learning. A major focus of this research should concern the identification of proficiency frequencies in a variety of skills and subject areas. By empirically identifying these frequencies, instructional goals can be established that ensure competency and efficiency in education.

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AIM*STAR WARS

[Setting Aims that Compete]

Owen R. White
University of Washington

Episode V: Uneasy Truce

In previous episodes we met a host of Learner Rebels and Learner Knights as they struggled to overthrow the bonds of the Evil Normie Empire. Now we turn to the final

> pages of Uncle Owen's chronicle as he reviews what has been revealed to him of the mysterious Learner Force. It seems that our dreams of defeating forever the Evil Normie Empire must await another age. For the moment, it seems that we must content ourselves with certain gains and an uneasy truce...

Eventually, instruction in the formal sense must stop. Special, artificial support for the skill will no longer be available. That does not mean that **learning** must stop, but the learner must be able to function independently, or the skill will simply cease to exist in any meaningful sense of the word.

I have already explored the notion of using traditional peer standards as performance aims and found them wanting(see Episode I, "The Deathstar"). While it is true that achieving normal levels of performance may facilitate acceptance into peer groups and provide useful skills for at least some post-school environments, it seems more often the case that other forms of competition will determine the eventual usefulness of the skills we teach.

In some cases, the skills which we would have our Learner Rebels master are in direct competition with other skills already in the Learner's behavioral repertoire(see Episode II, "Return of the Learner"). If we are to prevent the Learner from slipping back into those old habits once instruction is terminated, we must make it much easier for the Learner to use the new skill than the old. That might best be accomplished by setting the fluency aims for the new skill x1.5 to x2.0 higher than the fluency with which the learner is able to use the old, less desirable skill.

"Managers" in the Learner's world might also represent a form of competition(see Episode III, "The Normie Empire Strikes Back"). If the learner lacks fluency, others may simply become impatient and complete the task themselves or otherwise prevent the Learner from attempting the skill. Generally, managers can only be expected to allow a learner to perform a skill if it is [A]ge appropriate or otherwise expected, takes [L]ittle of the manager's time, [L]essens the manager's workload, does not compete with [O]ther demands on the manager's time, or is for some reason of special [W]orth to the manager. If demonstration of the skill depends in some way on manager cooperation, then performance standards for the new skill must take managerial patience and demands into consideration.

If a skill has been brought to a level where it competes effectively with any necessary peer standards, other behaviors in the learner's repertoire, and managerial patience and demands, then one might reasonably expect the skill to be used if and when it is appropriate to do so. However, the anticipated frequency of use should also be considered when establishing fluency standards.

If the skill is not likely to be used often, high fluency aims should be established before formal instruction is terminated(see Episode I, "The Deathstar"). If the skill will be used often, then relatively low aims may suffice. Even if those aims represent a fluency lower than one would eventually like to achieve with the skill, frequent use is likely to provide the practice necessary to build that additional fluency.

Will the Learner really continue to develop fluency without our guidance? Given a chance and a reason, Christina did just that(see Chart 10).

Carolyn Kaiser wanted to practice her Precision Teaching and was offered the chance to work with Christina, a cute, cooperative four year old Down Syndrome Learner-Rebel. Now, Christina's teachers were already having good success with all of her IEP objectives and did not particularly want to take a risk that Carolyn might mess things up. On the other hand, they didn't want to take Christina's valuable time to work on some totally irrelevant skill, so they compromised by selecting a skill that should have been a good year in advance of Christina's "developmental age" -- naming three basic colors. If Christina made progress, fine. If not, well, that was to be expected.

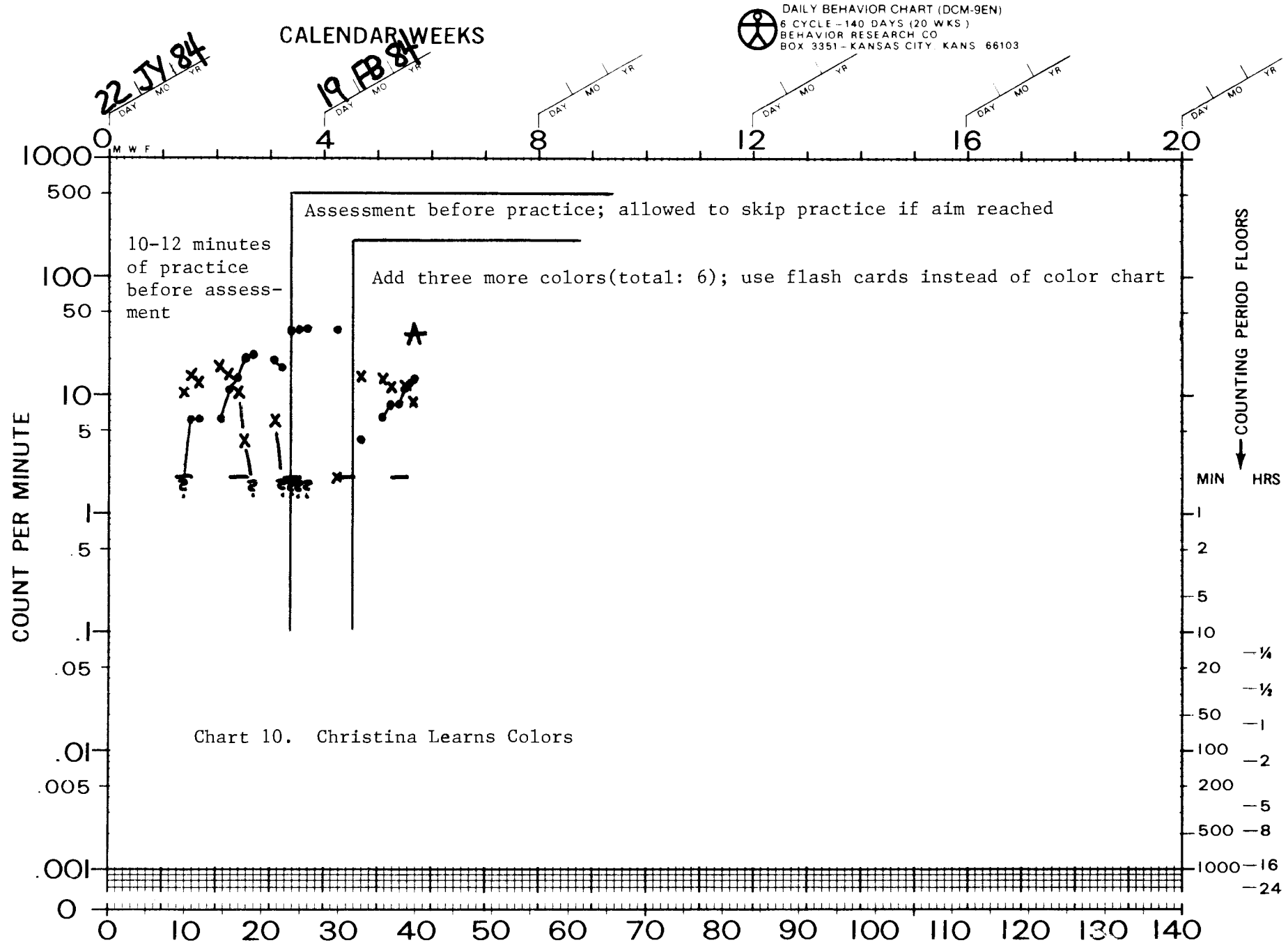

Chart 10. Christina Learns Colors

	White	Kaiser		Christina	4	points to colors named
SUPERVISOR	ADVISER	MANAGER		BEHAVER	AGE	COUNTED
University of Washington Seattle, Washington						
AGENCY			COUNTER	CHARTER		

Carolyn liked challenges, so everything was fine.

