(1966), in his study of integration, found that black students were more successful educationally when they felt control over their own destinies.

Following the completion of the study, Precision Teaching techniques were used with all the students in the math class.

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A COMPARISON OF THIRTY-SECOND AND SIXTY-SECOND FREQUENCIES

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The Multidisciplinary Diagnostic and Training Program (MDPT) at the University of Florida (Tesch & Fox, 1984) serves children in kindergarten through sixth grade from fourteen counties in north central Florida. Typically these children are referred because they have exhibited complex medical, learning or behavior problems, or combinations of these, and the referring agent is seeking assistance with determining effective interventions. To address the question of appropriate academic methods or materials, some MDTP children are placed in a specialized diagnostic classroom for a period of six weeks. While there, these students are exposed to a variety of techniques and materials in the areas of math, reading, language arts, and behavior management. The efficacy of many of the interventions is monitored using Precision Teaching. Because these students are limited to a six week, diagnostic placement and growth in so many areas must be assessed, time for interventions is at a premium.

The procedure of doubling the number correct obtained on a student's thirty-second timing and recording this figure as a one-minute frequency has been used in the diagnostic classroom. This strategy has been suggested by Wolking (1984) when frequency-building is the main objective. The frequency resulting from the doubled count becomes a short term goal for the one-minute performance.

Casual observation of student performance by the MDTP teachers, however, seemed to indicate that the frequency during a one-minute timing usually tapered off near the end of the timing. Student performance during the last half of the minute appeared lower than performance during the initial half. If this is true, the practice of doubling the number correct during a thirty-second timing may actually result in inflated one-minute frequencies. Furthermore, if this practice is used intermittently in combination with recording performance on one-minute timings, an inaccurate picture of student growth may occur and inappropriate decisions may result. The purpose of this study was to examine student performance on thirty-second and one-minute timings and determine if there is a discrepancy between the recorded frequency on a one-minute timing and the recorded frequency obtained by doubling performance on a thirty-second timing.

Method

Participants

Six students beginning the MDTP at various times during the Fall of 1984 were involved in this study. The six students, five males and one female, ranged in age from 8-13 and grade level from 2-6. Prior to beginning at MDTP, two of the students were enrolled in regular education, two in classrooms for the emotionally handicapped, one in a program for the learning disabled, and one in a Chapter I program.

Procedure

After an initial diagnostic assessment of reading skills of each of the six students, probes were selected for those skills which had been found deficient. For purposes of this study, one acquisition level skill was chosen for five of the students. Two skills were chosen for the sixth student. These acquisition probes were then administered for thirty seconds and for one minute each day, utilizing the same probe sheet. The child was instructed to begin at the same point on the probe sheet for each administration. The sequence of administration of the thirty-second and one-minute timings was alternated randomly. This procedure was implemented for four to five weeks for each student. No interventions were implemented for the targeted skill during this time. Students were told only that they were part of a special project.

Frequencies for correct responses derived from the thirty-second timings were recorded and charted. The number of correct responses on these timings were then doubled and charted as one-minute frequencies. During the one minute timings, notation was made when the first thirty seconds had elapsed. Frequencies for correct responses were recorded and charted for the first half-minute, second half-minute, and the total minute. Frequency multipliers were calculated and used to compare the thirty-second and the first half-minute frequencies, the first half-minute and the second half-minute frequencies, and the one-minute frequencies and the frequencies obtained by doubling the performance scores of thirty-second timings. After frequency multipliers were calculated for each pair of frequencies for each student, the median frequency multiplier was found for each of the three comparisons within and across students.

Results

The charted data for student 3a are displayed in Chart 1 and the median frequency multipliers for each student in each comparison are displayed in Table 1. In comparing thirty-second and first half-minute frequencies across students, the median frequency multiplier was x1.1, with four of the students recording higher median frequency multipliers for thirty-second frequencies.

Table 1

Median Frequency Multipliers Used to Compare Frequencies Across Timings, Partial Timings, and Extrapolated Timings

Students	30 Seconds-- First Half-min.	First Half-min.-- Second Half-min.	One-minute-- 30 Seconds x2*
1	x1.0	x1.4	/1.2
2	x1.1	x1.5	/1.3
3a	x1.1	x1.4	/1.2
3b	/1.1	x1.7	/1.3
4	x1.1	x1.8	/1.3
5	x1.0	x1.2	/1.1
6	x1.1	x1.4	/1.2

* Frequencies obtained by doubling performance scores for 30-second timings

In comparing first half-minute and second half-minute frequencies, the median frequency multiplier of x1.4 indicated that the first half-minute frequencies were, on the average, 40% higher than the second half-minute frequencies. The median frequency multiplier range was x1.2-x1.8, indicating that the median first half-minute frequencies were higher than the second half-minute counterparts for all students in the study.

In comparing the one-minute frequencies and the third-second timings with doubled performance scores charted as one-minute frequencies, the median frequency multiplier was /1.2, with a range of /1.1-/1.3. One-minute frequencies were, on the average, less, for all students, than frequencies obtained by doubling performance scores for thirty-second timings.

Discussion

It has been shown in this study that there is a close association between thirty-second frequencies and frequencies obtained from the first thirty seconds of a one-minute timing. There is a distinct difference in student performance, however, between the first and second halves of a one-minute timing. To double the performance score on a thirty-second timing and report this data as a one-minute frequency is to inflate the frequency substantially.