Following 10-12 minutes of instruction, Christina was assessed for 30 seconds and failed to name a single color-circle correctly. Oh well, it is a year early.

Carolyn still liked challenges. She hoped Christina felt the same way.

The next day, following 10-12 minutes of instruction, Christina achieved a correct frequency of 6 per minute over a 30 second timing, with a higher error frequency.

After seven days and a jaws-crossover, Christina seemed to peak out at 20 corrects per minute with 4 or 5 errors per minute, the edge of fluency-building, according to some rules (White and Haring, 1982). This is a good performance, but still too slow to be sure that Christina will remember the names very long, especially considering the anticipated frequency of skill use. This is too soon to let Christina go her own way. The "rules" would suggest a change in consequences to make continued practice worthwhile.

Learner-Rebels don't always read the professional literature. They might not know about the rules.

Carolyn decided to chance it. She would place faith in the Learner-Force and let Christina go. For a little insurance, however, she also arranged things to make continued(independent) practice worthwhile. She moved the assessment to the BEGINNING of the session(it used to be at the end, after 10-12 minutes of instruction) and told Christina that if she practiced on her own and met aim, there wouldn't be any instruction. "Aim" was 40 per minute-- x2 Christina's best performance to date. On the first day following the change in plan Christina reached 38 per minute with no errors. The same performance was recorded on the second day. On the third day she reached aim without "instruction." Carolyn responded appropriately by moving quickly on to the next level in the curriculum(more colors) -- a level supposedly a year and a half above Christina's "developmental age."

Can kids learn on their own?

They can, if they have a reason.

The best reasons are provided by working with a skill that will be immediately useful to the learner in daily life. Even if you find it necessary to work with somewhat more "abstract" skills, learners can still learn on their own if the consequences for doing so are meaningful. For Christina, those consequences were the repeated opportunities to buy her way out of 10-12 minutes of instruction.

One should never place blind faith in learner progress, however. Scouts should be employed to assess skill use outside instruction; Flankers should be deployed to assess the development of important related skills not being directly taught, and Rear Guard assessments should be conducted to make sure skills for which direct instruction has been terminated are being maintained and, if necessary, are continuing to develop in fluency (see Episode IV, "Scouts, Flankers and Rear Guard").

If you have reached your performance aim for CVC words in isolation, but climb the ALPs(Advanced-Learning-Probes) only to find the learner is still making mistakes with CVC words within the context of the grade-level reader, then the learner is still not using the skill you tried to teach. Raise your aims. Provide the learner with the fluency which will make the skill easier to use and more functional.

Don't just discontinue instruction in dressing skills when the learner meets the standards you agreed upon with the parents. Call the parents. Is the learner dressing himself in the home? If not, raise the standards to compete more effectively with whatever is holding the learner back.

If the skill is one which the pupil should use every day, find out if it IS being used when the learner is not specifically directed to do so. Does the reader CHOOSE to read? During freetime, how often does the learner read instead of playing pool? At home, does the learner ask what's on TV or simply read the TV guide? Does the learner buy or subscribe to any

magazine that isn't all pictures? Does the Learner READ? If not, it may simply be a matter of "taste"(playing pool can be nice too), but it may also be a matter of dysfluency. Try raising the aims.

Once a learner reaches aim in "takes bite with a spoon," what happens when you walk away? If fingers come into play with food more appropriately eaten with a spoon, then the aim for spoon-use was too low.

Take away the constraints. Don't tell the learner what to do. If the behavior you tried to teach is still used, then the performance aim was adequate to provide a service for the learner, at least for the time being. You will have at least reached that level of "independent practice" which Young Eric described(Haughton, 1980), and you might serve the learner's needs better by moving on to another skill.

Indeed, one might be well advised to conduct USE(Undirected Skill Employment) probes throughout a program. Set a few seconds aside each day to see whether the learner chooses to use a skill even when not specifically directed to do so. When unprompted use begins, perhaps it is time to move on. Success on USE probes becomes the aim. Of course, a few rear guard and flanker probes from time to time might also be wise...just to make sure.

So what's the bottom line?

Place faith in the Learner Force whenever possible.

However, don't abdicate all responsibility for setting at least minimal performance standards which will allow the learner to..

[A]advance rapidly to a level where the skill can be demonstrated
[I]independently,
[M]maintained over time, and provide a
[S]service of value to the learner.

Generally, for performance standards to become AIMS, they must provide..

[C]onfidence that the new skill will compete with
[O]ther skills in the learner's own behavioral repertoire,
[M]anager expectations and patience, and, when appropriate,
[P]eer performances. Generally, to enable the learner to be
[E]ffective in achieving those ends, we should
[T]arget the highest level of
[E]fficiency possible.

In other words, our AIMS must COMPETE.

Aim HIGH!

However, don't assume that you have to do all the work.

Whenever possible, allow the learner to provide for his or her own practice and to develop necessary additional fluency independently. Keep up the rear guard, flanking and USE probes, though, just to make sure it really happens.

Am I getting closer, Eric? Will I ever truly understand the mysteries of the Learner-Force?

Postscript

Through this tongue-in-cheek adventure I have attempted to share some of my own opinions concerning performance standards. I find that over the years my opinions are becoming increasingly similar to those who have preceded me in the quest for the ever elusive Learner-Force, including of course, Eric Haughton(Young Eric, Learner Knight, the man in search of the seventh cycle) and Ogden Lindsley (Ogi-Wan Sixcycle, the original Learner Knight). To them and so many others I owe a great debt. Perhaps someday I will finally catch up. Still, I might have misrepresented some of their opinions in this series, due in part to my own misunderstandings and the sad lack of "hard data" concerning the issue of performance aims.

I suppose, if I have an overriding opinion on the matter, it would be simply that there are no sure answers, no truly functional aims set in stone, unchanging for time immemorial. Rather, I believe that the frequencies which will make performance aims functional will rise and fall with the tide of curriculum development, the

changing demands of the world in which all Learner Rebels must live, and our own talents and priorities as teacher/managers. We must continue forever the evaluation and evolution of our standards.

Most importantly, though, I firmly believe that what will prove functional for one learner might prove dysfunctional for another. We could simply set aims so high that they would ensure functional fluency for virtually any learner, but that might prove counter-productive to rapid movement through curricula. I believe that we must look to the learner's own behavioral repertoire, the learner's own managers' patience and expectations, and at least occasionally, the learner's own peer group for guidance. We must document the functionality of an individual's aims by probing outside the instructional situation and after instruction has been terminated to determine if the skill we sought to develop is actually being used. That, unfortunately, is where our data fail us most.

Although I have tried to share interesting and suggestive charts throughout this series, the reader will note that most of the charts showed the performances of learners only within instructional situations. I have provided no data to verify that the frequencies of competing behaviors did indeed play a role in determining the functionality of new skills. The documentation that an assessment of managerial patience can lead to a functional performance aim is non-existent, at least within the confines of this series.

I, and Learner Knights Haring, Liberty and Billingsley, are currently conducting additional studies concerning those issues, and will share our charts as they take form. Meanwhile, if any reader has already collected information that bears on the notions presented in this series, or would like to communicate concerning possible future studies, we would be **very** interested in hearing from them.

May the Learner Force be with us all.

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Chart-sharing

PRECISION RUNNING: A REAL SHORTCUT!

Tom McCrudden
Omaha, Nebraska

A significant consequence of daily charting is discovery(Lindsley, 1970). The purpose of this article is to share how daily charting led to an important discovery for me in running.

When I began running on March 1, 1975, my daily schedule reflected the tempo of the time: Long Slow Distance-- LSD --(Henderson, 1984). Basically, this suggests running longer distances at a slower speed with regular doses of speedwork. LSD was contrary to track running in the U.S., which until 1969 was running shorter distances at race pace(that is, SFD).

I departed from the LSD practice in 1980 when I began running much longer distances at a much faster pace. I continued this schedule until September, 1982 when I began having soreness on the bottom of my right heel. I decreased my speed and mileage to relieve the soreness, but it persisted. In December, 1982, I consulted a

sports podiatrist who diagnosed my injury as plantar fascilitis(a common overuse injury) and he offered me four recommendations: consider purchasing foot supports(orthotics), do leg flexibility exercises, run fewer, and slower miles. I followed the recommendations and continued to chart daily, monthly, and yearly.

In Table 1 is listed my yearly mileage from the years 1975-1984 starting from September through August. In Table 2 is presented my best 10K race time on the same certified race course and my mileage per year for the last four years. Chart 1 displays these same data.

Table 1
Running Mileage per Year

Year(SP-AG)	Mileage
1975-76	2253.75
76-77	1971.25
77-78	2184.25
78-79	2080.00
79-80	2405.00
80-81	2588.00
81-82	2498.00
82-83	1807.25
83-84	1565.35

Table 2
Best 10-K Race Time
on the Same Certified Course
and Running Mileage Per Year

Date (D,M,Y)	Best 10K Time	Yearly Mileage
26/7/81	34:50	2588.00
19/9/82	35:22	2498.00
18/9/83	37:40	1807.25
16/9/84	36:15	1565.35

The Big Discovery: I was able to run 39% less mileage in 1984 than in 1981 and still do a 10K time which was only 4% slower than my best 10K time, which I ran in September, 1981!

Incidentally, notice how much more obvious this interpretation is as a consequence of a visual examination of data presented on Chart 1 as compared to the same data when presented in Table 2.

Some of the beneficial consequences of this discovery arrived at through P.T. measurement procedures are: less time and work result in almost the same pay-off, thereby, helping the charter "to work smarter not harder"; and the savings in time and energy can be used for other interests (e.g. family, writing, etc.). These are two reasons why I say, "Precision Running is a Real Shortcut!"

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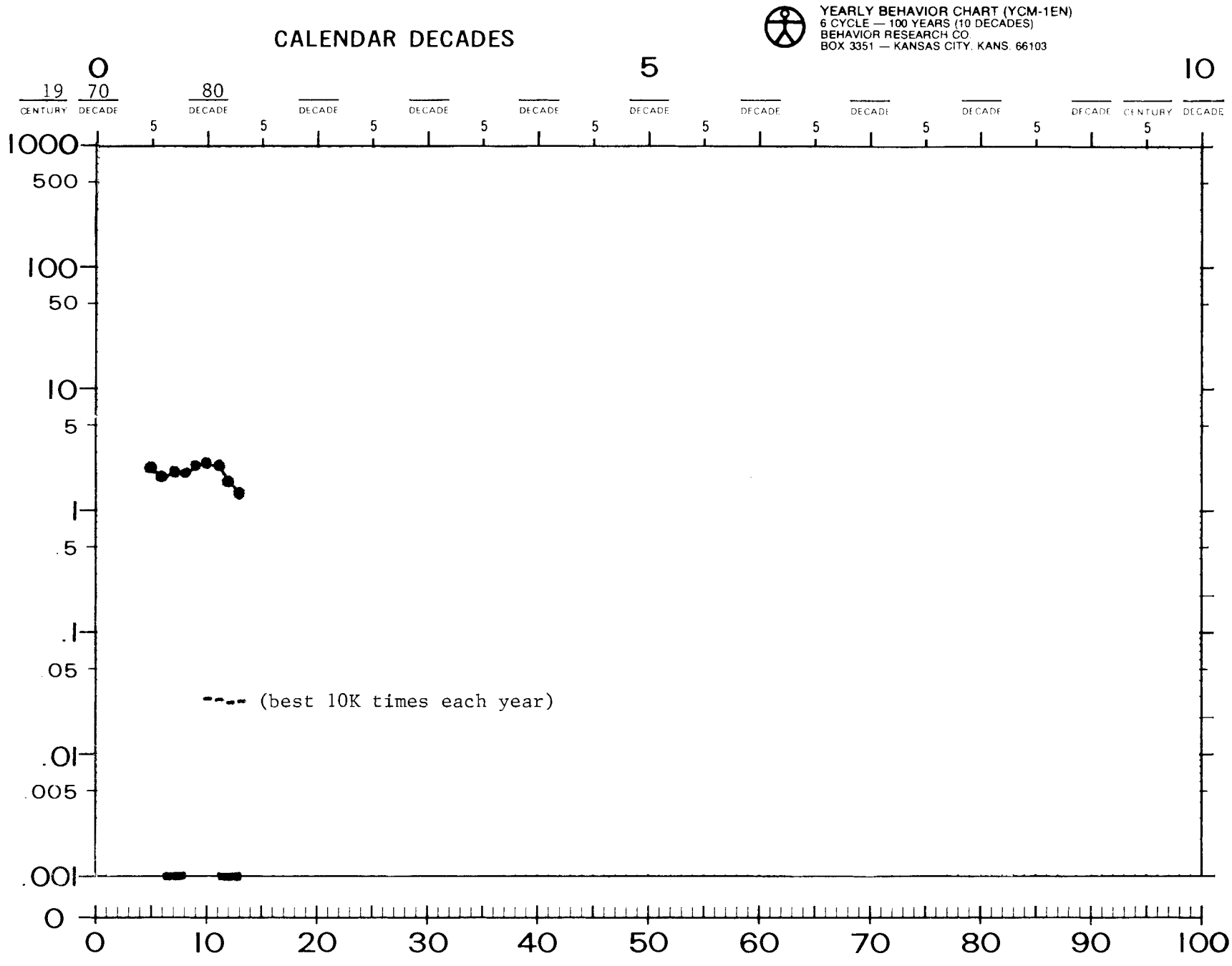
Tom McCrudden is a psychologist and enthusiastic precision runner, who resides at 12236 "P" Street, Omaha, NE 68137.