An important limitation of the study involved the manner in which the probes were administered. Students may have exhibited higher thirty-second

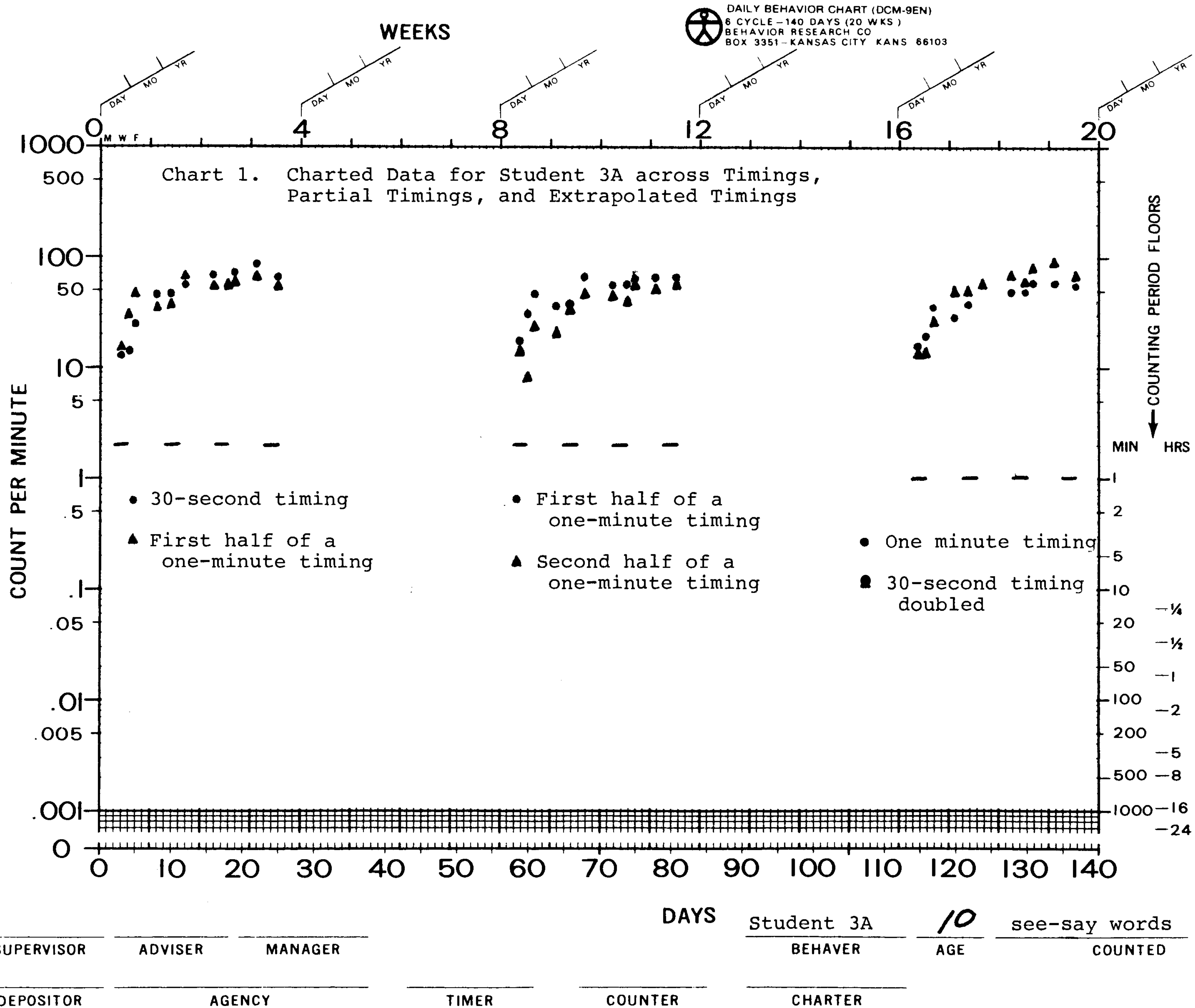

Chart 1. Charted Data for Student 3A across Timings, Partial Timings, and Extrapolated Timings

and first half-minute frequencies because they always began the timings by responding to the same sequence of items.

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Editor's note: When a precision teacher charts a 30-second frequency on the Standard Celeration Chart (SCC), using a 30-second counting period floor and a frequency finder, the count is automatically doubled. For example, a count of 10 correct responses in 30 seconds becomes 20 per minute on the SCC. If the charter remembers to mark the counting period floor, there need be no confusion between an actual frequency and a doubled count with an erroneous counting period.

A MOLAR AND MOLECULAR ANALYSIS OF LOGARITHMICALLY CHARTED RUNNING DATA

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Conservative estimates now indicate that there are 30 million Americans who regularly run for the purpose of recreation and aerobic fitness. Most of these people begin with the simple goal of weight loss or to make the stairs at work less problematic. However simple their beginnings, many runners soon begin thinking of their first race. Next come attempts at racing longer distances, with quicker times. Later, a day or two per week of "speed work" is added to the weekly training regimen to increase the "quality" of workouts. This progress-orientation that seems a natural part of running is also evident in the practice of most runners in logging data regarding their runs.

Another sector in America's running community is made up of elite runners, the members of university track teams, or the "professional" runner who performs at the upper end of the running continuum. Like the serious fun runner, the elite athlete is always looking for a way to improve his or her training and racing performance, and is involved in logging of pertinent data.

Logarithmic charting of running data has been shown to be useful in determining the overall mileage base required for optimum performance at a specific distance (McCrudden, 1985). This article will show how Standard Celeration Charting techniques can be used to provide molar and molecular analyses of a running program, and thereby improve the runner's performance.

One of the early philosophies of the running boom was the L.S.D. (long slow distance) approach to both running and racing (Henderson, 1969, 1977). However, it has now been accepted that running faster in races is enhanced by variety in training, which includes some faster mileage. Even Henderson (1977) now recommends adding this higher quality mileage to the training regimen. Another vital factor in improved running, often neglected by both