TWO-YEAR CHART

Karen Nelson and Carole Peterson
SIMS Secondary Center

Tom entered the SIMS Secondary Center, a program for severely learning and language disabled seventh and eighth graders, as a 13-year-old non-reader who still could not say letter sounds. He had a kindergarten reading level on standardized tests. The SIMS staff introduced him to the SIMS Reading Program, a phonetically-based reading curriculum which utilizes Precision Teaching techniques to monitor student progress. Simultaneously, he participated in an oral language class where part of the curriculum included reading and defining functional words. These functional words consisted of **School Words** such as Office and Principal, **Road Signs** such as Yield and No Turn on Red, Building Signs such as Closed and No Loitering, and **General Information Signs** such as Inflammable and No Lifeguard on Duty.

Daily and monthly probes were charted to monitor his progress in both of these curriculum areas. It is interesting to note that Tom refused to make errors, choosing instead to skip unknown words.



SUPERVISOR	ADVISER	MANAGER	Tom McCrudden	39	Runner	runs miles
			BEHAVER	AGE	LABEL	COUNTED
DEPOSITOR	AGENCY	Race Officials	Tom	Tom		
		TIMER	COUNTER	CHARTER		

Upon examining his monthly charts at the end of seventh grade, the staff noted that he made minimal progress on the phonetic curriculum while showing steady and significant gains in pace on the functional words curriculum. The latter is displayed in Chart 1. The staff felt that Tom's progress on these functional words was partly due to the teaching of the definitions of those words prior to his learning to read them. Consequently, these words were in his vocabulary and were relevant to his life as opposed to the phonetic curriculum which he referred to as "full of baby words."

The first monthly probe in eighth grade showed Tom maintaining his pace on the functional words, but not on the SIMS phonetic curriculum. Therefore, the SIMS staff decided to place more emphasis on these functional words by teaching and monitoring them in reading class as well as periodically in his written language class. Note the steady progress from October, 1984 - January, 1985. At that time, the staff decided that Tom should read only the functional words and do multiple practices in his reading class. Note the jump in pace in February, 1985. It is also interesting to note that the teacher who conducted the monthly probes was not the reading tutor who practiced with him.

In viewing Tom's two-year chart, three conclusions are evident:

1. Tom made gains in reading pace when the reading curriculum was relevant (functional) to his daily living environment.
2. Tom's learning picture shows a perfect "jaws", with corrects steadily increasing and skips steadily decreasing.
3. The staff decision to emphasize functional reading vocabulary was appropriate.

Karen Nelson is the Program Coordinator and Carole Peterson is a learning disabilities teacher at the SIMS Secondary Center, Minneapolis Public Schools, 256 Upton Ave. S., Minneapolis, MN 55405.

CELERATION AND RITALIN

Henry A. Tenenbaum
and
Susan K. Peterson
University of Florida

The use of Methylphenidate(Ritalin) has been a popular method for combating hyperactivity with elementary school children. Estimates have placed the incidence rate at 1.19 percent of the elementary school population(Lambert, Sandoval and Sassone, 1978). Because of this high incidence rate, there has been an increasing interest in alternative methods for controlling hyperactive children(O'Leary, 1980).

Recent research indicates that direct contingency management tactics have equalled or surpassed the effects of drug therapy(Rapport, Murphy and Bailey, 1982). Also, response cost systems along with psychostimulant medication have also been reported to be an effective intervention for increasing on task behavior and academic performance for hyperactive children(Rapport, et al, 1982).

Although, studies have reported increased academic performance and improved social behavior, no study has related the rate of learning when students are on or off Ritalin. The data presented here displays the celerations of two students who were on Ritalin and their subsequent celerations when Ritalin was no longer dispensed to them. The data were collected within a natural classroom setting. No attempt was made to isolate variables other than Ritalin and academic tasks, which were varied simultaneously. The constants were schedules of reinforcement, teachers, and time and place that timings were administered.

The two subjects were part of the University of Florida's Multidisciplinary Diagnostic and Training Program (MDTP). This program is a joint project between the Departments of Special Education and Pediatrics. One service that this project provides is a diagnostic classroom for children (K - 6) who are exhibiting some maladaptive behaviors within their classroom setting. Children who attend the Diagnostic Classroom,

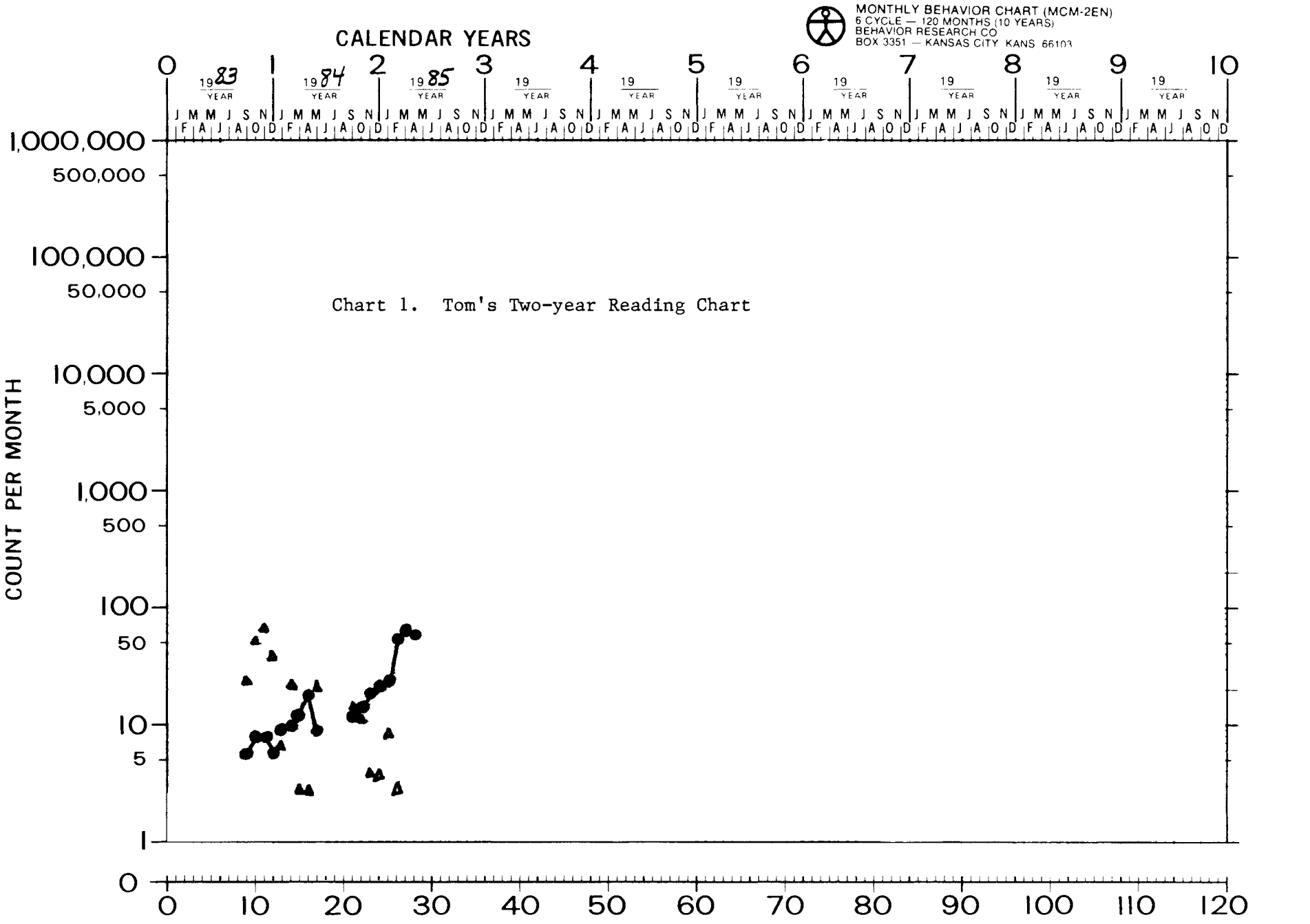


Chart 1. Tom's Two-year Reading Chart

K. Nelson — ADVISER
C. Peterson — MANAGER
Tom — BEHAVER
7-8 — AGE
reads functional words — COUNTED

SIMS Secondary Center Minneapolis, Minnesota — AGENCY
C. Peterson — TIMER
Tom — COUNTER
C. Peterson — CHARTER

located in the College of Education, are usually enrolled for six weeks. They attend Monday through Friday for their total school day. During this time special educators, a language clinician, and a school psychologist perform academic assessments, implement various interventions, and provide educational alternatives to the students' home schools.

Behavioral and academic growth is carefully monitored in the MDTP classroom. Direct Instruction and Precision Teaching are used daily. The two students whose data are displayed are R.G. and K.A. Both were referred to the MDTP classroom, because they experienced behavioral and academic difficulties. Student R.G. was in fifth grade; while student K.A. was in kindergarten. Prior to attending the Diagnostic Classroom both students were medically diagnosed as hyperactive and they were treated with Ritalin.

While attending the MDTP classroom R.G. and K.A. earned points on a point card. These were given to student R.G. intermittently for appropriate behaviors(e.g., hand raising, staying on work, working quietly). Student K.A. earned a smiley face every 10 minutes for working quietly in his seat. Additionally, he earned points intermittently for raising his hand, and staying on his job. The points earned by both students were traded for small prizes, activities or computer time.

The student's celerations on targeted academic tasks were determined while they were taking Ritalin. After three weeks in attendance at the Diagnostic Classroom, the project's neurologist discontinued the Ritalin for both students. Celerations were continually monitored each week.

RESULTS

The data presented in Charts 1 through 4 depict two week celerations for corrects and errors on several skills. The initial data on Charts 1 and 2 indicate student celerations on a series of tasks for two weeks while taking Ritalin. Charts 3 and 4 indicate student celerations on a new series of tasks during a subsequent two week period while no Ritalin was taken by either student.

Chart 1 displays student K.A.'s celerations for corrects and errors for several academic tasks while taking Ritalin. Student K.A. received daily practice for two weeks on think/write vertical lines, see vowels/circle "a", and see numbers/ circle ones. Student K.A.'s median celeration for correct responses was /1.2. Her median celeration for error responses was x1. When Ritalin was discontinued (see Chart 3), K.A. received daily practice on think/say letters A - D, see random numbers 1-3/say number, and see dot/make circle around dot. Student K.A.'s median celeration for correct responses on these skills was x1.4. Her median celeration for errors was /6.

Student R.G. received daily practice for two weeks on see/say words in text, see/say meaning of contractions, see/write plurals, and see/say meaning of abbreviations, while taking Ritalin. Student R.G.'s median celeration for corrects was x1.4, while her median celeration for errors was /1.1(see Chart 2). When Ritalin was discontinued, student R.G. practiced daily for two weeks on see/say isolated blends, see/say words, hear/write spelling words, and see/say digraphs. The median celeration for corrects was x1.6, while the median celeration for errors was /1.8(see Chart 4).

DISCUSSION

The data described here begin to suggest that Ritalin may have its most pronounced effect on inhibiting deceleration of errors. The data also suggest that a controlled research study be undertaken to isolate the effect of Ritalin on student academic performance.

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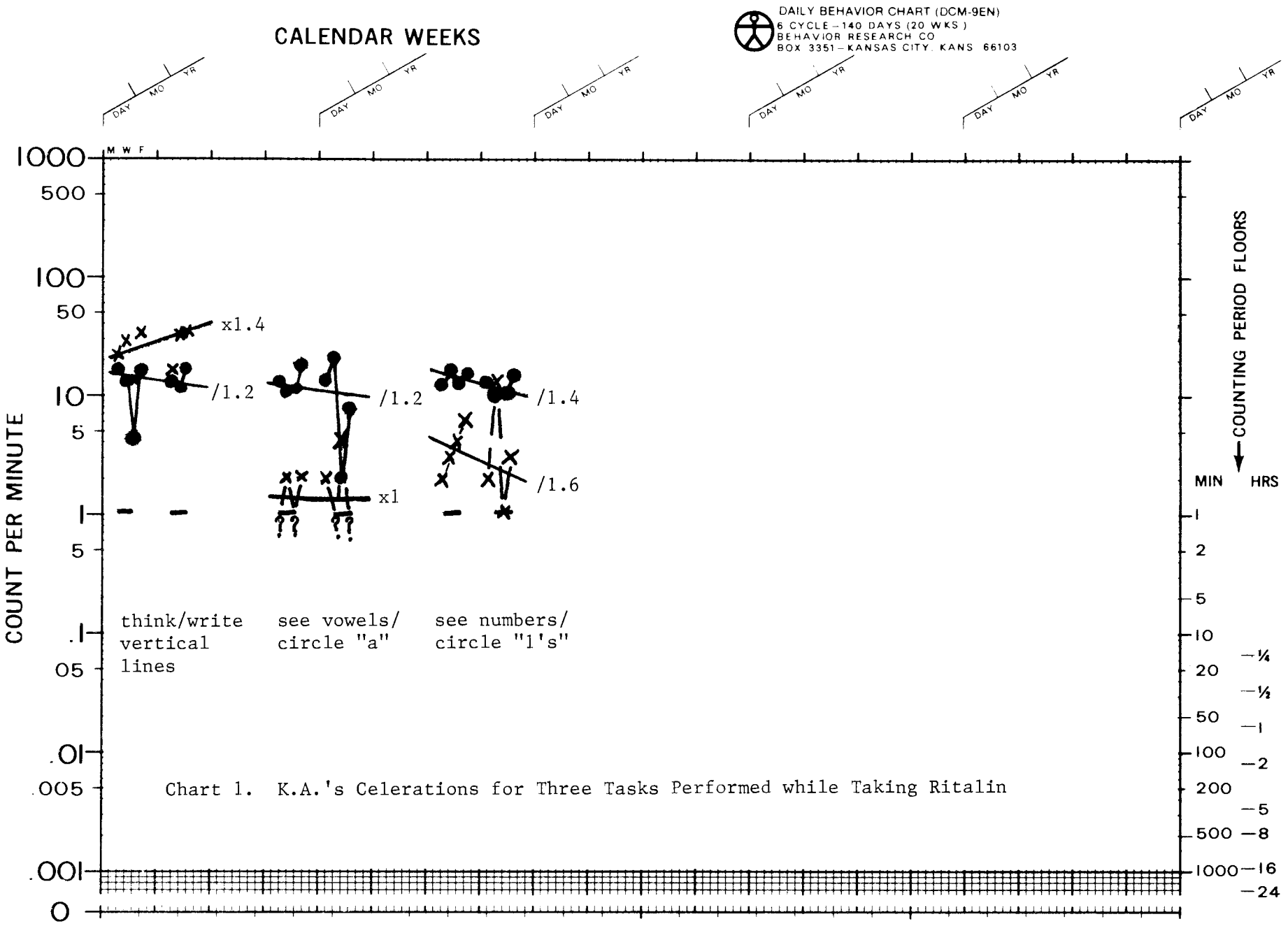

Chart 1. K.A.'s Celerations for Three Tasks Performed while Taking Ritalin

CALENDAR DAYS

Tenenbaum	Peterson		K.A.		performs three tasks described on the chart
SUPERVISOR	ADVISER	MANAGER	BEHAVER	AGE	COUNTED

University of Florida Gainesville, Florida

AGENCY TIMER COUNTER CHARTER

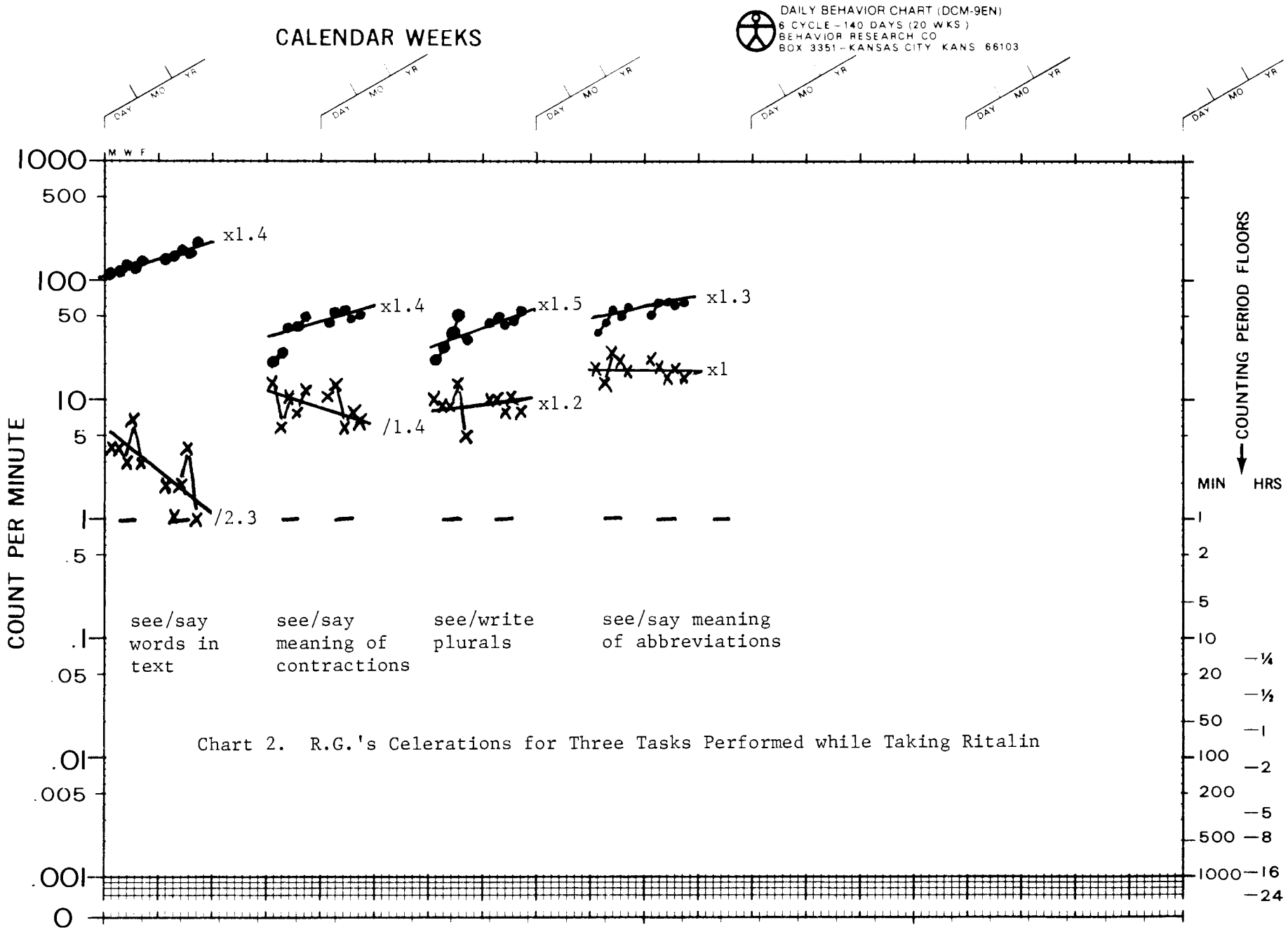

Chart 2. R.G.'s Celerations for Three Tasks Performed while Taking Ritalin

Tenenbaum	Peterson		R.G.		performs four tasks described on the chart
SUPERVISOR	ADVISER	MANAGER	BEHAVER	AGE	COUNTED
University of Florida Gainesville, Florida					
AGENCY	TIMER	COUNTER	CHARTER		

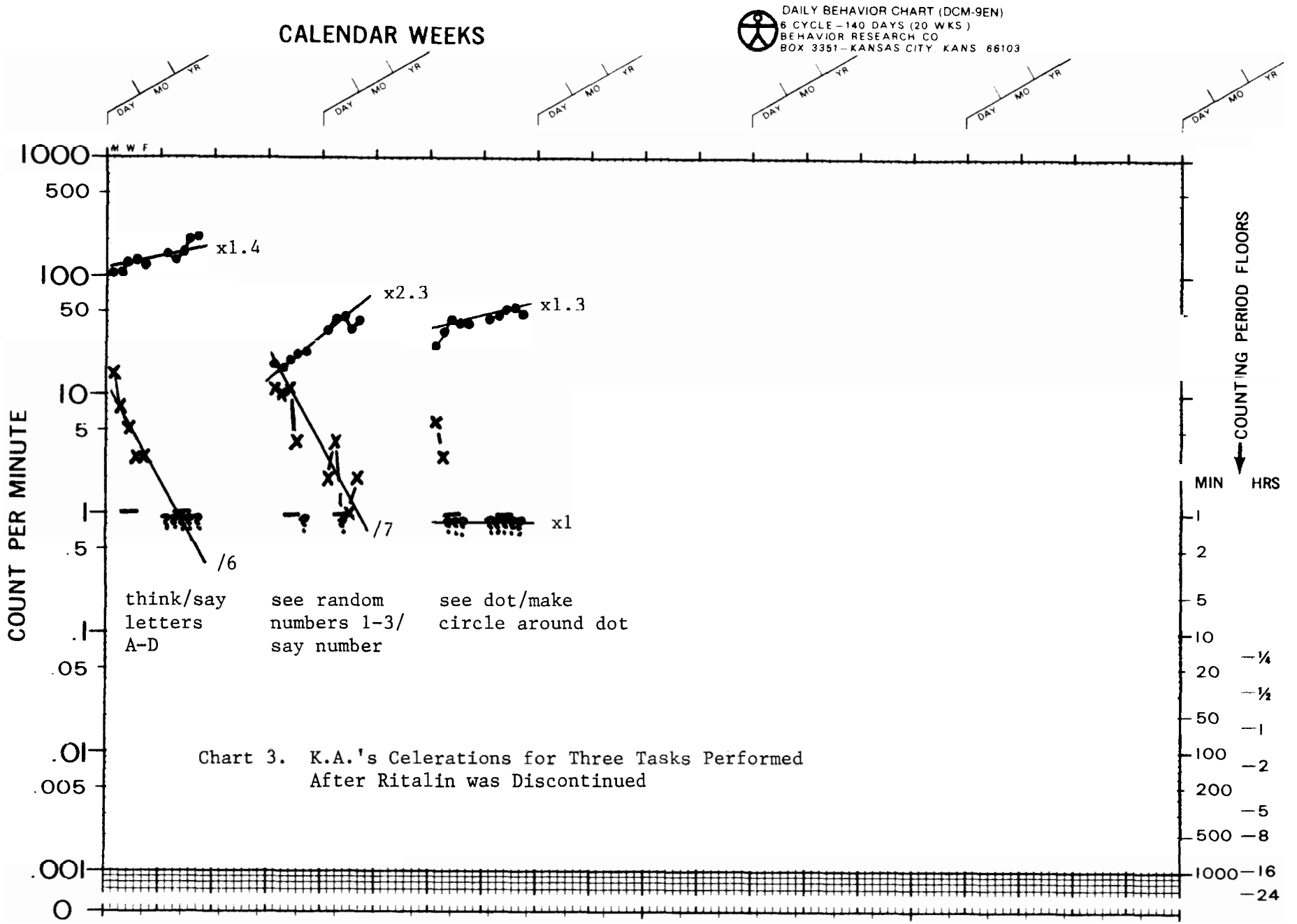

Chart 3. K.A.'s Celerations for Three Tasks Performed After Ritalin was Discontinued

CALENDAR DAYS

SUPERVISOR	ADVISER	MANAGER	BEHAVER	AGE	LABEL	COUNTED
	Tenenbaum	Peterson	K.A.		performs three tasks described on the chart	

DEPOSITOR	AGENCY	TIMER	COUNTER	CHARTER
	University of Florida Gainesville, Florida			

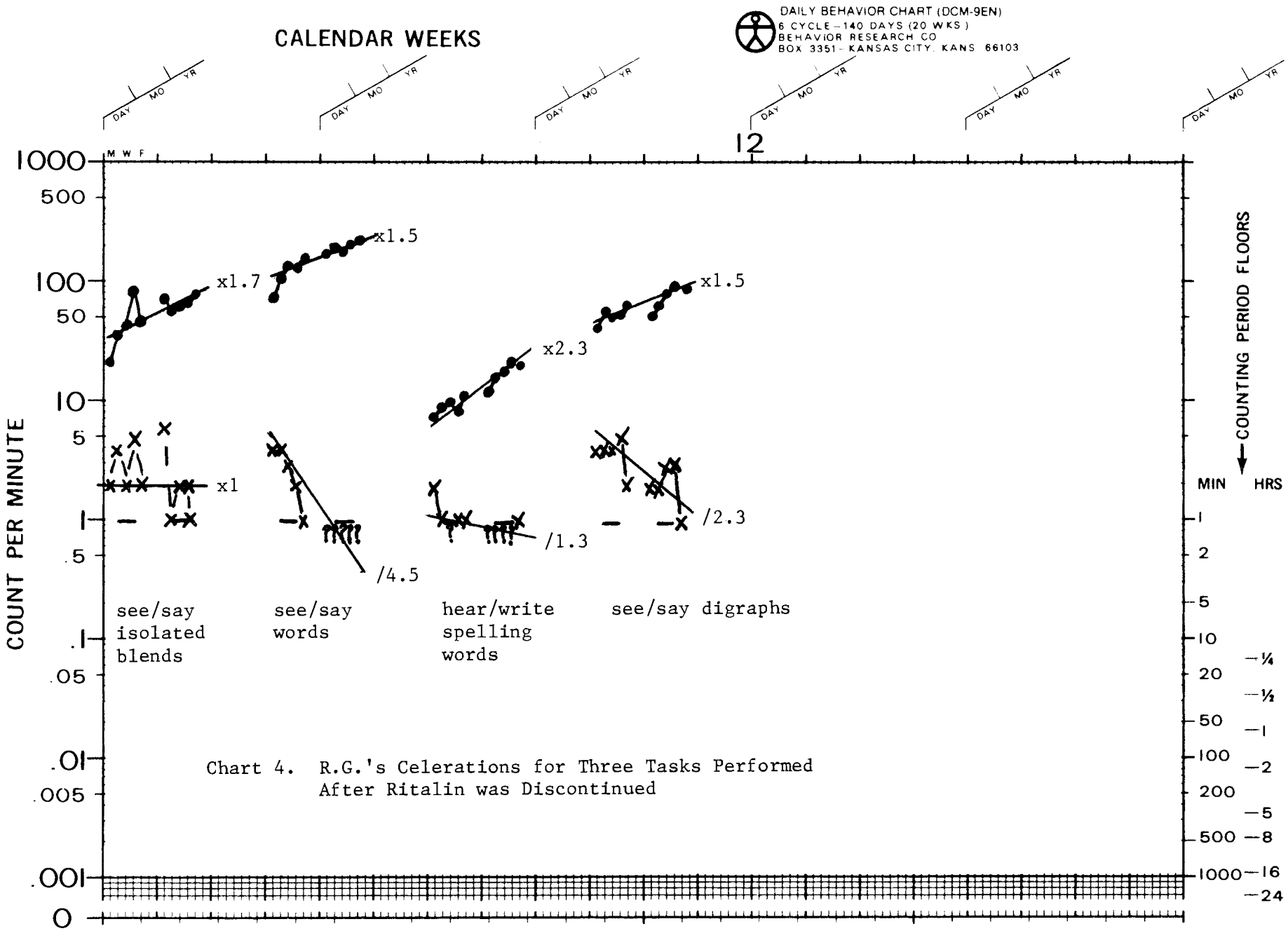

Chart 4. R.G.'s Celerations for Three Tasks Performed After Ritalin was Discontinued

performs four tasks described on the chart

Tenenbaum	Peterson		R.G.		
SUPERVISOR	ADVISER	MANAGER	BEHAVER	AGE	COUNTED
University of Florida Gainesville, Florida					
AGENCY		TIMER	COUNTER	CHARTER	

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Henry Tenenbaum is a school psychologist and Susan Peterson is a diagnostic teacher at the University of Florida Multidisciplinary Diagnostic and Training Program, Norman Hall, Room 1341, Gainesville, FL 32611.

HIGH SEE-SAY FREQUENCIES IN A SPECIAL EDUCATION CLASSROOM

Linda Diviaio and Alan Ellis
Orange County Public Schools

This article briefly describes a precision reading program in Alan Ellis' classroom for trainable mentally handicapped (TMH) students in Orlando, Florida. One hundred-word passages are designated in individual stories in a remedial reading series as content for a one-minute timing. Within this passage ten high-frequency vocabulary words are repeated throughout. Prior to the timings, students are given opportunities for drill and practice on the high frequency words. The students are timed for one minute daily. When students reach their aim for two consecutive days they move ahead to the next story where ten new vocabulary words are introduced. Chart 1 shows the progress of James -- a 15 year old TMH student. The teacher has found that Precision Teaching has not only increased fluency in reading, but has proven that TMH students can achieve high see-say frequencies.

We can and need to expect the best from our mentally handicapped students. If teachers have pinpointed appropriately, in most cases, these students can reach frequencies close to those of "regular" students.

Linda Divaio conducts training and follow-up activities with the Orange County Public Schools Precision Teaching Project, 800 South Delaney Ave., Orlando, FL 32801. Alan Ellis is a special education teacher.

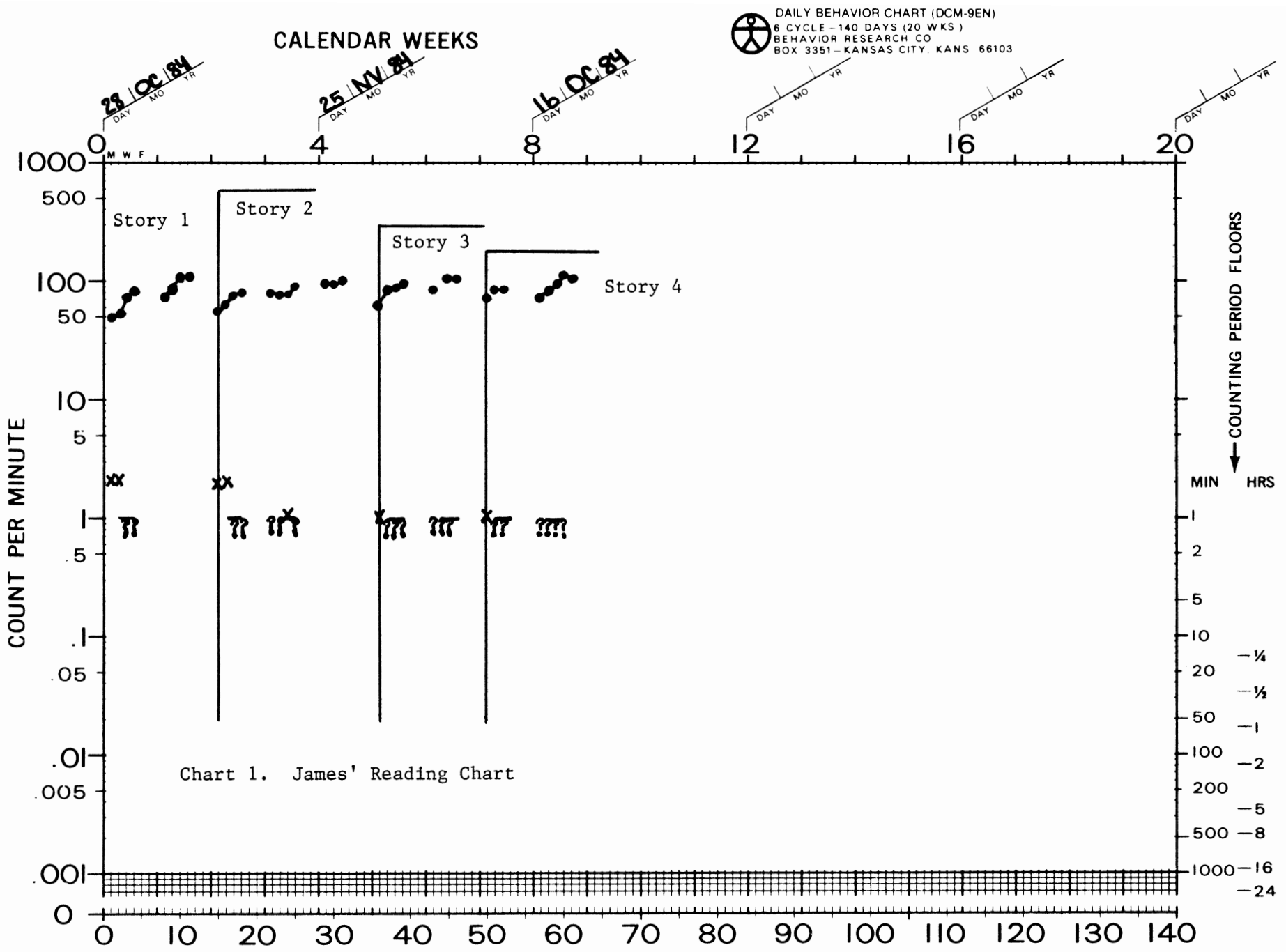

Chart 1. James' Reading Chart

SUPERVISOR	ADVISER	MANAGER	BEHAVER	AGE	LABEL	COUNTED
	Diviaio	Ellis	James			reads words

AGENCY	TIMER	COUNTER	CHARTER
Orange County Schools Orlando, Florida			

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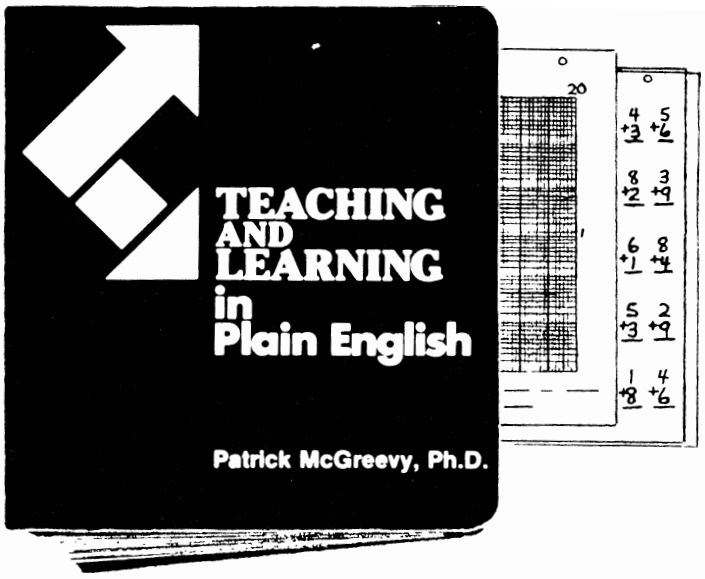

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